European Commission

bridge

2024 Brochure

The BRIDGE initiative and project factsheets

July 2024

AUTHORS

RINA Consulting S.p.A.: Fabiola Roccatagliata, Francesca Api, Eleonora Rebora

PwC Business Services Srl: Beatrice Profeta, Mirella Levato

ICONS: Sara Lazzarin, Chiara Serio

Contact: BRIDGE Secretariat
E-mails: **secretariat@horizon-bridge.eu**; **communication@horizon-bridge.eu**

EUROPEAN COMMISSION

Directorate-General for Energy Unit: B5 – Innovation, Research, Digitalisation, Competitiveness

Contact: George Paunescu
E-mail: **Mugurel-George.PAUNESCU@ec.europa.eu**

European Commission

B-1049 Brussels

CINEA

European Climate, Infrastructure and Environment Executive Agency, Unit C2 – Horizon Europe Energy

Contact: Manuela Conconi
E-mail: **Manuela.CONCONI@ec.europa.eu**

Contact: Mariana Stantcheva
E-mail: **Mariana.STANTCHEVA@ec.europa.eu**

European Commission

B-1049 Brussels

ACKNOWLEDGEMENTS

Graphic design and layout by Orazio Di Maria and Rossella Fiori (ICONS).
Proofreading by Mark Thompson (ICONS).

bridge

Cooperation between Horizon 2020 and Horizon Europe Projects in the fields of Smart Grid, Energy Storage, Islands, and Digitalisation

2024 Brochure

July 2024

LEGAL NOTICE

PDF	ISBN 978-92-9405-119-6	doi: 10.2926/505056	HZ-05-24-598-EN-N
BOOK	ISBN 978-92-9405-118-9	doi: 10.2926/641472	HZ-05-24-598-EN-C

Luxembourg: Publications Office of the European Union, 2024

TABLE OF CONTENTS

1. FOREWORD

A successful green and digital transition involves overhauling the energy system. It means speeding up the energy-use electrification and integrating the system across different energy carriers. It's all about decarbonising energy generation, decentralising resources, improving energy efficiency and going digital. In this context, the development of smart energy systems is essential to meet the energy demand of tomorrow while tackling climate change. Smart grids are instrumental in achieving the EU's energy and climate goals.

Research and innovation play a crucial role in the advancement of smart grids and smart energy systems. By investing in cutting-edge technologies, new solutions, and novel approaches, we can unlock the full potential of these systems and pave the way for a more sustainable and resilient energy future.

Strong research and innovation are needed to support the EU's comprehensive policy framework for energy.

Important drivers are mentioned below.

The European Green Deal, a flagship initiative of the EU, aims to make Europe the world's first climate-neutral continent by 2050. It sets out the vision and a comprehensive roadmap for transforming the EU's economy and energy systems to achieve this goal. It includes measures for decarbonising the energy sector.

The REPowerEU initiative reinforces the Green Deal and aims to further accelerate the deployment of renewable energy and energy efficiency solutions across the EU and to diversify our energy supply. The initiative sets even more ambitious targets for the energy transition.

The 'Fit for 55' package provides the legal means for accelerating our energy transition. It aims to make the EU's climate, energy, land use, transport and taxation policies fit for reducing the net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels.

Additionally, the Green Deal Industrial Plan aims to strengthen the EU's industrial base for clean technologies. The manufacturing industries that are needed for the continuous development of smart energy systems will be strongly supported, notably through the provisions of the Net-Zero Industry Act.

The AI Innovation package and its GenAI4EU initiative aim to boost the uptake of generative AI in all strategic European industries, including energy. This will help put Europe on the map of this transformative technology, which is expected to play a key role for the European competitiveness.

Finally, the European Commission has put forward targeted strategies addressing the needs of smart and integrated energy systems. Both the EU Plan on Digitalising the Energy System and the EU Action Plan on Grids aim to scale up investments in smart grids and to promote the use of innovative technologies and solutions. They will help to further modernise and expand the EU's electricity grid, enabling better resilience, flexibility and rapid integration of renewable energy sources.

The European Commission's BRIDGE initiative brings together a vibrant community of smart grids, energy storage, islands, and digitalisation projects funded by Horizon 2020 and Horizon Europe programmes. Established in 2016, BRIDGE fosters continuous knowledge sharing amongst projects and baselining of their activities and results, as well as facilitating the uptake of innovative technologies in the energy sector. It also encourages the projects to synthesise and deliver joint conclusions and recommendations on exploiting the key project results and experiences for advancing the delivery of the Green Deal and REPowerEU objectives.

The community has now reached 183 projects, out of which 105 are ongoing. It brings together more than 2,237 partners from 38 countries. The total EU funding amounts to €1.6 billion.

We welcome this new brochure of BRIDGE projects, which provides an excellent overview of them, their implementing partners, demonstrators, innovative technologies and key exploitable results, as well as their geographical coverage. We look forward to continuing work with the whole community, maintaining BRIDGE as a vibrant and inclusive community of knowledge and best practice, and further developing it by adding new member projects. Enjoy your reading and follow the BRIDGE web site for up-to-date information.

Dr. Vincent Berrutto

Head of Unit for "Digitalisation, Competitiveness, Research & Innovation" Directorate-General for Energy, European Commission

Dr. Max Lemke

Head of Unit for "Internet of things", Directorate-General Communications Networks, Content and Technology, European Commission

Robert Goodchild

Head of Unit for "Horizon Europe Energy", European Climate, Infrastructure and Environment Executive Agency, European Commission

2. INTRODUCTION TO THE BRIDGE INITIATIVE

2.1 Purpose of the initiative

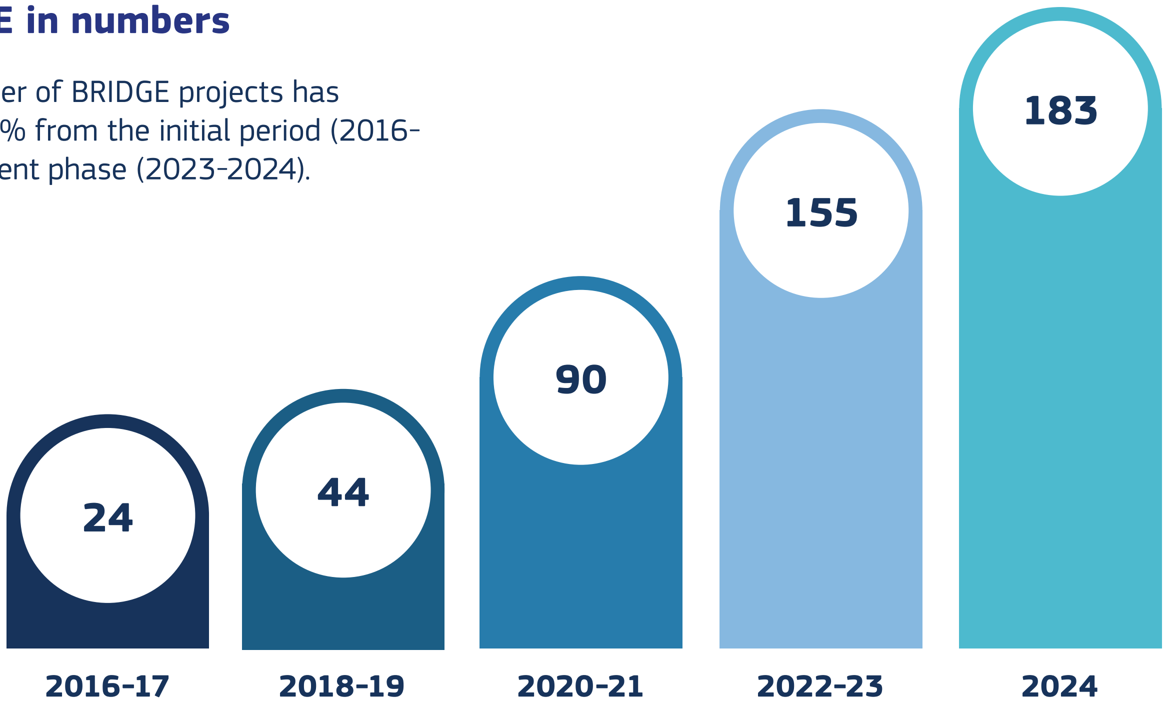
BRIDGE has been a collaborative platform for 183 European research and innovation projects, all funded under the Horizon 2020 and Horizon Europe programmes. Of these projects 105 are currently active and 78 have been completed between 2016 and 2024. These projects involve 2,237 organisations from 38 countries and have received a total accumulated funding of €1.6 billion from the European Union. The BRIDGE initiative covers various thematic fields such as smart grids, energy storage, islands, and the digitalisation of the energy sector. Notably, between 2023 and 2024, there has been an average growth of 18% (the % refers to projects started before January 2024) in this collaborative endeavour.

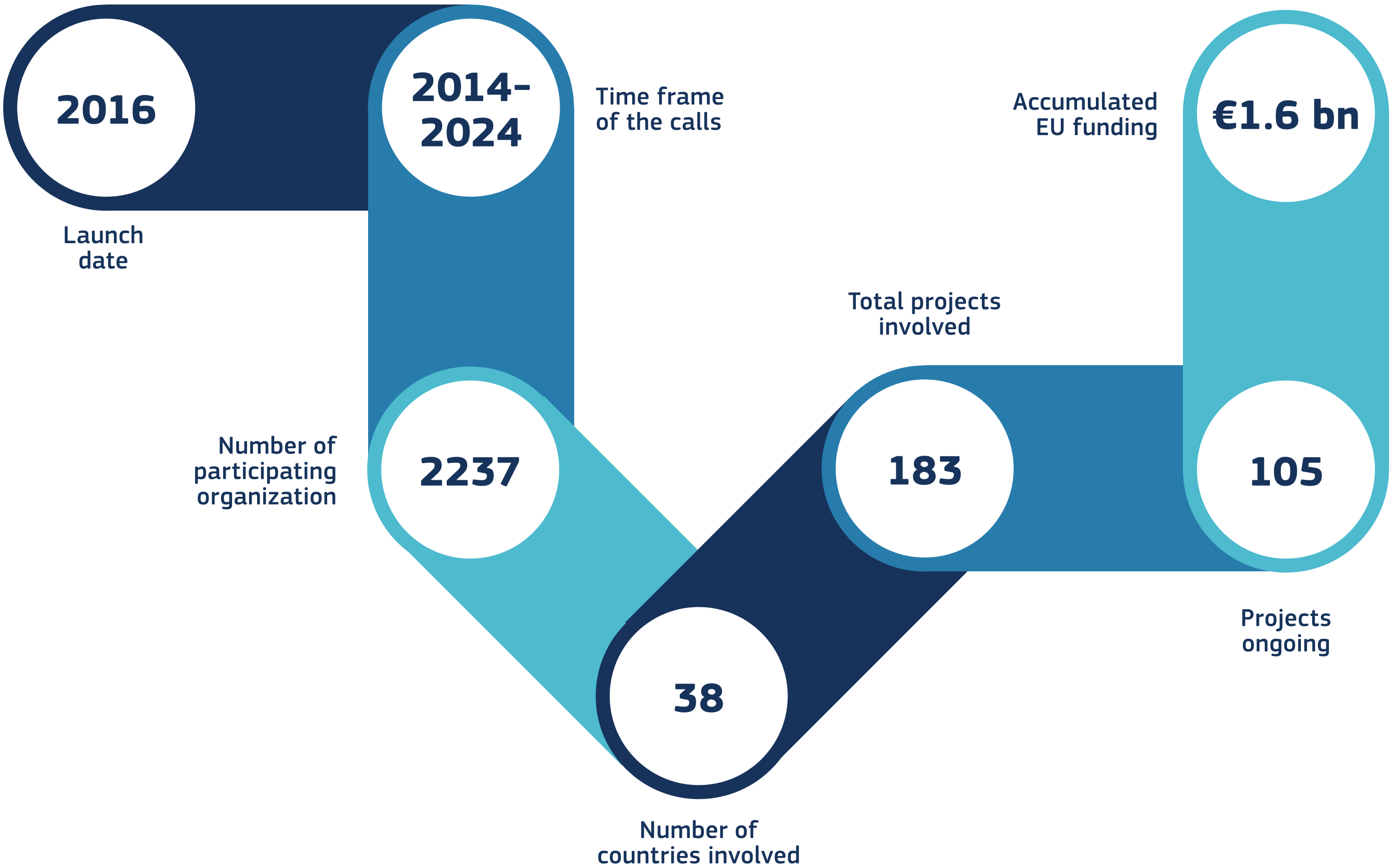
The primary objective of BRIDGE is to help member projects share knowledge, experience and best practices so that barriers to effective innovation can be overcome.

Based on the project results, the BRIDGE working groups draft reports with recommendations for policy development. This brochure presents data analysis from all these projects, especially the ongoing ones, providing detailed factsheets available from page 36 onward.

2.1.1 BRIDGE in numbers

The overall number of BRIDGE projects has increased by 763% from the initial period (2016-2017) to the current phase (2023-2024).



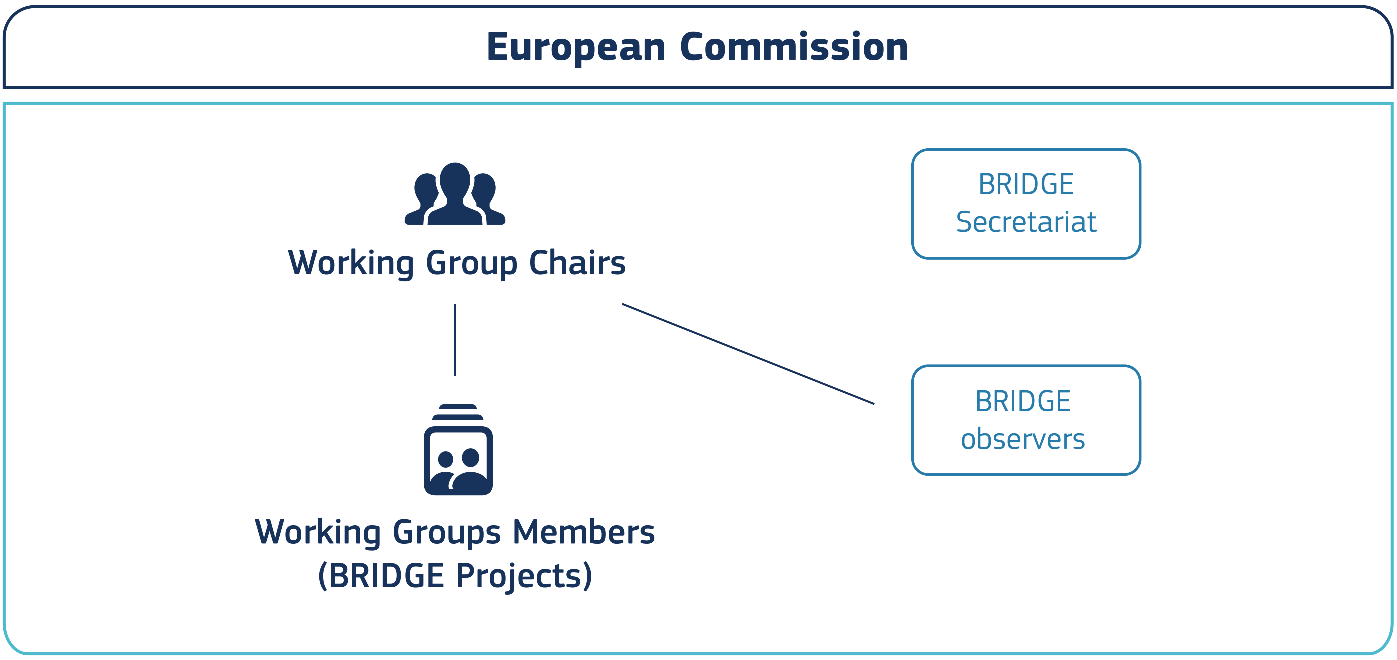


2.2 BRIDGE Governance and Working Groups

To ensure active engagement and the achievement of its goals, the BRIDGE initiative has structured itself into specialised Working Groups, comprising representatives from both Horizon 2020 and Horizon Europe projects. Each Working Group operates under the guidance of a designated chairperson, chosen amongst its active members. Final appointments are endorsed by the Commission, reflecting the community-driven and collaborative nature of the selection process.

The Working Groups' Chairs play a pivotal role in steering the groups' activities and fostering effective collaboration among its members.

Observers can also be involved in Working Groups' activities: these are projects that, while not obligated to participate in BRIDGE, opt to engage with the initiative based on their own interests and objectives. These observers contribute to the diversity of perspectives and expertise within the BRIDGE ecosystem, enriching the collaborative environment.



To support the BRIDGE initiative, a dedicated Secretariat has been established. Under the leadership of the Head of the BRIDGE Secretariat and bolstered by dedicated contact points, the Secretariat facilitates communication, coordination, and support across various facets of the BRIDGE initiative.

Consortium

Secretariat Bridge	secretariat@horizon-bridge.eu
Communication & Dissemination	communication@horizon-bridge.eu

Through the Working Groups, the initiative pursues its mission across four distinct areas of interest.

Each Working Group provides a platform for project members to focus on specific topics, share expertise, and tackle challenges and opportunities within their domains. By fostering collaboration and interdisciplinary dialogue, these groups drive innovation and inform policy decisions, contributing to sustainable solutions and societal impact within the BRIDGE community and beyond.

Data Management

- Communication infrastructure embracing the technical and non-technical aspects needed to exchange data and the related requirements.
- Cybersecurity and data privacy entailing data integrity, customer privacy and protection.
- Data handling including the framework for data exchange and related roles and responsibilities, together with the technical issues supporting the exchange of data in a secure and interoperable manner, and the data analytics techniques for data processing.

Regulation

- Comprehensive understanding of the regulatory aspects of the energy sector, addressing regulatory barriers to energy storage and smart grids, identifying best practice and providing recommendations
- Promotion of knowledge exchange between Horizon projects with an impact on, or addressing, different regulatory aspects in the field of energy.

Consumer and Citizen Engagement

- Cohesive understanding of the role and methodologies of engagement within European R&I projects.
- Better understanding and leverage of the actions of consumers and citizens in shaping the energy landscape.
- Focus on smart tools, indicators, and engagement strategies.

Business Models

- Design of tools to evaluate the benefit and values of the services and solutions developed in the activities of the projects, including the investigation of the tools to capture business ideas and build the Business Model and the quantification methods for Business Models benefits of services and solution under various Use Case scenarios.
- Design of a business model that better incorporates the integration of the data value chain and the monetisation of data, where better observability creates additional social value. This involves investigating the types and characters of the data value chains in BRIDGE projects.

3. PARTNERS, PILOTS AND TECHNOLOGIES

3.1 Partners involved in BRIDGE projects

The partners involved in the BRIDGE initiative are of various types. The categories below have been considered for this analysis:

Consumers

Residential, professional, public institutions, and industrial consumers, as well as cities acting as consumers in projects.

Regulated operators

Transmission System Operators (TSOs), and Distribution System Operators (DSOs) as defined by the Electricity Directive.

Local energy communities

Locally controlled entities driven by community values, not profit. They engage in distributed generation and operate as distribution system operators, suppliers, or aggregators at the local level, spanning across borders.

National energy agencies

National energy agencies' roles include ensuring energy security, promoting sustainable and renewable energy sources, setting and enforcing energy standards, conducting research and development, and advising on energy efficiency and conservation.

Power technology providers

Providers that manufacture hardware for power transmission, distribution, and generation.

Energy storage providers

Including various technologies like batteries from electric vehicles and hot water tanks.

ICT/Digital solution providers

Vendors of software and telecommunication services.

Digital Innovation Hubs

DIHs help companies become more competitive with their business/production processes, products or services.

Research & Innovation partners

Research centres, universities, academic institutions, think-tanks, research and innovation consultants.

Energy suppliers

Power generators, retailers, and ESCOs.

Aggregators

Aggregators combine customer loads or generated electricity for market transactions.

Market operators

Manage energy market transactions.

Renewable energy associations

Renewable energy associations include generators of renewable power, developers of clean technology, and businesses involved in energy storage, electric vehicles, and decentralised energy solutions.

Media outlets

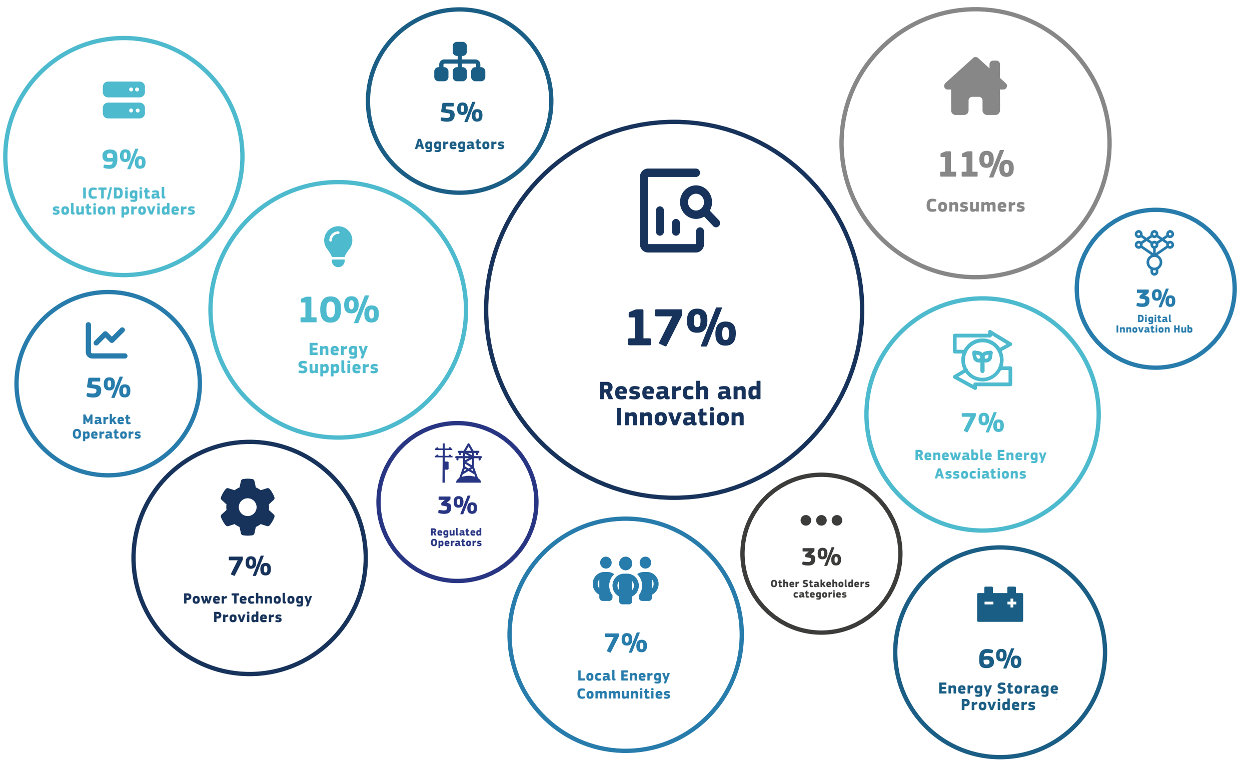
Media Outlets are broadcasting channels providing news, information and feature stories to the public in different ways: newspapers, magazines, social media and the Internet, television and radio.

Other stakeholder categories

Partners not classified in the above categories, including international organisations, communication agencies, water supply operators, IT consultancies, technology manufacturers, and engineering services.

With a focus on the ongoing BRIDGE projects, it emerges that the partners most involved are Research & Innovation partners (17%), Consumers (11%) and Energy Suppliers (10%). It is to be noted that partners fulfil multiple roles within the energy landscape. For instance, electricity operators on islands often serve as both energy suppliers and Distribution System Operators (DSOs). Additionally, some power technology providers diversify their offerings by selling ICT tools and storage devices. Therefore, the % provided below is calculated taking into account that each single project analysed can refer to a variety of topics.

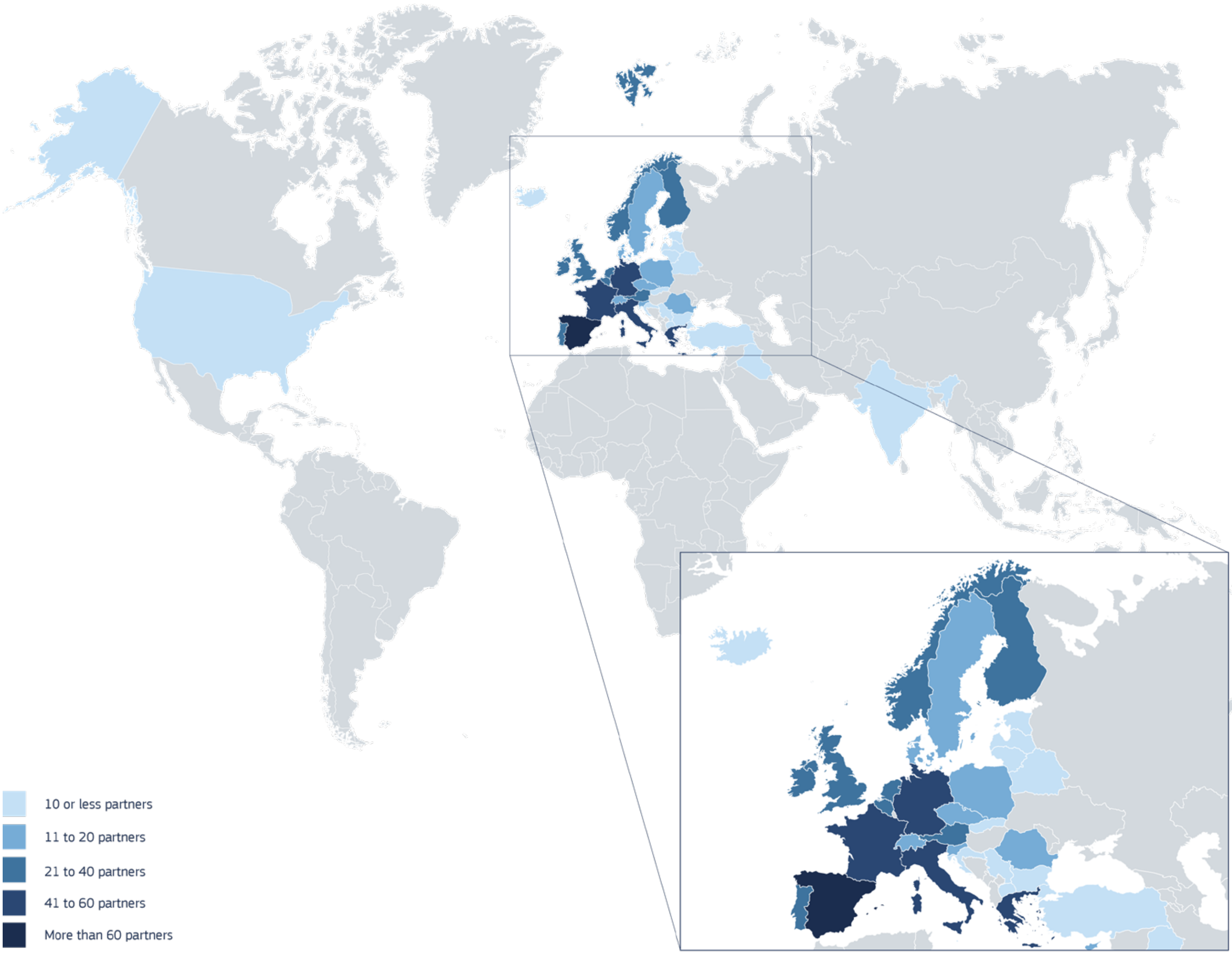
In ongoing and completed projects within the BRIDGE initiative, partners are categorised based on their primary roles:



3.2 Geographical distribution of partners

The participating organisations in BRIDGE projects come from EU and non-EU countries.

For example, Spain (83), Italy (58), Germany (57), France (54), Austria (54), Greece (41), Belgium (38), Netherlands (35), Portugal (33), Ireland (23), Finland (21), United Kingdom (37) and Norway (23).



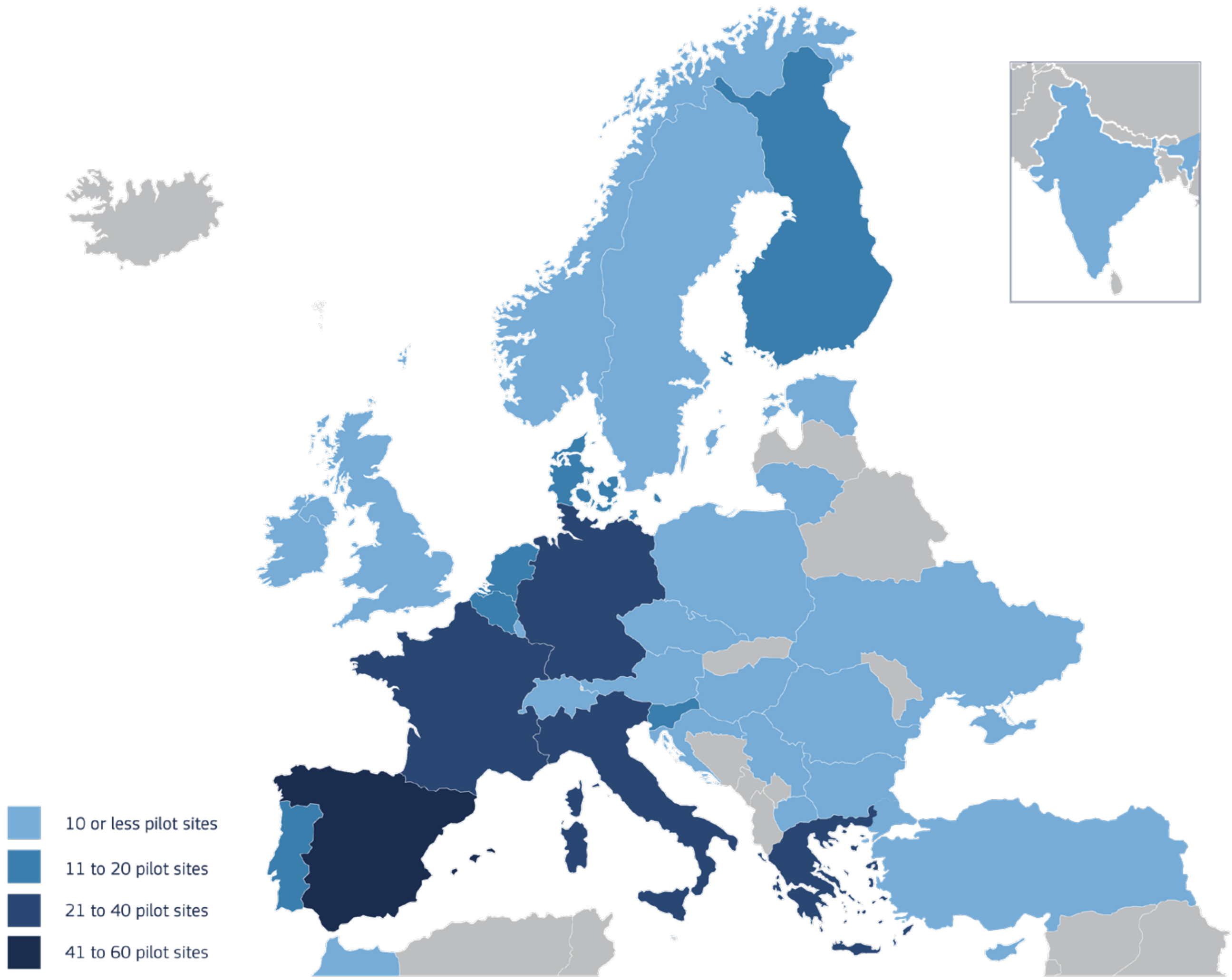
[2] All EU countries with BRIDGE projects are considered, as well as non-EU countries with at least two active projects. This method ensures a comprehensive count, providing appropriate representation of established BRIDGE ties at global level.

3.3 Geographical distribution of physical demonstrators and pilots

There are 105 BRIDGE projects ongoing, and all but 2 involve demonstrations or pilot tests of technologies and solutions.

BRIDGE demos or pilots are hosted by 33 countries as indicated on the map below. Spain hosts the highest number of demo sites (53), followed by Germany (34), Italy (33), France (28), Greece (27), Netherlands (19) Portugal (16), Belgium (15), Denmark (14), Finland (13), Slovenia (11), Sweden (10), Austria (9), and Poland (5).

Some demos and pilot sites are hosted outside the EU, with he highest numbers in Norway (10) and United Kingdom (10), followed by Switzerland (9), Turkey (4) and India (3).



In addition to this first analysis based on the numbers of active demonstrators, this brochure contains at its end a table with more details regarding the type of demonstrators currently active in the individual territories.

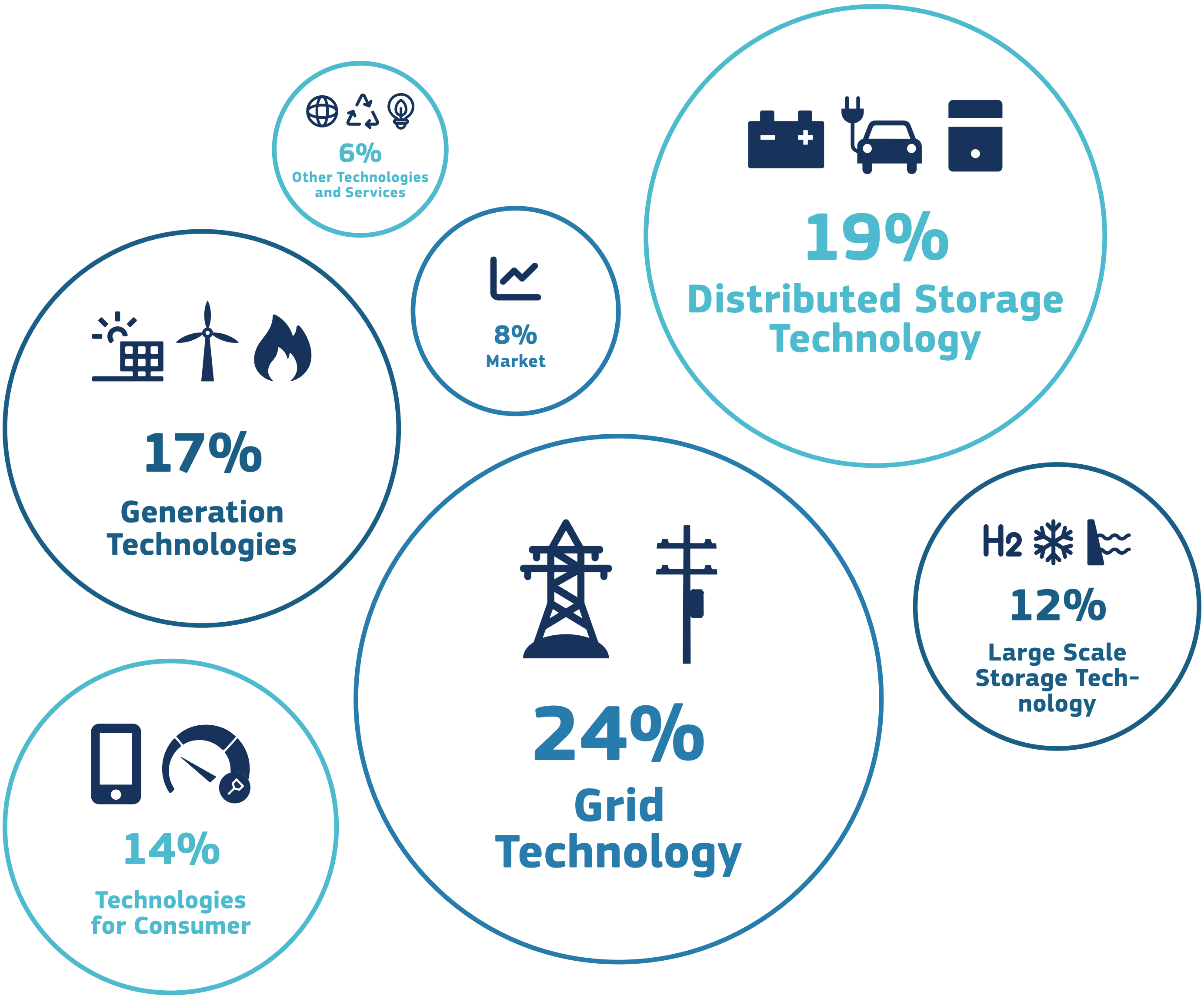
3.4 Technologies and services tackled by BRIDGE projects

A broad range of technologies and services are being tested by BRIDGE projects. We distinguished six main categories, and we left the seventh called "other" specifically for project activities that do not align with any of the previously mentioned technologies.

Technologies for consumer	Demand response, smart appliances, smart metering, heating/cooling peak load management.
Grid Technologies	HVDC, HVAC, multi-terminal (MT), protections, HVDC breaker, grid inertia, network management, monitoring and control tools[1], micro-grid, semiconductor devices and power converters.
Large Scale Storage Technologies	In general connected at transmission level[2]: power to gas (P2G), compressed air energy storage (CAES), hydro storage, and molten salt storage.
Distributed Storage Technologies	Battery energy storage systems (BESS), flywheel energy storage, pumped hydro storage, thermal energy storage (TES), hydrogen energy storage, compressed air energy storage (CAES).
Generation Technologies	Wind turbines, photovoltaic (PV), solar thermal, biogas, tidal energy, micro-generation, floating offshore wind, floating offshore PV, Ocean thermal energy conversion (OTEC).
Market	Infrastructure costs, electricity market, ancillary services, other market services.
Other technologies and services	Recycling demonstration plant for EoL windmill blades, Ultra-High-Strength - concrete precast components, innovative materials, Life Cycle Assessment (LCA), energy system modelling.

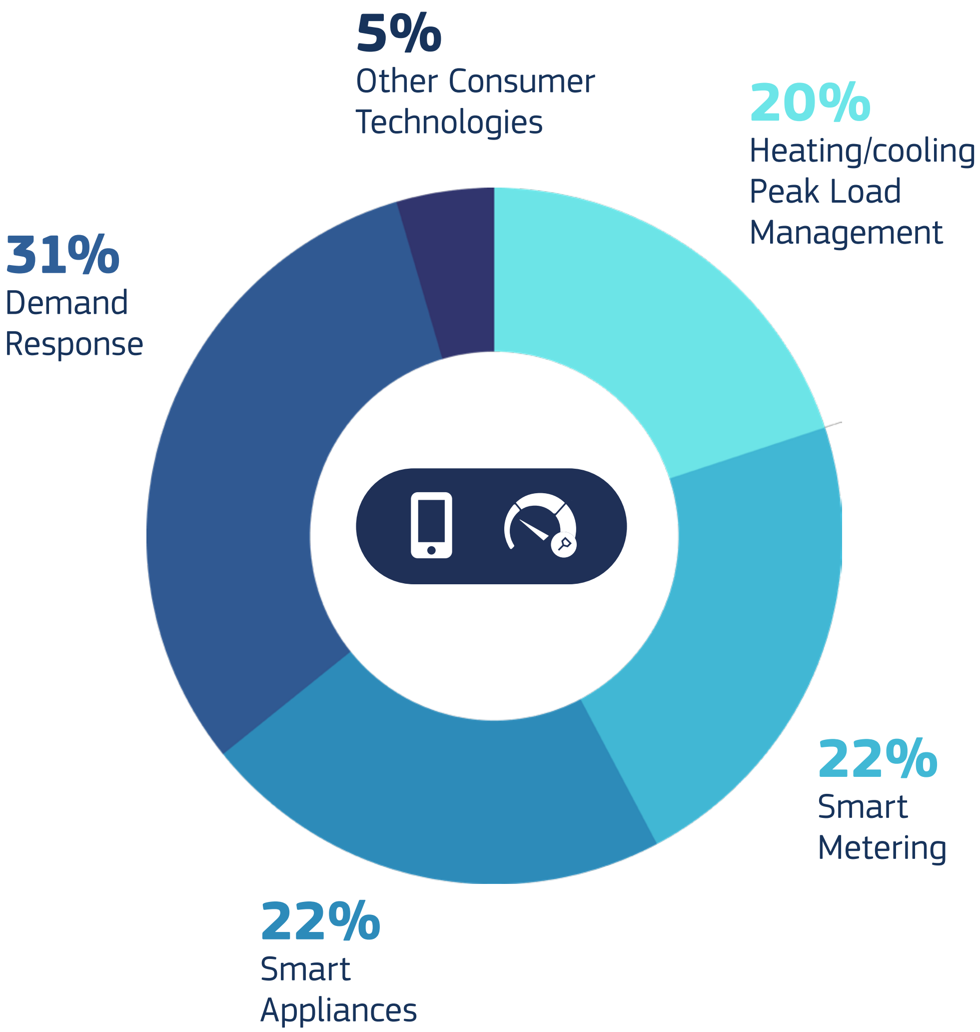
1 Noted further on in Project fact sheets 'Network management and control tools'.
2 It might happen however that such technologies, at a smaller scale, are connected at the distribution level (in particular CAES).

The distribution of technologies and services addressed by BRIDGE projects is presented in the graph below. Grid Technologies represent the largest percentage at 24%, followed by Distributed Storage Technology at 19%, and Generation Technologies at 17%. Technology for Consumers accounts for 14% of the total. Large Scale Storage Technology represents 12%, Market Technologies cover 8%, and the emerging field of sustainable energy technologies and practices is included in "Other Technologies and Services" at 6%.

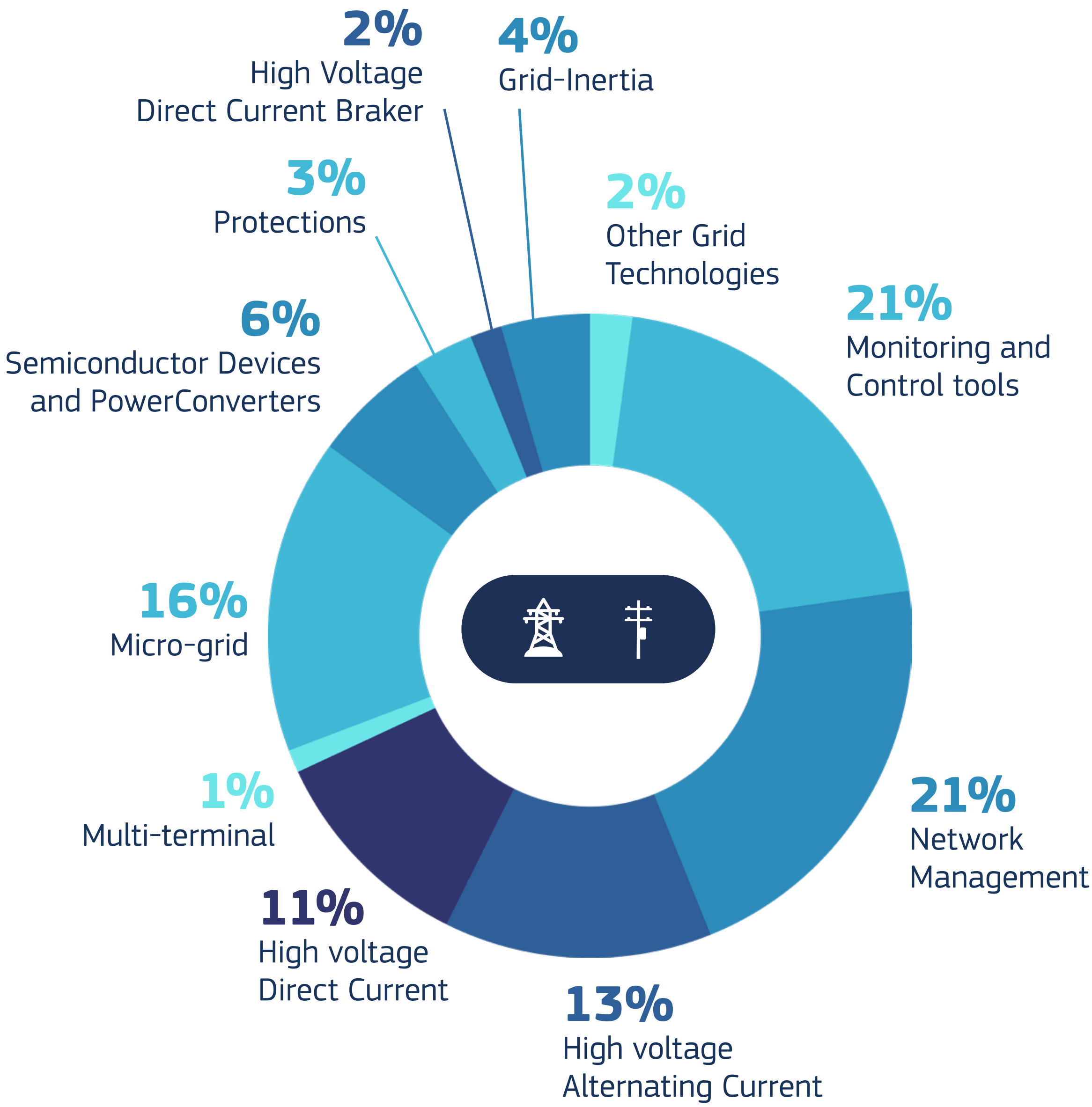


Each macro category is further analysed below, taking into account the specific technologies it comprises.

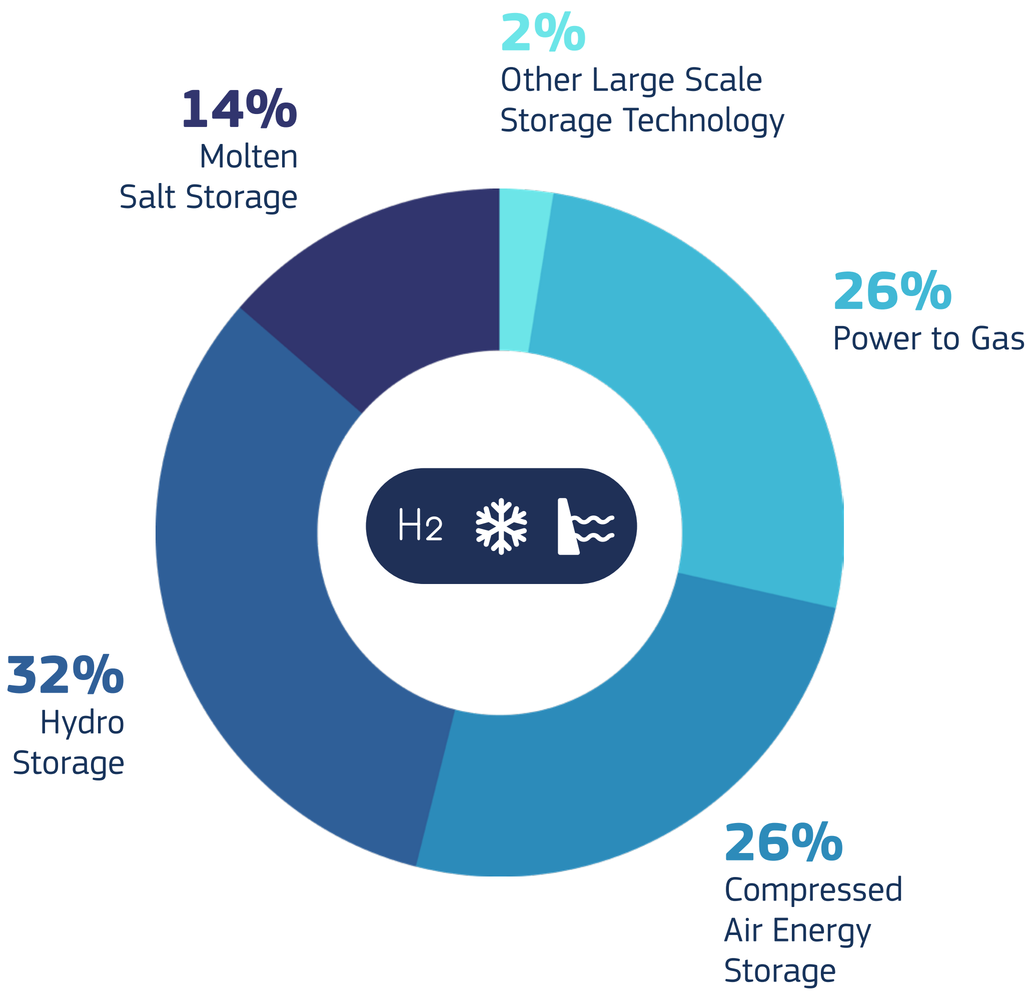
From the analysis of the **Technologies for Consumers**, this is mostly composed of Demand Response (31%), Intelligent Household Appliances and Smart Metering (22%), management of Peak Heating Loads/ Cooling (20%) and Other Consumer Technologies (5%).



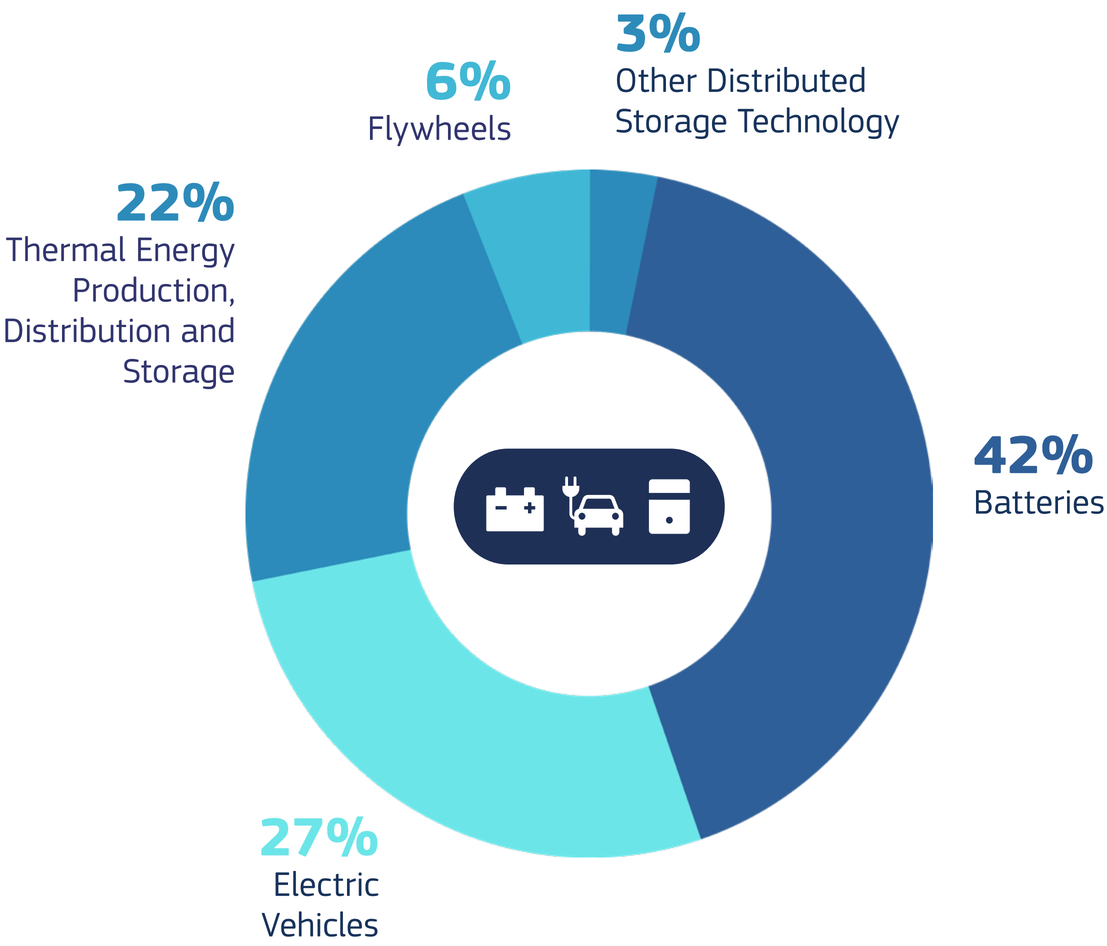
Among the **Grid Technologies**, Network Management Monitoring and Control Tools (21%) together they represent 42% of grid technology. Micro-grids follow with 16%, High Voltage Direct Current (13%), High Voltage Alternating Current (11%), Semiconductor Devices and Power Converters (6%), Grid Inertia (4%), Protections (3%), High Voltage Direct Current Breaker (2%) and Multi-terminal (1%).



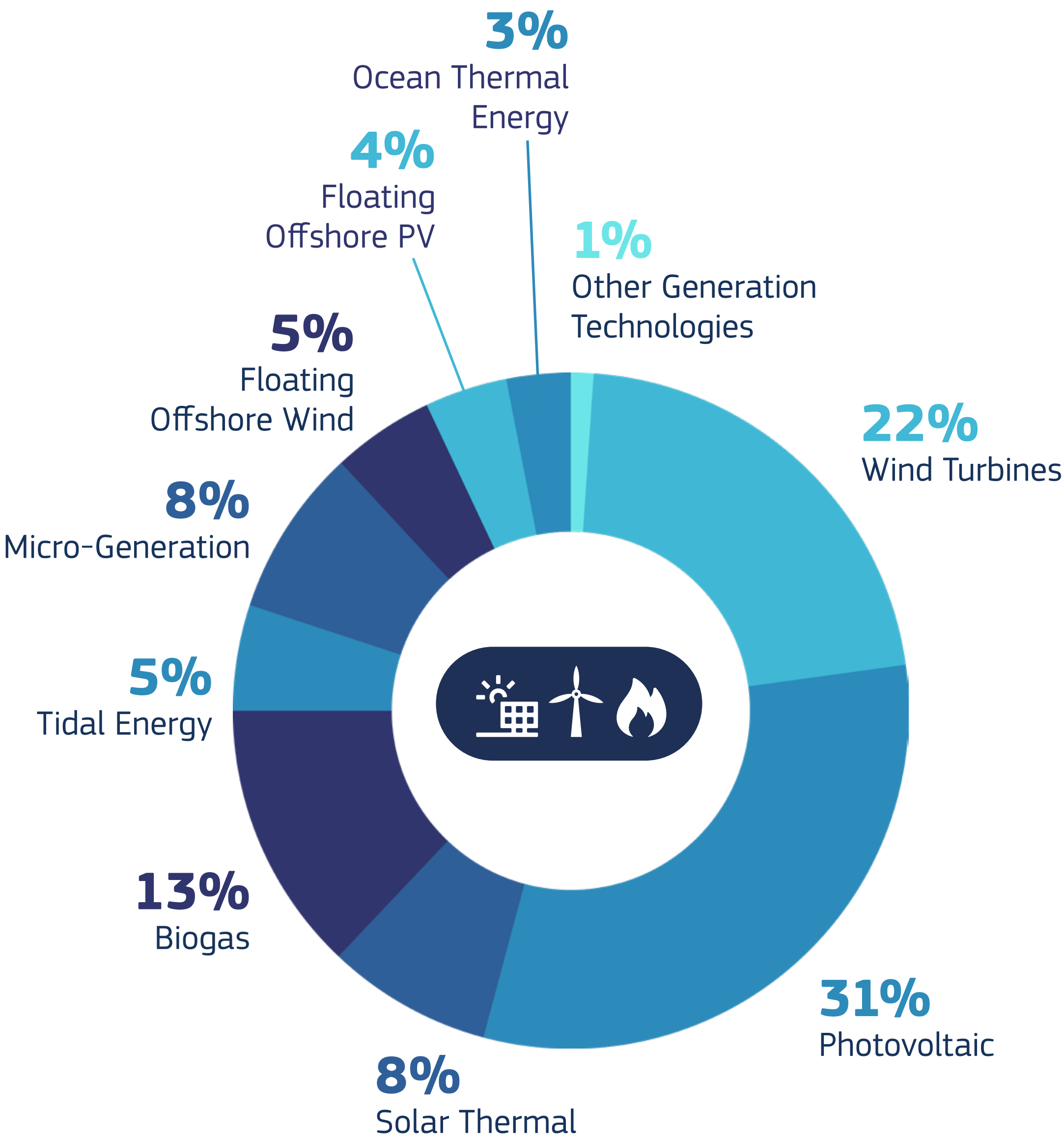
Regarding **Large-Scale Storage Technologies**, which accounts for 12% of the total, 26% work with Power to Gas, 26% with Compressed Air Energy Storage and 32% involves Hydro Storage.



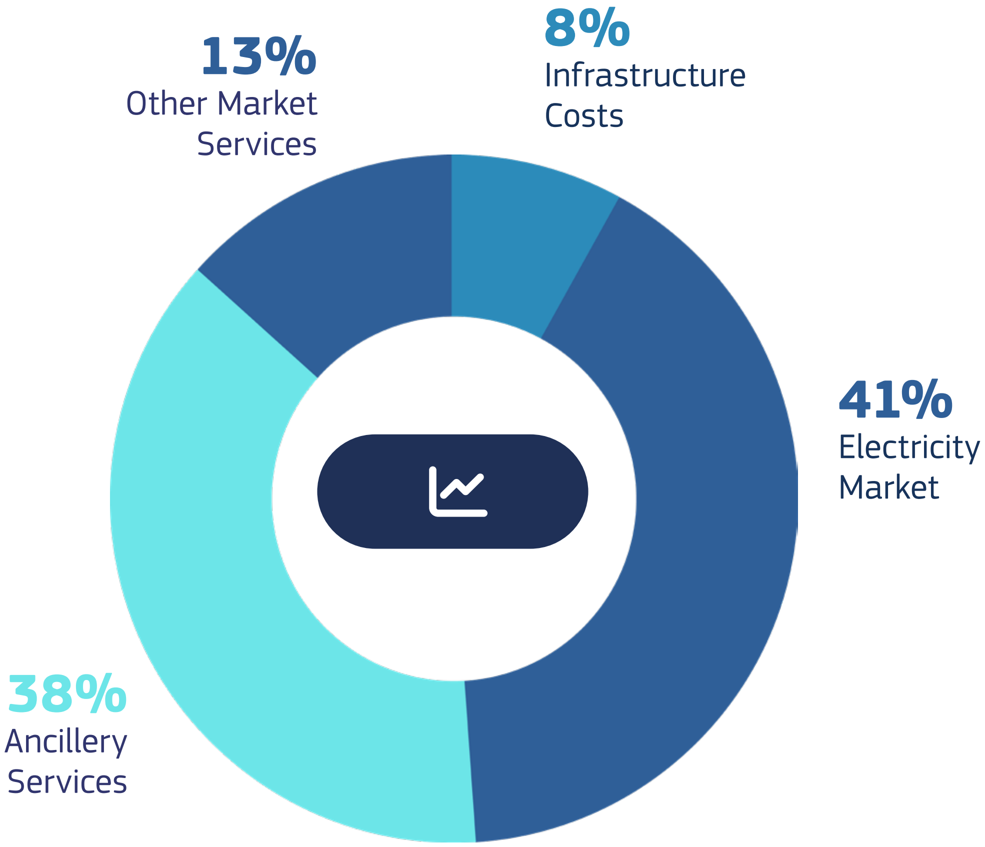
Distributed Storage Technologies, 19% of the total number of BRIDGE projects, involve different types. The most significant are Batteries (42%), Electric Vehicles (27%), Thermal Energy Production (22%), Distribution and Storage (22%), Flywheels (6%).



Generation Technologies represent the third main area covered by the total BRIDGE projects (17%). Photovoltaic Systems account for 31%, followed by Wind Generation (22%) and biogas (13%). In addition, other emerging technologies are addressing the innovation needs of the market, for example Solar thermal (8%), Micro-generation (8%), Tidal energy (5%), Floating offshore wind (5%) and other.



Finally, the **Market** category is divided in different types: Electricity Market (41%), Ancillary Service (38%) and Infrastructure Costs (8%).



4. HOW TO READ THE PROJECTS OVERVIEW AND THE FACTSHEETS

4.1 Projects overview

From the visual overview on page 26 you will be able to see all the projects that have participated in BRIDGE since 2016. They are presented by call chronologically.

The active projects have been assigned some keywords that are colour-coded to help the reader identify the projects' areas of interest.

Electricity Grids	Market Design	Energy Storage
Decarbonisation	Digitalisation	General Topics
Consumers/Prosumers	System Integration	Other

Click on the name of the active project to access its project factsheet or click on the name of the ended project to access its CORDIS factsheet.

4.2 Factsheets

Ongoing projects are presented in factsheets.

- The first page includes main information such as start and end date, budget, website, keywords and project partners. Additionally, the reader will see a map where the countries involved in the project as well as the demonstration sites are displayed ( ).
- The second page presents the project more in detail including its scope, expected impact, developed technologies and expected KERs.

The list of factsheets is organised by calls: from the most recent ongoing projects to the oldest ones.

For further information on closed projects, please check previous brochures:

- *Brochure BRIDGE 2023*
- *Brochure BRIDGE 2021*
- *Brochure BRIDGE 2020*

5. PROJECTS OVERVIEW AND FACTSHEETS

2015

H2020-LCE-2014-2015

LCE-07-2014 - Distribution grid and retail market

AnyPLACE
EMPOWER
ENERGISE
Flex4Grid
FLEXICIENCY
FLEXMETER
NOBEL GRID
P2P-SmarTest
Smarter EMC2
UPGRID

LCE-10-2014 - Next generation technologies for energy storage

NAIADES

LCE-08-2014 - Local / small-scale storage

ELSA
NETfficient
RealValue
SENSIBLE
STORY
TILOS

LCE-05-2015- Innovation and technologies for the deployment of meshed off-shore grids

PROMOTioN

LCE-06-2015 - Transmission grid and wholesale market

FutureFlow
MIGRATE
SmartNet

LCE-09-2015 - Large scale energy storage

CryoHub
STOREandGO

2016

H2020-LCE-2016-2017

LCE-02-2016 - Demonstration of smart grid, storage and system integration technologies with increasing share of renewables: distribution system

GOFLEX
InteGrid
inteGRIDy
InterFlex
INVADE
SMILE
WiseGRID

LCE-07-2016-2017 - Developing the next generation technologies of renewable electricity and heating/cooling

GRIDSOL
RE-SERVE

LCE-04-2017 - Demonstration of system integration with smart transmission grid and storage technologies with increasing share of renewables

CROSSBOW
EU-SysFlex
FLEXITRANSTORE
OSMOSE

LCE-05-2017 - Tools and technologies for coordination and integration of the European energy system

TDX-ASSIST
MAGNITUDE

2018

H2020-DT-2018-2020

DT-ICT-10-2018-19 - Interoperable and smart homes and grids

InterConnect

DT-ICT-11-2019 - Big data solutions for energy

BD4OPEM
PLATOON
SYNERGY
BD4NRG

H2020-LC-SC3-2018-2019-2020

LC-SC3-ES-5-2018-2020 TSO – DSO – Consumer: large-scale demonstrations of innovative grid services through demand response, storage and small-scale (RES) generation

CoordiNet

INTERRFACE

LC-SC3-ES-6-2019 - Research on advanced tools and technological development

FLEXGRID

FlexPlan

LC-SC3-ES-2-2019 - Solutions for increased regional cross-border cooperation in the transmission grid

FARCROSS

TRINITY

LC-SC3-ES-8-2019 - European Islands Facility - Unlock financing for energy transitions and supporting islands to develop investment concepts

NESOI

LC-SC3-ES-1-2019 - Flexibility and retail market options for the distribution grid

ebalance-plus

EUniversal

FEVER

FlexiGrid (864048)

FLEXIGRID (864579)

PARITY

Platone

X-FLEX

2020

LC-SC3-EC-3-2020 - Consumer engagement and demand response

ACCEPT

BRIGHT

HESTIA

iFLEX

ReDREAM

SENDER

TwinERGY

HYPERRIDE TIGON REACT IANOS ISLANDER MAESHA ROBINSON VPP4I-SLANDS

LC-SC3-ES-10-2020 - DC – AC/DC hybrid grid for a modular, resilient and high-RES share grid development

OneNet

LC-SC3-ES-5-2018-2020 - TSO – DSO – Consumer: Large-scale demonstrations of innovative grid services through demand response, storage and small-scale (RES) generation

RE-EMPOWERED SUSTENANCE

LC-SC3-ES-13-2020 - Integrated local energy systems (Energy islands): International cooperation with India

COMPILE E-LAND IElectrix MERLON MUSE GRIDS RENAISSANCE SERENE LocalRES CREATORS eNeuron RENergetic

LC-SC3-ES-3-2018-2020 - Integrated local energy systems (Energy islands)

POCITYF

LC-SC3-SCC-1-2018-2019-2020 - Smart Cities and Communities

H2020-DT-2018-2020

EnergyShield PHOENIX SDN-micro-SENSE ELECTRON

SU-DS04-2018-2020 - Cybersecurity in the Electrical Power and Energy System (EPES): an armour against cyber and privacy attacks and data breaches

2021

HORIZON-CL5-2021-D3-01

DATACELLAR EDDIE ENERSHARE OMEGA-X SYNERGIES

HORIZON-CL5-2021-D3-01-01 - Establish the grounds for a common European energy data space

READY4DC

HORIZON-CL5-2021-D3-01-02 - Laying down the basis for the demonstration of a Real Time Demonstrator of Multi-Vendor Multi-Terminal HVDC with Grid Forming Capability: Coordinated action

int:net

HORIZON-CL5-2021-D3-01-03 - Interoperability community

HORIZON-CL5-2021-D5-01

DriVe2X EV4EU FLOW XL-Connect SCALE

HORIZON-CL5-2021-D5-01-03: System approach to achieve optimised Smart EV Charging and V2G flexibility in mass-deployment conditions (2ZERO)

TRANSENSUS LCA

HORIZON-CL5-2021-D5-01-04: LCA and design for sustainable circularity - holistic approach for zero-emission mobility solutions and related battery value chain (2ZERO & Batteries Partnership)

HORIZON-CL5-2021-D3-02

WEDUSEA

HORIZON-CL5-2021-D3-02-01 - Demonstration of wave energy devices to increase experience in real sea condition

SENERGY NETS ELEXIA FEDECOM

HORIZON-CL5-2021-D3-02-05 - Energy Sector Integration: Integrating and combining energy systems to a cost-optimised and flexible energy system of systems

BEFLEXIBLE ENFLATE STREAM

HORIZON-CL5-2021-D3-02-06: Increasing energy system flexibility based on sector-integration services to consumers (that benefits system management by DSOs and TSOs)

eFORT R2D2

HORIZON-CL5-2021-D3-02-07: Reliability and resilience of the grid: Measures for vulnerabilities, failures, risks and privacy

NEWGEN HVDC-WISE

HORIZON-CL5-2021-D3-02-08: Electricity system reliability and resilience by design: High-Voltage, Direct Current (HVDC)-based systems and solutions

SCARLET

HORIZON-CL5-2021-D3-02-09: Demonstration of superconducting systems and elpipes

AdvanSiC FOR2ENSICS SiC4GRID

HORIZON-CL5-2021-D3-02-10 - Demonstration of advanced Power Electronics for application in the energy sector

EVERY1

HORIZON-CL5-2021-D3-02-11: Reinforcing digitalisation related know how of local energy ecosystems

HORIZON-CL5-2021-D3-03

NATURSEA-PV PLOTEC SUREWAVE

HORIZON-CL5-2021-D3-03-10 - Innovative foundations, floating substructures and connection systems for floating PV and ocean energy devices

BLOW INFINITE NEXTFLOAT WHEEL

HORIZON-CL5-2021-D3-03-12: Innovation on floating wind energy deployment optimized for deep waters and different sea basins (Mediterranean Sea, Black Sea, Baltic Sea, North-east Atlantic Ocean)

2022

HORIZON-CL5-2022-D2-01

BATMAX

ENERGETIC

NeMo

NEXTBMS

HORIZON-CL5-2022-D2-01-09 - Physics and data-based battery management for optimised battery utilisation (Batteries Partnership)

HORIZON-CL5-2022-D4-01

DEDALUS

DR-RISE

HORIZON-CL5-2022-D4-01-01 - Demand response in energy-efficient residential buildings

HORIZON-CL5-2022-D3-03

SUDOCO

TWAIN

WILLOW

ICONIC

HORIZON-CL5-2022-D3-03-04 - Integrated wind farm control

HORIZON-CL5-2022-D4-02

EVELIXIA

WeForming

HORIZON-CL5-2022-D4-02-04 - Smart-grid ready and smart-network ready buildings, acting as active utility nodes (Built4People)

HORIZON-CL5-2022-D3-01

Blades2Build

EoLo-HUBs

REFRESH

HORIZON-CL5-2022-D3-01-02: Demonstration of innovative materials, supply cycles, recycling technologies to increase the overall circularity of wind energy technology and to reduce the primary use of critical raw materials

REEFLEX	HORIZON-CL5-2022-D3-01-12 - Replicable solutions for a cross sector compliant energy ecosystem
MAXBlade	HORIZON-CL5-2022-D3-01-07 - Demonstration of innovative rotor, blades and control systems for tidal energy devices
MASTERPIECE, RESCHOOL, COMMUNITAS, ENPOWER	HORIZON-CL5-2022-D3-01-08: Supporting the action of consumers in the energy market and guide them to act as prosumers, communities and other active forms of active participation in the energy activities
InterOPERA	HORIZON-CL5-2022-D3-01-09: Grid Forming Capability (in support of the offshore strategy)
FlexCHESS, INTERSTORE, PARMENIDES	HORIZON-CL5-2022-D3-01-10: Interoperable solutions for flexibility services using distributed energy storage
2LIPP, AGISTIN, i-STENTORE, SINNOGENES	HORIZON-CL5-2022-D3-01-11: Demonstration of innovative forms of storage and their successful operation and integration into innovative energy systems and grid architectures
GLocalFlex, OPENTUNITY, RESONANCE	HORIZON-CL5-2022-D3-01-12: Replicable solutions for a cross sector compliant energy ecosystem
MOPO, iDesignRES	HORIZON-CL5-2022-D3-01-13: Energy system modelling, optimisation, and planning tools

BEST-Storage

THUMBS UP

ECHO

HYSTORE

HORIZON-CL5-2022-D3-01-14 - Thermal energy storage solutions

2023

HORIZON-CL5-2023-D3-01

Air4NRG

SCO2OP-TES

SEHRENE

STORE2HYDRO

HORIZON-CL5-2023-D3-01-13: Development of novel long-term electricity storage technologies

SHIFT2DC

HORIZON-CL5-2023-D3-01-11 - Demonstration of DC powered data centres, buildings, industries and ports

EURO-TIDES

SEASTAR

HORIZON-CL5-2023-D3-01-08: Demonstration of sustainable tidal energy farms

HEDGE-IoT

ODEON

HORIZON-CL5-2023-D3-01-15 - Supporting the green and digital transformation of the energy ecosystem and enhancing its resilience through the development and piloting of AI-IoT Edge-cloud and platform solutions

MISSION

HORIZON-CL5-2023-D3-01-12 - Development of MVDC, HVDC and High-Power Transmission systems and components for a resilient grid

TwinEU

HORIZON-CL5-2023-D3-01-10 - Supporting the development of a digital twin to improve management, operations and resilience of the EU Electricity System in support to REPowerEU

2024

HORIZON-CL5-2023-D4-01

InterPED

PEDvolution

HORIZON-CL5-2023-D4-01-03 - Interoperable solutions for positive energy districts (PEDs), including a better integration of local renewables and local excess heat sources

HORIZON-CL5-2023-D2-01

HAVEN

SMHYLES

HORIZON-CL5-2023-D2-01-05 - Hybrid electric energy storage solutions for grid support and charging infrastructure (Batt4EU Partnership)

HORIZON-CL5-2023-D2-01-05 - Hybrid electric energy storage solutions for grid support and charging infrastructure (Batt4EU Partnership)

Back to projects' list

Electricity grids | Energy storage | Digitalisation

HAVEN

High-PerformAnce Hybrid Energy Storage System for multi-serVicE provisioNing

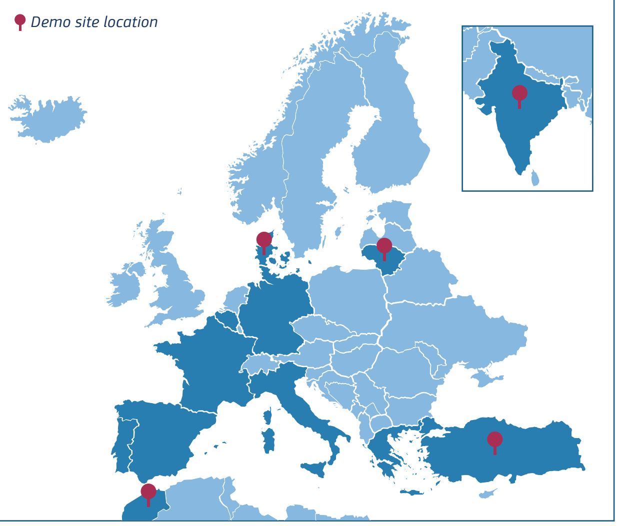
HAVEN's main objective is to design and demonstrate in relevant operational conditions (TRL 7) a smart, highly modular, scalable, sustainable and safe HESS with advanced cognitive functionalities and optimized high-energy (HE) and high-power (HP) capabilities for multi-service provisioning to support the electrical grid and EV charging infrastructure

FROM	January 2024
TO	December 2027

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
6 643 370,00 €	5 991 258,50 €	www.best-storage.eu

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	Micro-grid; Network management; Monitoring and control tools
Distributed Storage Technologies	Storage for self- consumption, Hydrogen battery, V2G

PROJECT PARTNERS' COUNTRIES



COORDINATOR	CORDEEL NV (BELGIUM)
OTHER PARTNERS	• LAMBROEKSTRAAT 5 A (Belgium) • FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV (Germany) • IKERLAN S. COOP (Spain) • UAB SOLI TEK R&D (Lithuania) • IMECAR ELEKTRONIK SANAYI VE TICARET LIMITED SIRKETI (Türkiye) • RELIABILITY AND SAFETY TECHNICAL CENTER (Belgium) • INEGI - INSTITUTO DE CIENCIA E INOVACAO EM ENGENHARIA MECANICA E ENGENHARIA INDUSTRIAL (Portugal) • RENEWABLE ENERGY SOLUTIONS FOR THE MEDITERRANEAN AND AFRICA (Italy) • ASOCIACION ESPAÑOLA DE LA INNOVACIÓN EN EL MARKETING Y LA INVERSIÓN SOSTENIBLE (Spain) • DANMARKS TEKNISKE UNIVERSITET (Denmark) • TOTALENERGIES ONETECH (France) • Inovacijsko-razvojni institut Univerze v Ljubljani (Slovenia) • BATTERY INNOVATION AND TECHNOLOGY CENTER (Belgium) • MOROCCAN AGENCY FOR SUSTAINABLE ENERGY SA (Morocco) • The Tata Power Compannny limited (India)

Project Description

Context

HAVEN seeks to achieve a modular, scalable and cost-efficient solution with the capability to efficiently manage power and energy shares while optimising the system in terms of sizing, CAPEX/OPEX, aging stress and store degradation depending on the specific application. In addition, the project will go a step further by developing a flexible Digital Twin (DT) of the system, valid regardless of the cell chemistry and application and adaptable for second life battery modules, that enables to predict the performance and management of the system over its lifetime, while easing its design and predictive maintenance.

Project presentation, technical description and implementation

"HAVEN features a systematic, collaborative, and integrated approach to the design and demonstration of a

cutting-edge, sustainable, and safe HESS capable of long duration storage and provision of multiple services for supporting the electrical grid and EV charging infrastructure by coupling complementary technology assets, namely, next-generation high-energy (HE) and high-power (HP) storage technologies, optimised power converter devices with innovative cognitive functionalities, advanced and cyber-secured energy management and control tools and strategies in a novel system architecture. HAVEN seeks to achieve a modular, scalable and cost-efficient solution with the capability to efficiently manage power and energy shares while optimising the system in terms of sizing, CAPEX/OPEX, aging stress and store degradation depending on the specific application.

Project Impacts

By achieving its project results, HAVEN will contribute to both short-term outcomes and long-term impacts, as specified under the topic HORIZON-CL5-D2-1-5 and its associated Destination "Cross-sectoral solutions for the climate transition", respectively. This contribution will take place through two Key Impact Pathways (KIPs): at the HESS system level (1) and application level (2), with the achievement of the former being a prerequisite for the latter. The effect of their uptake, dissemination and deployment will then pave the way towards achieving broader, long-term effects. To maximize their effect, these pathways will be directly coupled with appropriate and high-quality DEC measures

Expected key exploitable results of the project

- Digital Twin of HESS.
- Energy management system.
- Novel power electronics.
- HE and HP battery systemS.

HORIZON-CL5-2023-D2-01-05 - Hybrid electric energy storage solutions for grid support and charging infrastructure (Batt4EU Partnership)

Back to projects' list

Electricity grids | Energy storage | System integration

SMHYLES

Safe, sustainable and Modular HYbrid systems for Long-duration Energy storage and grid Services

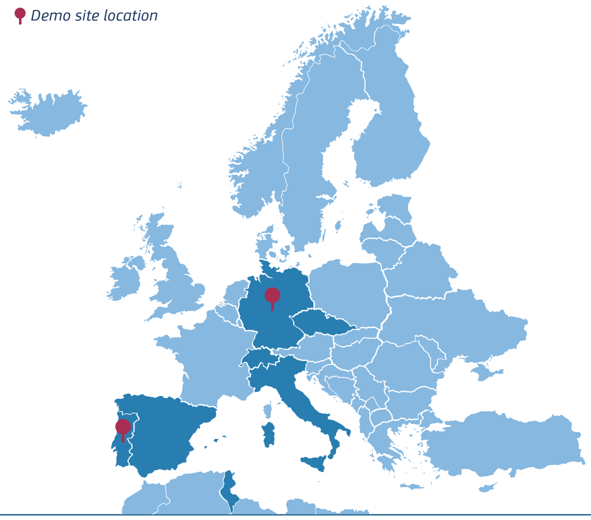
The overarching objective of SMHYLES project is to design and demonstrate, at a relevant industrial scale, safe and sustainable HESS based on the smart combination of low-CRM and aqueous ESS (batteries and supercapacitors) capable of medium-to-long duration energy storage and provision of multiple services. The project will mainly deal with 1) the design of innovative storage components of the two different HESS, i.e., modular VRFB, aqueous hybrid supercapacitor module and smart ZEBRA battery, 2) their optimal integration and management into a HESS supported by digital tools and 3) the demonstration of HESS usage in three different demo sites.

FROM	January 2024
TO	December 2027

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
7 575 088,75 €	5 996 081,25 €	https://cordis.europa.eu/project/id/101138029

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	Micro-grid; Monitoring and control tools
Distributed Storage Technologies	Batteries; Other distributed storage technologies (Supercapacitors, Hybrid systems)
Market	Electricity market; Ancillery services

PROJECT PARTNERS' COUNTRIES



COORDINATOR	FONDAZIONE BRUNO KESSLER (Italy)

OTHER PARTNERS

- FONDAZIONE BRUNO KESSLER (Italy)
- Hochschule für angewandte Wissenschaften Landshut (Germany)
- FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV (Germany)
- BAYERISCHE FORSCHUNGSALLIANZ BAVARIAN RESEARCH ALLIANCE GMBH (Germany)
- FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS (Spain)
- CHARGE2C-NEWCAP LDA (Portugal)
- SONICK SPA (Italy)
- CAPWATT, S.A. (Portugal)
- GRACIOLICA LDA (Portugal)
- INESC TEC - INSTITUTO DE ENGENHARIADE SISTEMAS E COMPUTADORES, TECNOLOGIA E CIENCIA (Portugal)
- UNIVERZITA TOMASE BATI VE ZLINE (Czechia)
- RINA CONSULTING SPA (Italy)
- COMETE INTERNATIONAL (Tunisia)
- CAPWATT SERVICES, S.A. (Portugal)
- Indrivetec AG (Switzerland)

Project Description

Context

The dramatic effects of the climate crisis are calling for a change in the electrical grid paradigm. The market of Energy Storage Systems is now undertaking continuous growth, boosted by the relentless penetration of renewables. In this context, state of the art ESSs still have several limitations mainly due to technological constraints. Technology-dependent reaction times and rigid coupling between energy and power capacity, makes the choice of a specific ESS for different use cases very cumbersome and seldom optimal from both the technical and economic point of view. In addition, sustainability and safety of BESS need to be improved to satisfy the current and future requirements.

Project presentation, technical description and implementation

SMHYLES targets the development of safe and sustainable Hybrid Energy Storage Systems (HESSs) targeting different use and business cases. Electrochemical energy storage technologies such as VRFB, ZEBRA batteries and aqueous supercapacitors will be enhanced introducing innovations to solve some of the existing limitations and issues, also working toward the upscaling (WP3-WP4). Novel PCS technologies will be also designed and built for the optimal integration of batteries and SC into HESS (WP3-WP4). Research activities will also cover the development of software tools for HESS optimal design and management (WP2). These will be integrated into Smart EMS customized for HESS (WP4). Two novel HESS will be developed, prototyped and demonstrated at relevant industrial scale (WP4-WP5) in two pilot sites with an additional pilot demonstrating on-demand storage expansion of an existing HESS.

Project Impacts

SMHYLES targets the development of safe and sustainable Hybrid Energy Storage Systems (HESSs) targeting different use and business cases. Electrochemical energy storage technologies such as VRFB, ZEBRA batteries and aqueous supercapacitors will be enhanced introducing innovations to solve some of the existing limitations and issues, also working toward the upscaling (WP3-WP4). Novel PCS technologies will be also designed and built for the optimal integration of batteries and SC into HESS (WP3-WP4). Research activities will also cover the development of software tools for HESS optimal design and management (WP2). These will be integrated into Smart EMS customized for HESS (WP4). Two novel HESS will be developed, prototyped and demonstrated at relevant industrial scale (WP4-WP5) in two pilot sites with an additional pilot demonstrating on-demand storage expansion of an existing HESS.

Innovative aspects of the project

The SMHYLES project aims to develop and demonstrate safe, sustainable and modular HESSs for long-duration storage and grid services integrating novel storage solutions, smart digital models and EMS and advanced power electronics. The Project envisages to go beyond the state of the art in various dimensions reflecting its ambition through 3 innovation pillars: (i) HESS digital tools, (ii) Advanced energy storage technologies, and (iii) HESS integration and management.

Expected key exploitable results of the project

- Integrated AHESS: pilot system for Demo #1 in Maia, Portugal.
- Integrated SHESS: pilot system for Demo #2 in Graciosa Island, Portugal.
- Modular VRFB.
- Upscaled recycling process for Vanadium electrolyte.
- High-voltage sustainable SC module.
- Advanced BMS for ZEBRA battery.
- Grid-forming PCS for HESS.
- Advanced EMS and HESS ontrols.
- Digital solutions for HESS design.
- Research results on HESS design, management & operation.

Key exploitable results and sub-key exploitable results achieved to date

The project is in early phase since it started on the 1st of January 224. No key exploitable result are yet to be achieved at the moment.

HORIZON-CL5-2023-D3-01-13: Development of novel long-term electricity storage technologies

Back to projects' list

Energy storage

Air4NRG

Air Isothermal Compression Technology for Long Term Energy Storage

AIR4 NRG

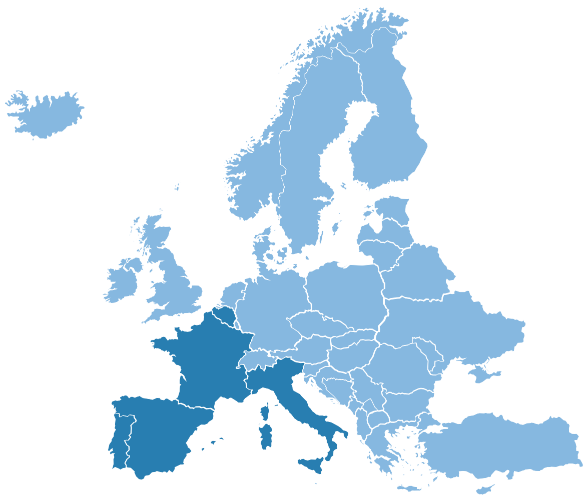
The main objective of the Air4NRG project is to develop an innovative, efficient and sustainable energy storage solution based on compressed air, namely a plug-and-play 40ft standard container, designed following grid and energy management system (EMS) integration requirements, and validated in a relevant environment, achieving TRL5 by the end of the project.

FROM	January 2024
TO	December 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
4 959 398,75 €	4 959 398,75 €	https://air4nrg.eu/

TECHNOLOGIES AND SERVICES DEPLOYED		
Large Scale Storage Technologies	Compressed air energy storage	
Distributed Storage Technologies	Other distributed storage technologies (Compressed air energy storage)	

PROJECT PARTNERS' COUNTRIES



COORDINATOR	ZABALA BRUSSELS (Belgium) -> prima riga di other partners
OTHER PARTNERS	• ZABALA BRUSSELS (Belgium) • SEGULA ENGINEERING (France) • ARIZAGA, BASTARRICA Y COMPANIA SA (Spain) • CNET CENTRE FOR NEW ENERGY TECHNOLOGIES SA (Portugal) • INSTITUT MINES-TELECOM (France) • LOMARTOV SL (Spain) • FONDAZIONE ICONS (Italy)

Project Description

Context

Energy storage solutions are potential candidates to provide the required flexibility to the electricity system. Lithium batteries have been developed to help address this challenge. However, their extremely high ecological footprint, low range of storage duration and unsustainability prove that this solution is not sufficient. Currently, long-term energy storage (LTES) is mainly provided by Pumped-Storage Hydroelectricity (PSH). Moreover, as of today, Compressed Air Energy Storage (CAES) has seen limited development so far due to poor energy efficiency, sometimes the use of fossil fuels and the need for specific underground cavities as storage tanks.

Project presentation, technical description and implementation

Air4NRG aims to develop an innovative, efficient (over 7% RTE), long-term, and sustainable CAES prototype, which can enhance renewable energy availability and offer robustness and safety while increasing cost-effectiveness and improving the environmental footprint.

Before reaching the final demonstration, the project methodology will combine process simulation of isothermal compression and expansion, experimental development on test benches, scalability work and industrialization study.

The integrability to the electrical grid system and their intelligent EMS, will be proven by the end of the project through end user integration activities (TRL5). The project will result in a plug and play prototype of a standard 4ft container-size with an over 1-hours storage duration.

Project Impacts

- The expected service life compared to Lithium batteries will be increased three-fold and will ensure quality storage through zero self-discharge.
- The solution is independent of rare or strategic materials (e.g., rare earths, lithium, cobalt, etc.) and only based on isothermal compression and expansion of air.
- The potential emissions of greenhouse gases, pollutants, and other hazardous substances are reduced to zero during the operation phase.
- The need for only highly common materials will also allow the reuse of existing components (such as gas storage tanks).
- As gas storage tanks are already industrialised and cheap, long duration energy storage (LDES) for 1+ hours is expected to be far cheaper than Lithium batteries.
- Safety hazards associated with energy storage, which include potential for fire, explosion and electrical shock, are reduced to zero due to the lack of chemicals or explosive materials.

Innovative aspects of the project

Air4NRG aims to develop a long-term, large-scale compressed air energy storage solution with improved environmental and economic balance vs existing technologies. Through patented isothermal compression-expansion tech (I-CAES), it aims to achieve over 7% round-trip efficiency only using water and air. The technology is designed as a critical raw material-free solution with simple industrial infrastructure needs, allowing for full development in the EU through a 4ft plug-and-play prototype.

Expected key exploitable results of the project

- Storage time at maximum power of, at least, 1 hours.
- Detailed modelling of the full storage process in operation.
- Round trip efficiency of more than 7%.
- Industrialised storage system of 2kW and 1 MWh to be embedded in two standard containers (4ft).
- Zero self-discharge.
- 1 sec response time in use, 1 sec for reaching the full power (ramp up).

- Technology lifetime of more than 3 years.
- Prototype to be validated in a relevant environment (physically simulated, TRL5).
- A reduction of the land footprint of 8% compared to pumped hydroelectric energy storage (PHES).
- A reduction of the carbon footprint of 6% compared to Lithium-ion batteries.
- A reduction of levelized costs of 4% compared to Lithium-ion batteries.
- To create jobs in the short term -at least 6 new FTE positions.

HORIZON-CL5-2023-D3-01-13: Development of novel long-term electricity storage technologies

Back to projects' list

Energy storage

SCO2OP-TES

sCO2 Operating Pumped Thermal Energy Storage for grid/industry cooperation

SCO2OP-TES

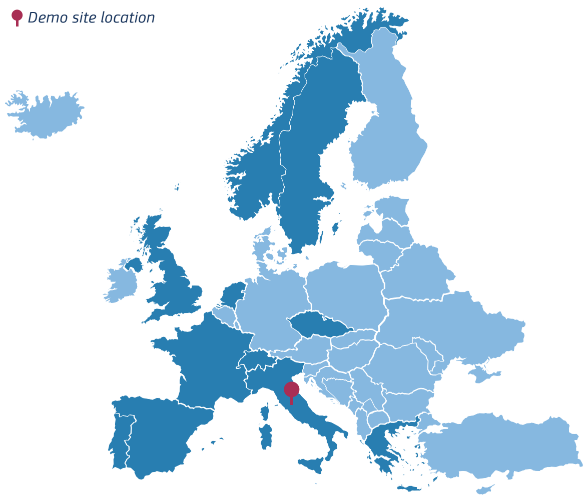
SCO2OP-TES project aims to develop and validate up to TRL5 in UNIGE-TP lab the next generation of Power-to-heat-to-power (P2H2P) energy storage able to guarantee long duration and large scale energy storage to facilitate bulky RES integration in EU energy systems as well as to enhance fossil based power plants flexibilization and facilitate grid integration of EU industries. SCO2OP-TES promotes indeed a new paradigm where industrial WH (even at low temperature like 150-200°C) can be used not only to produce power via ORC or sCO2 Cycles, but to operate P2H2P storage systems more efficiently and grid flexibly.

FROM	December 2023
TO	November 2027

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
4 701 873,75 €	4 701 873,75 €	https://cordis.europa.eu/project/id/101136000

TECHNOLOGIES AND SERVICES DEPLOYED		
H2	**Large Scale Storage Technologies**	Other large-scale storage technologies (Thermally Integrated Pumped Thermal Energy Storage based on sCO2)

PROJECT PARTNERS' COUNTRIES



COORDINATOR	UNIVERSITA DEGLI STUDI DI GENOVA (Italy)

OTHER PARTNERS

- RINA CONSULTING SPA (Italy)
- KUNGLIGA TEKNISKA HOEGSKOLAN (Sweden)
- ENOGIA (France)
- POLITECNICO DI MILANO (Italy)
- CNET CENTRE FOR NEW ENERGY TECHNOLOGIES SA (Portugal)
- CENTRUM VYZKUMU REZ SRO (Czechia)
- HERON II THERMOILEKTRIKOS STATHMOSVOIOTIAS ANONYMI ETAIREIA (Greece)
- RPOW CONSULTING SL (Spain)
- KYOTO GROUP AS (Norway)
- FUNDACION CARTIF (Spain)
- ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS (Greece)
- ALFA LAVAL VICARB SAS(France)
- THE UNIVERSITY OF BIRMINGHAM (United Kingdom)
- SIT TECHNOLOGIES SRL (Italy)
- EDP - GESTAO DA PRODUCAO DE ENERGIASA (Portugal)

Project Description

Context

EU energy grids and systems and the requirements to manage them are changing. EU is targeting to strongly reduce its emissions in the energy and industrial sector and such energy transition is mostly having two main players: RES and promotion of electrification. Electricity storage has a key role in this transition, nevertheless, this “EU RES driven electrification campaign” cannot be managed by “INVERTER DRIVEN” storage only balancing the grid is mandatory in order to allow for the targeted RES penetration in the grid. Balancing the grid is mandatory in order to allow for the targeted RES penetration in the grid thus storage based on rotating machines are necessary.

Project presentation, technical description and implementation

SCO2OP-TES promotes a new technological paradigm based on pumped thermal energy storage (PTES) with sCO2 cycles for long-duration grid scale storage as well as, and where available, concurrent utilization of freely available heat like thermal RES or industrial waste heat. SCO2OP-TES will assess through a relevant pilot campaign, the potential of sCO2 CARNOT BATTERIES based on innovative Molten Salt (MS) Thermal Energy Storage (TES) and sCO2 turbomachinery. Via its pilot and replication campaign, SCO2OP-TES promotes the role of P2H2P as key enabling energy storage technology to boost RES integration on the grid, enhance Fossil based power plants flexibility in new RES based scenario and facilitate industrial electrification integration in EU energy systems, also promoting energy intensive industries as grid flexibility actors.

Project Impacts

SCO2OP-TES will develop and validate technologies and modelling approaches to make EU leader in the field of sCO2 based P2H2P solutions, boosting industrial energy efficiency and Waste Heat Recovery (WHR) as well as fostering a storage solution based on rotating-machine and therefore more grid flexible and environmentally friendly (as no CRMs are required) if compared to batteries (particularly Li-On ones) or electro-chemical storage solutions

Innovative aspects of the project

- New TI-PTES layout.
- USe of sCO2 for PTES.
- Innovative sCO2 Machines.
- Innovative TES and HEX.

Expected key exploitable results of the project

- New TI-PTES layout.
- INovel modelling and control approaches.
- Innovative sCO2 Machines.
- Innovative TES and HEX.

HORIZON-CL5-2023-D3-01-13: Development of novel long-term electricity storage technologies

Back to projects' list

Energy storage | System integration

SEHRENE

Store Electricity and Heat foR climatE Neutral Europe

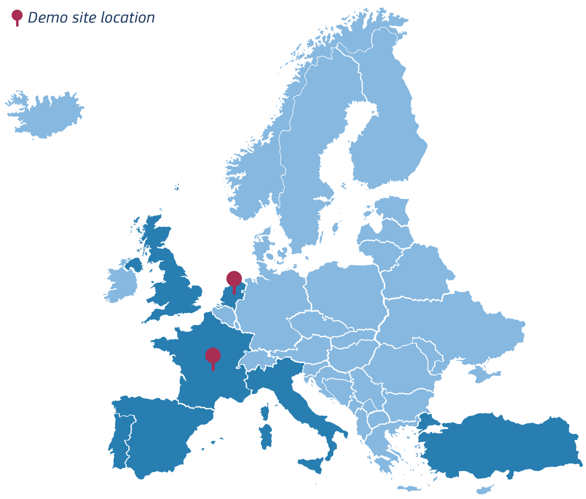
SEHRENE's new electrothermal energy storage (ETES) concept is designed to store renewable electricity (RE) and heat and to restitute it as needed. It is very energy-efficient (80-85%), is geographically independant and uses no critical raw materials. A TRL4 prototype and the digital twins of 3 full use-cases will be delivered: (i) ceramics plant storing excess, on-site PV power in a micro-grid and industrial waste-heat for continuous green H2 production and self-consumption, (ii) a smart-grid, and (iii) a geothermal power plant.

FROM	January 2024
TO	June 2027

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
3 548 416,75 €	3 548 416,75 €	https://cordis.europa.eu/project/id/101135763

TECHNOLOGIES AND SERVICES DEPLOYED		
Distributed Storage Technologies	Thermal energy production, distribution and storage	

PROJECT PARTNERS' COUNTRIES



COORDINATOR	ENERGIES ALTERNATIVES (France)
OTHER PARTNERS	• COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES (France) • UNIVERSITE DE LIEGE (Belgium) • POLITECNICO DI MILANO (Italy) • TURBODEN SPA (Italy) • FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS (Spain) • TORRECID SA (Spain) • ZORLU ENERJI ELEKTRIK URETIM AS (Türkiye) • CUERVA ENERGIA SLU (Spain) • SOCIEDADE PORTUGUESA DE INOVACAO CONSULTADORIA EMPRESARIAL E FOMENTO DA INOVACAO SA (Portugal) • TECHNOVATIVE SOLUTIONS LTD (United Kingdom) • UNIVERSITY OF LEICESTER (United Kingdom)

Project Description

Context

In March 2023, the European Commission presented the Net Zero Industry Act aiming to manufacture 4% of Europe's strategic energy technologies in Europe by 23. The Act covers 8 technologies, of which energy storage, heat pumps (HP), renewable electricity (RE) and technologies for the grid. This will enable Europe to capture international investments. Indeed, in 222, energy (mostly energy storage, including hydrogen and batteries) attracted the most investments of all emerging deep-tech sectors . In addition, 41.4 GW of new solar PV capacity was added in the EU in 222, a 47% increase versus 221, more than double projections.

Project presentation, technical description and implementation

SEHRENE proposes a novel Electro-Thermal Energy Storage (ETES) with a disruptive architecture unlocking the main technological issue in the pioneering ETES concept, i.e., round-trip efficiencies (RTE) reduced by temperature losses (temperature pinch). SEHRENE proposes several pioneering innovations to maximize the efficiency of "power-to-heat" and "heat-to-power" conversions.

To meet the goals and the requested impacts, SEHRENE project is structured into 4 Technical Work Packages, and 3 transversal WPs including the ones dedicated to dissemination and managementFigure 8. The work plan covers 42 months. The WP2 will define the industrial specifications from the 3 use cases. WP3 aims to provide a pre-design and detailed design of the ETES for each use case. The outcom

Project Impacts.

Technological impacts: development of new technologies of TES coupled with power cycle and heat pump.

Economic impacts: lower cost of energy stored.

Environmental impacts: decreased CO2 emission in industrial plant, less intensive use of raw critical materials

Innovative aspects of the project

SEHRENE's TES concept increases intrinsic KPIs (energy density and heat transfer rate) via the optimum technico-economic design based on models and simulations. It also enables the best integration in the system (use of the TES as a condenser for the HP and an evaporator for the ORC) to optimize depth-of-discharge, discharging time, etc. It will be based on isotropic metallic foam based on Kelvin cells that would ensure good heat transfer conduction in the whole TES volume.

Expected key exploitable results of the project

- Peer-reviewed publications on several areas (thermodynamics, numerical modelling, energy, technico-economic assessment).
- Use cases assessment results for implementation of ETES concept.
- Prototypes exploitation and experimental results
- Dissimination activities toward stakeholders: webinars, workshops.

HORIZON-CL5-2023-D3-01-13: Development of novel long-term electricity storage technologies

Back to projects' list

Energy storage | System integration | Decarbonisation

STORE2HYDRO

Novel long-term electricity storage technologies for flexible hydropower

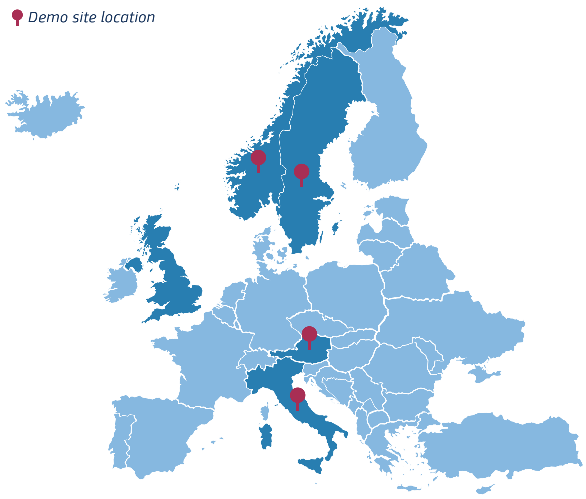
STORE2HYDRO aims to retrofit reversible pump turbine technology into existing hydropower facilities to increase Europe's electricity storage capacity by 22TWh/year. It involves developing innovative mechanical solutions for large-scale pumped storage, mapping untapped hydropower sources, implementing digital twin technologies, and conducting life cycle and cost assessments. The project will enhance the flexibility and efficiency of hydropower plants, supporting the European Green Deal goals.

FROM	January 2024
TO	December 2027

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
4 315 796,25 €	4 315 796,25 €	https://cordis.europa.eu/project/id/101136176

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	Monitoring and control tools
Large Scale Storage Technologies	Hydro storage

PROJECT PARTNERS' COUNTRIES



COORDINATOR	LULEA TEKNISKA UNIVERSITET (Sweden)

OTHER PARTNERS

- NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET NTNU (Norway)
- STIFTELSEN NORSK INSTITUTT FOR NATURFORSKNING NINA (Norway)
- AARHUS UNIVERSITET (Denmark)
- ALMA MATER STUDIORUM - UNIVERSITA DI BOLOGNA (Italy)
- TECHNISCHE UNIVERSITAET WIEN (Austria)
- AKER SOLUTIONS AS (Norway)
- VATTENFALL AB (Sweden)
- UPPSALA UNIVERSITET (Sweden)
- WRG EUROPE LTD (United Kingdom)
- UNIVERSITY OF STRATHCLYDE (United Kingdom)

Project Description

Context

The STORE2HYDRO project aligns with the European Commission's priorities for sustainable energy and decarbonization. By retrofitting existing hydropower facilities with innovative storage technology, the project supports sustainability goals by enabling increased renewable energy integration and grid stability. It contributes to the digitalization of energy systems through the use of digital twin technologies, enhancing operational efficiency. This initiative fosters economic growth by promoting cost-effective energy storage solutions and leveraging untapped hydropower resources for clean energy generation, aligning with broader EU policies for green transition and energy security.

Project presentation, technical description and implementation

The project aims to enhance electricity storage using hydropower by retrofitting reversible pump turbine technology. Key objectives include increasing storage capacity by 22 TWh/year.

The approach involves:

1. Developing retrofit solutions for pump turbines.

2. Implementing digital twins for real-time monitoring and optimization.

3. Conducting life cycle assessments and cost analyses.

Key technologies include retrofit pump turbines and digital twin systems for predictive maintenance and modeling.

Project Impacts

The STORE2HYDRO project addresses the challenge of enhancing electricity storage within existing hydropower facilities to support grid flexibility and renewable energy integration. The objectives include:

Technological Challenges and Objectives:

Develop retrofit solutions for reversible pump turbine technology to enable large-scale, long-duration electricity storage in high-head reservoir-to-reservoir (RtR) and low-head run-of-river (RoR) hydropower plants.

Increase European electricity storage capacity by 22 TWh per year or more through these innovations.

Unique Technical Approach:

Utilization of retrofitable reversible pump turbine technology to enhance flexibility and efficiency without altering existing hydropower infrastructure.

Introduction of digital twin technologies to optimize energy storage operations and maximize grid stability.

Methodology and Approach:

- Conduct research and development to advance pump turbine designs to Technology Readiness Levels (TRL) 4-5.
- Map untapped hydropower potential across Europe and assess the feasibility of energy storage solutions.
- Implement detailed life cycle assessments (LCA) and cost analyses (CAPEX/OPEX) to ensure economic viability.

Key Components and Technologies:

Innovative mechanical solutions for retrofitting reversible pump turbines, addressing cavitation issues and enhancing flexibility.

Digital twin technologies for real-time monitoring and predictive modeling of energy storage systems, optimizing performance and reliability.

Innovative aspects of the project.

The most impactful aspect of the STORE2HYDRO project is the development of retrofitable reversible pump turbine technology for electricity storage in existing hydropower plants. This innovation allows for significant increases in storage capacity without major infrastructure changes, contributing to grid flexibility and renewable energy integration. Additionally, the use of digital twin technologies enhances operational efficiency and system reliability.

Expected key exploitable results of the project

Key Exploitable Results:

- Retrofitable Reversible Pump Turbine Technology for existing hydropower facilities.
- Digital Twin tools for enhanced hydraulic and sediment dynamics understanding.
- Cost-effective components and solutions for pump-turbine retrofitting.
- Mapping of untapped hydropower sources for electricity storage.
- Operational guidelines for integrating new technologies into existing hydropower systems.
- Key exploitable results and sub-key exploitable results achieved to date.

Key Exploitable Results Achieved:

- Developed retrofitable reversible pump turbine technology prototype for existing hydropower facilities.
- Initial implementation and testing of digital twin tools for hydraulic and sediment dynamics analysis.
- Identified and characterized untapped hydropower sources for electricity storage.
- Conducted preliminary cost-effectiveness analysis of components for pump-turbine retrofitting.

Sub-Key Exploitable Results in Progress:

- Refinement and optimization of retrofitable pump turbine design.
- Further development and calibration of digital twin tools for accurate system modeling.
- Detailed economic assessment and feasibility study of identified hydropower sites.

HORIZON-CL5-2023-D3-01-11 - Demonstration of DC powered data centres, buildings, industries and ports

Back to projects' list >

Electricity grids | Energy storage | System integration

SHIFT2DC

SHIFT to Direct Current

SHIFT2DC aims to design, simulate, and implement MV and LV DC solutions across Europe, with 32 partners from 12 countries collaborating. The project evaluates technical feasibility, cost-effectiveness, and environmental impact in data centers, buildings, industries, and ports. It will also assess consumer attitudes towards DC solutions and develop tools to encourage their adoption. Outcomes will be case-agnostic, suitable for various applications, with subsequent stages offering sector-specific simulations. Emphasis on interoperability, scalability, and security is key, with efforts to shape standards and regulatory frameworks that support it.

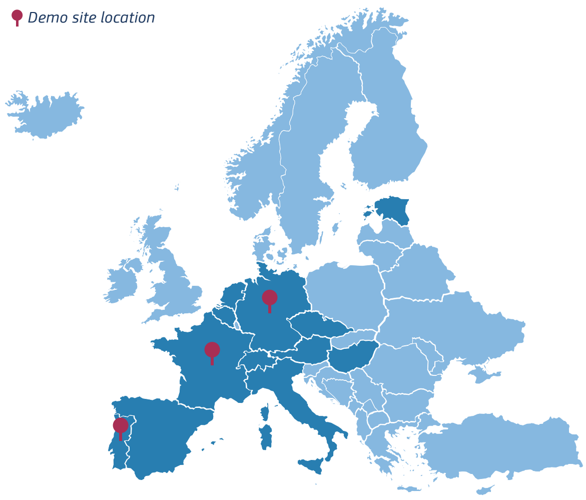
FROM	December 2023
TO	May 2027

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
11 322 202,50 €	8 999 345,25 €	https://cordis.europa.eu/project/id/101136131

TECHNOLOGIES AND SERVICES DEPLOYED

Grid Technologies	Multi-terminal; Protections; Network management; Monitoring and control tools
Distributed Storage Technologies	Batteries; Electric vehicles

PROJECT PARTNERS' COUNTRIES



COORDINATOR: INESC ID - INSTITUTO DE ENGENHARIADE SISTEMAS E COMPUTADORES, INVESTIGACAO E DESENVOLVIMENTO EM LISBOA (Portugal)

OTHER PARTNERS

- ELECTRICITE DE FRANCE (France)
- CNET CENTRE FOR NEW ENERGY TECHNOLOGIES SA (Portugal)
- FUNDACION TECNALIA RESEARCH & INNOVATION (Spain)
- RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (Germany)
- FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV (Germany)
- SCHNEIDER ELECTRIC INDUSTRIES SAS (France)
- NEXANS FRANCE (France)
- FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS (Spain)
- WATT & WELL (France)
- TALLINNA TEHNIKAÜLIKOOL (Estonia)
- BACHMANN GMBH (Germany)
- HIRO MICRODATACENTERS B.V. (Netherlands)
- EATON INDUSTRIES GMBH (Germany)
- HITACHI ENERGY SPAIN SA (Spain)
- PHOENIX CONTACT ELECTRONICS GMBH (Germany)
- APRAM - ADMINISTRACAO DOS PORTOS DA REGIAO AUTONOMA DA MADEIRA SA (Portugal)
- IST-ID ASSOCIACAO DO INSTITUTO SUPERIOR TECNICO PARA A INVESTIGACAO E O DESENVOLVIMENTO (Portugal)
- PCB DESIGN KUTATO ES FEJLESZTO KORLATOLT FELELOSSEGU TARSASAG (Hungary)
- EUROPEAN HEAT PUMP ASSOCIATION (Belgium)
- FINCANTIERI SI SPA (Italy)
- SETEC BATIMENT (France)
- EEM EMPRESA DE ELECTRICIDADE DA MADEIRA SA (Portugal)
- LABORATOIRE NATIONAL DE METROLOGIE ET D'ESSAIS (France)
- Stichting Current OS (Netherlands)
- ZVEI e. V. (Germany)
- JJ COOLING INNOVATION SARL (Switzerland)
- NEXANS SWEDEN AB (Sweden)
- DC-SYSTEMS B.V. (Netherlands)
- EATON ELEKTROTECHNIKA SRO (Czechia)
- EATON INDUSTRIES (AUSTRIA) GMBH (Austria)
- PHOENIX CONTACT GMBH & CO KG (Germany)

Project Description

Context

Electric devices increasingly use DC due to its efficiency and cost advantages over AC. From renewable energy sources like photovoltaic panels and wind farms to consumer electronics and e-mobility, DC's application is expanding. Despite its benefits, including savings on materials and improved system controllability, technical, regulatory, and standardization challenges hinder its widespread adoption. Addressing these, particularly the need for advanced control algorithms, protection designs, and simulation tools, is critical for DC's future.

Project presentation, technical description and implementation

The SHIFT2DC project advances DC technology, focusing on low voltage solutions previously overlooked in HVDC development. It aims to harmonize converter controls, enhance fault protection, and utilize durable insulation materials to ensure stable DC operation. The project will develop open-source design tools, living labs for real-time testing, sustainable DC cabling, and control algorithms for efficient DC integration. It will also propose new DC/DC converter technologies for renewables and storage, design power flow control for DC and hybrid grids, and perform environmental and feasibility studies. Solutions will be tested in key sectors and across European demonstrators, with regulatory insight and standardization efforts integral to its strategy.

Project Impacts

The SHIFT2DC project is set to deliver multiple impacts across various sectors:

A) Data Centres:

- Design and demonstration of a DC-powered data center.
- Renewable energy systems integration.
- Cost-benefit analysis highlighting savings over traditional AC data centers.

B) Commercial and Residential Buildings:

- R&I in DC distribution with demonstrations and validations.
- Intelligent DC systems installation, encompassing all related components.
- Efficiency and cost comparison of DC vs. AC systems.

C) Industry:

- R&I leading to the demonstration of energy-efficient industrial applications.
- Innovation in circuit protection for selectivity and reliability.
- Research into suitable insulation materials for DC applications.

D) Ports:

- R&I for the development of a DC port infrastructure.
- Simulation and analysis of DC distribution for port electrification.
- Tools to estimate necessary DC charging infrastructure.
- System-level cost-benefit analysis for DC versus AC ports.
- Business model development for ports as energy hubs.

The project's regulatory contributions are crucial for the adoption of DC solutions, requiring a concerted political and economic progress. Effective communication, dissemination, and exploitation strategies are essential to ensure the project's success and the utilization of its outcomes.

Innovative aspects of the project

SHIFT2DC innovates DC grid technology, focusing on low-voltage areas. It enhances converter control, fault management, and uses durable insulation for system stability. The project introduces open-source simulation tools, living labs, and sustainable DC cables, improving energy and data integration. Novel control algorithms and DC/DC converters will interface with renewable sources and storage, enhancing grid performance and protection coordination.

Expected key exploitable results of the project

- Pre-qualification of DC solution procedure.
- Participation in Grid and system services.
- Energy hubs Management.
- Sustainable and smart DC Cable.
- Micro Solar DC Systems and Partial Power Processing.
- Smart PDU High Density V2X DC stations.
- LVAC-LVDC Interlink converter /Static protection System.
- LVDC measurement device and DC connector.
- Fast-response control technologies.
- Multisocket-Smart Power Distribution Unit.
- Passive cooling system.
- Sharing Voltage control approach.
- EMS tool for AC/DC Hybrid Systems.
- DC Solutions Design tool.
- DC Solutions simulation tool.
- DC Protection & Stability Assessment tool.
- DC Challenges and opportunities.
- DC simulation tools and algorithms.
- LV living lab for testing solutions.
- Industrial DC grid demonstrator.
- DC data centre demonstration.
- Data Exploitation.

HORIZON-CL5-2023-D3-01-08: Demonstration of sustainable tidal energy farms

Back to projects' list

Electricity grids | Energy storage | System integration

EURO-TIDES

EUROpean Tidal energy pilot farm focused on Industrial Design, Environmental mitigation and Sustainability

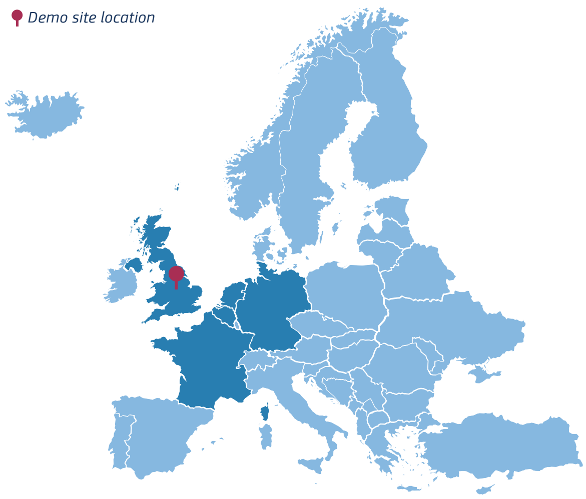
EURO-TIDES will deliver a 9.6 MW tidal energy farm of 4x2.4 MW Orbital devices, and deploy it in 2027, running in full operational conditions for 15 years. The project aims to: 1.De-risk tidal energy technology development; 2.Reduce the LCOE of Orbital's floating tidal technology to under €100/MWh; 3.Boost the availability of tidal streams to over 95%; 4.Increase bankability and insurability and provide essential technology metrics verification using internationally recognised methodologies; 5.Improve market confidence and supply chain capacity; 6.Increase knowledge of environmental impacts. The project will accelerate commercialisation and lead to a 2 GW+ project pipeline deployment.

FROM	December 2023
TO	November 2029

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
3 653 620,00 €	3 192 720,63 €	https://cordis.europa.eu/project/id/101136085

TECHNOLOGIES AND SERVICES DEPLOYED	
Distributed Storage Technologies	Batteries; Thermal energy production, distribution and storage
Generation Technologies	Tidal energy

PROJECT PARTNERS' COUNTRIES



COORDINATOR	ASSOCIATION EUROPEENNE DE L'ENERGIE DE L'OCEAN (Belgium)

OTHER PARTNERS

- BELGISCH LABORATORIUM VAN ELEKTRICITEITSINDUSTRIE (Belgium)
- MARASOFT B.V. (Netherlands)
- RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (Germany)
- ENERGIE DE LA LUNE (France)
- THE UNIVERSITY OF EDINBURGH (United Kingdom)
- THE EUROPEAN MARINE ENERGY CENTRE LIMITED (United Kingdom)
- ORBITAL MARINE POWER LIMITED (United Kingdom)

Project Description

Context

By delivering a 9.6 MW tidal energy farm of 4x 2.4 MW Orbital devices, using the previous learnings from the FORWARD-23 & MAXBLADE EU-funded projects, this project aims to:

- de-risk tidal energy technology development and reduce LCOE costs, bankability, insurability
- foster EU global leadership in sustainable RE technologies
- deliver 1GW of disruptive RE sources to support open strategic autonomy and a diverse technology portfolio, whilst reducing supply–demand balancing by 25% in the transition to a net zero energy system
- advance a climate neutral energy supply
- create over 32, FTE years in a leading European clean energy supply chain.

Project presentation, technical description and implementation

Tidal energy is currently higher cost and more immature than other RES generating technologies. This project seeks to deliver innovations to advance the deployment of tidal farms based on a multidisciplinary design approach, to advance designs & innovations around electrical and anchoring designs for arrays, industrial design for volume manufacturing and environmental monitoring. 4 tidal turbines will be constructed and then deployed and operated for 2 yrs to validate the project innovations. The project will consider how arrays are operated cost effectively by developing a suite of digital infrastructure to efficiently manage tidal farms and handling large amounts of low and high frequency data. It will also be integrated with battery storage and a hydrogen electrolyser and scenarios will be tested to explore how the value of tidal stream energy can be enhanced through power-to-x.

Project Impacts

Tidal stream energy provides Europe with a non-intermittent, predictable source of low carbon energy with initial 2GW of capacity and up to c.1GW in European waters supporting rapidly upgraded regulatory frameworks and strategies around energy security.

Financing of 2GW+ of tidal stream projects in Orbital's current project portfolio with commercial debt and expanded insurance provision in line with EU Strategy on offshore renewable energy.

2GW installed capacity support €1.7 billion of direct spend, €1.42 billion in indirect GVA and €.31 billion in induced GVA. Leading to 32, FTE years in supply chain associated with 2GW of deployment.

€1.7 billion of contracts awarded to European suppliers from initial 2 GW of installation. 32, FTE years created in the supply chain associated these orders. European suppliers positioned to capture long term market calculated a t 1GW/€5bn. Europe's strategy autonomy is enhanced as European suppliers can competitively deliver all tidal farm scopes of supply.

Tidal stream sector provide Europe with a non-intermittent, predictable source of low carbon energy with initial 2 GW of capacity and up to c. 1 GW in European waters supporting rapidly upgraded regulatory frameworks and strategies around energy security.

Advancing a climate neutral energy supply with 1GW global potential. Improving technology environmental sustainability by offsetting 24,65, tonnes of CO2 equivalent.

Innovative aspects of the project

The most impactful aspect of the project is the development of a new-generation EPES platform integrating risk assessment, anomaly detection, and energy restoration. This approach combines cutting-edge cybersecurity measures with advanced data analytics and training solutions, fostering resilience against evolving threats. The project's innovative use of AI, virtual reality (VR), and cybersecurity standards sets a new standard for safeguarding critical energy infrastructure.

Expected key exploitable results of the project

Expected results and outcomes:

- Reduction of tidal stream LCOE from €12/MWh to <€1/MWh. Quantification of the benefits of tidal stream energy in a high renewables penetration net zero energy system.
- Collection, collation and communication of 17,25 hours of turbine operational data showing the production of over 5GWh+ during this period.
- Tidal farm availability increased to 95%+. Detailed performance datasets produced.
- Established route to manufacture of 8 devices per annum. Creation of a European Supply chain competitiveness Roadmap.
- Increased understanding of environmental impacts of tidal stream energy with 17,25 hours of environmental data collected and disseminated.
- Local and national governments put in place supportive policy frameworks (notably revenue support) for tidal stream energy.

Key exploitable results and sub-key exploitable results achieved to date. The project has just commenced (November 223) and therefore exploitable results have not been generated yet.

The main envisaged exploitable results are:

- Improved array design (electrical and anchoring) for floating tidal stream farms.
- Improved knowledge of component reliability
- An environmental monitoring system for tidal farms.
- Improved understanding of how to operate tidal farms in conjunction with power-to-x to enhance the value of tidal stream energy
- An integrated digital infrastructure for high and low frequency data handling from tidal farms.

HORIZON-CL5-2023-D3-01-08: Demonstration of sustainable tidal energy farms

Back to projects' list

Electricity grids | System integration | Decarbonisation

SEASTAR

Sustainable European Advanced Subsea Tidal Array

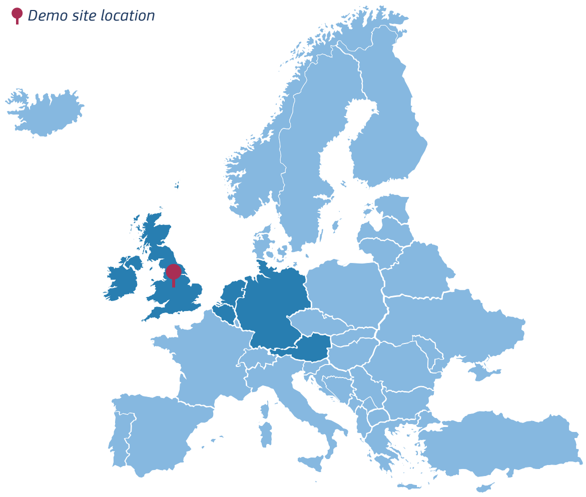
SEASTAR aims to deliver a 4MW array of 16 tidal stream turbines at the Fall of Warness tidal site in Orkney. This tidal farm will:1. showcase industrial scale manufacturing, operation, and maintenance techniques throughout the entire lifecycle: from design, production, shipping, deployment, and operation to decommissioning; 2. address critical environmental evidence gaps and develop cost-effective, reliable, monitoring solutions to accelerate permitting and remove barriers for future large tidal farms; 3. reinforce the collaborative partnership between the UK and EU, create high-quality green jobs and enhance Europe's position as a global frontrunner in the marine energy supply chain.

FROM	December 2023
TO	February 2029

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
4 562 997,50 €	3 360 346,26 €	https://www.seastar-project.eu/

TECHNOLOGIES AND SERVICES DEPLOYED		
Generation Technologies	Tidal Energy	

PROJECT PARTNERS' COUNTRIES



COORDINATOR	NOVA INNOVATION LIMITED (Ireland)

OTHER PARTNERS

- SKF GMBH (Germany)
- SKF MARINE GMBH (Germany)
- ASSOCIATION EUROPEENNE DE L'ENERGIE DE L'OCEAN (Belgium)
- DLA PIPER WEISS TESSBACH RECHTSANWALTE GMBH (Austria)
- WOOD GROUP KENNY IRELAND LTD (Ireland)
- PRIMO MARINE THE NETHERLANDS B.V. (Netherlands)
- OCEAN WAVE VENTURE LIMITED (Ireland)
- NATURE POSITIVE LIMITED (United Kingdom)
- RENEWABLE RISK ADVISERS LIMITED (United Kingdom)
- THE EUROPEAN MARINE ENERGY CENTRE LIMITED (United Kingdom)
- LEASK MARINE LIMITED (United Kingdom)
- NOVA INNOVATION LTD (United Kingdom)

Project Description

Context

By demonstrating the industrial design and manufacturing processes through the world's first volume production run of tidal energy devices, the project will:

- Foster EU global leadership in secure and sustainable RE technologies.
- Diversify the RE technology portfolio: predictable tidal power, compliments wind and solar.
- Enhance sustainability of RE value chains, taking fully into account circular economy, social, economic & environmental aspects in line with the European Green Deal priorities.
- Enhance European energy security& autonomy of energy supply, while accelerating the green transition.
- Reduce cost and improve efficiency of RE tech.
- Achieve climate neutrality by 25

Project presentation, technical description and implementation

The global transition to net zero carbon requires the complete decarbonisation of energy supply. Tidal power is a major untapped source of renewable energy (RE), and offers 4 GW of predictable, zero-carbon power to enhance European energy security and resilience.

SEASTAR will address the following challenges in order to accelerate the large-scale commercialisation of tidal power:

- Technological, by demonstrating for the first time the industrial systems, manufacturing and operational techniques required to efficiently deliver a large tidal farm;
- Environmental, by generating and sharing transferable knowledge on key consenting risks, de- risking future large arrays globally; and
- Commercial, focusing on increasing large array insurability and bankability, and cutting costs to accelerate the sustainable commercialisation and scaling of tidal power.

Project Impacts

Commercial impacts:

- Cost reduction in LCOE for tidal power comes from three sources: economies of volume, increased array yield, and reduced cost of capital.
- Increased bankability of tidal power.
- De-risk future large tidal farms by generating transferable learning on environmental impacts and developing environmental best practice.
- Boost European export potential & collaboration: UK-EU collaboration with 1GW global potential.

Technological impacts:

- Demonstrate for the first time volume manufacturing, deployment & operation of a large tidal farm.
- Demonstrate high technology reliability and availability.
- The increased confidence in cost-effective delivery of tidal energy.
- Technological advances include tidal farm cabling design, array-scale device control, and array-scale deployment, operation and maintenance techniques.
- Improving operational efficiency, proving long-term, high device reliability and availability, and decreasing costs will accelerate the development of the tidal energy sector, enabling technology developers to reach commercial maturity and bring their products to market.
- Better integration of sustainable RE-based solutions, including through digital technologies.

Enhanced innovation capacity:

- Develop and validate novel industrial processes and systems and array cabling solutions that will advance the state-of-the-art for the whole ocean energy sector.

Scientific impacts:

- New knowledge on the environmental effects of tidal arrays at scale will be shared with EMODNET and the IEA OES Environmental task.
- Maximising impact through engagement with the ERSG, which will include the key regulators consenting tidal power projects around the world.

Societal and environmental impacts:

- Developing a new manufacturing sector, contributing to European energy and technology security and the Blue Economy.
- Benefiting the European and global consumers from the development of a new, entirely predictable, diversified renewable energy source.
- Reduced carbon emissions in Europe.
- Strengthen European energy and technology security, while accelerating the green transition
- Fostering European global leadership in affordable, secure and sustainable Renewable Energy (RE) technologies, improving their competitiveness in growth markets, and through the diversification of the RE technology portfolio.

Expected key exploitable results of the project

The SEASTAR project will:

- Deliver the world's largest ever tidal farm (number of deployed devices). It will demonstrate, for the first time, industrial systems for the volume manufacturing, deployment and operation of tidal turbines for 2+ years within the project (2 years in total).
- Showcase high availability and reliability of proven tidal turbines to build confidence in the sector.
- Secure 2%+ debt funding (bankability).
- 6% cost reduction in turbine CAPEX.
- Validate a 33% LCOE reduction for tidal power.
- Maintain 1% European supply chain with 19 EU member states.
- Demonstrate the sustainability of tidal energy, disseminating transferable learning and best practice on environmental monitoring and operation experience and to regulators and the wider sector, securing regulator buy-in for large commercial arrays.

HORIZON-CL5-2023-D3-01-15 - Supporting the green and digital transformation of the energy ecosystem and enhancing its resilience through the development and piloting of AI-IoT Edge-cloud and platform solutions

Back to projects' list

Digitalisation | System integration | Decarbonisation

HEDGE-IoT

Holistic Approach towards Empowerment of the DiGitalization of the Energy Ecosystem through adoption of IoT solutions

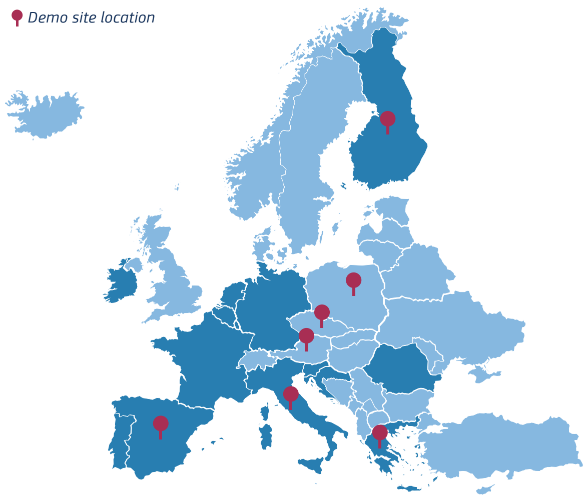
HEDGE-IoT aims to deploy IoT assets across the energy system, integrating AI/ML tools for enhanced grid intelligence and resilience. Objectives include boosting renewables' hosting capacity, creating new market opportunities with interoperable energy services, and advancing IoT standardization. Key outcomes involve improved grid resilience, expanded renewable integration, and accelerated IoT adoption in energy.

FROM	January 2024
TO	June 2027

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
21 952 255,00 €	17 999 755,00 €	https://cordis.europa.eu/project/id/101136216

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	Network management

PROJECT PARTNERS' COUNTRIES



COORDINATOR	CORDEEL NV (BELGIUM)

OTHER PARTNERS

- EUROPEAN DYNAMICS LUXEMBOURG SA (Luxembourg)
- RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (Germany)
- ENGINEERING - INGEGNERIA INFORMATICA SPA (Italy)
- EREVNITIKO PANEPISTIMIAKO INSTITOUTO SYSTIMATON EPIKOINONION KAI YPOLOGISTON (Greece)
- INESC TEC - INSTITUTO DE ENGENHARIADE SISTEMAS E COMPUTADORES, TECNOLOGIA E CIENCIA (Portugal)
- NEDERLANDSE ORGANISATIE VOOR TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK TNO (Netherlands)
- TAMPEREEN KORKEAKOULUSAATIO SR (Finland)
- TEKNOLOGIAN TUTKIMUSKESKUS VTT OY (Finland)
- TRIALOG (France)
- CYBERETHICS LAB SRLS (Italy)
- CENTRO DE INVESTIGACAO EM ENERGIA REN - STATE GRID SA (Portugal)
- INTERNATIONAL DATA SPACES EV (Germany)
- ELIA TRANSMISSION BELGIUM (Belgium)
- HRVATSKI OPERATOR PRIJENOSNOG SUSTAVA D.D. (Croatia)
- UNIVERSITATEA TEHNICA CLUJ-NAPOCA (Romania)

OTHER PARTNERS	• CLUSTER VIOOIKONOMIAS KAI PERIVALLONTOS DYTIKIS MAKEDONIAS (Greece) • F6S NETWORK IRELAND LIMITED (Ireland) • SOCIAL OPEN AND INCLUSIVE INNOVATION ASTIKI MI KERDOSKOPIKI ETAIREIA (Greece) • ABB OY (Finland) • ENERVA OY (Finland) • JARVI-SUOMEN ENERGIA OY (Finland) • DIMOSIA EPICHEIRISI ILEKTRISMOU ANONYMI ETAIREIA (Greece) • DIACHEIRISTIS ELLINIKOU DIKTYOU DIANOMIS ELEKTRIKIS ENERGEIAS AE (Greece) • INDEPENDENT POWER TRANSMISSION OPERATOR SA (Greece) • ELLINIKO HRIMATISTIRIO ENERGEIAS (Greece) • HARDWARE AND SOFTWARE ENGINEERING EPE (Greece) • QUE TECHNOLOGIES KEFALAIOUCHIKI ETAIREIA (Greece) • ARETI S.P.A. (Italy) • APIO S.R.L. (Italy) • ACEA ENERGIA SPA (Italy) • VOLKERWESSELS ICITY B.V. (Netherlands) • ARNHEMS BUITEN BV (Netherlands) • STICHTING VU (Netherlands) • COOPERATIVE ELECTRICA DO VALE DESTE CRL (Portugal) • REN - REDE ELECTRICA NACIONAL SA (Portugal) • MC SHARED SERVICES SA (Portugal) • ELES DOO OPERATER KOMBINIRANEGA PRENOSNEGA IN DISTRIBUCIJSKEGA ELEKTROENERGETSKEGA OMREZJA (Slovenia) • ELEKTRO GORENJSKA PODJETJE ZA DISTRIBUCIJO ELEKTRICNE ENERGIJE DD (Slovenia) • OPERATO DOO (Slovenia) • SVEUCILISTE U ZAGREBU FAKULTET ELEKTROTEHNIKE I RACUNARSTVA (Croatia) • INSTITUT JOZEF STEFAN (Slovenia) • KONCAR - DIGITAL DOO ZA DIGITALNE USLUGE (Croatia) • EUROPEAN DYNAMICS ADVANCED INFORMATION TECHNOLOGY AND TELECOMMUNICATION SYSTEMS SA (Greece) • ELERGONE ENERGIA, LDA (Portugal) • MODELO CONTINENTE HIPERMERCADOS S.A. (Portugal)

Project Description

Context

The project aims to address key thematic areas outlined by the European Commission, emphasizing sustainability, digitalisation, and economic growth. By deploying IoT solutions in energy systems, the project aligns with EU priorities to enhance grid resilience, promote renewable energy integration, and foster innovation in digital technologies. This initiative supports EU objectives by advancing smart energy networks, empowering consumers, and driving efficiencies across the energy ecosystem. The project's context underscores a strategic push towards sustainable, inclusive, and technologically advanced energy systems in Europe.

Project presentation, technical description and implementation

The "HEDGE-IoT" project aims to revolutionize energy systems with IoT solutions for enhanced digitalization and sustainability. Key objectives include deploying AI/ML tools at edge and cloud levels, fostering interoperable energy services, and standardizing data formats. This approach integrates IoT assets to optimize grid intelligence and flexibility, offering unique computational orchestration for energy services. Key components like AI/ML and standardized architectures drive efficiency and resilience in energy systems.

Project Impacts

Economic impacts:

- Increased market opportunities for IoT-enabled energy services.
- Cost reductions in operational and maintenance expenses.
- Creation of new business models and market entrances.

Social impacts:

- Improved job quality and creation of skilled employment opportunities.
- Enhanced public trust through inclusive engagement with end-users.

Environmental impacts:

- Decreased carbon emissions through optimized energy management.
- Energy savings and resource efficiency.

Technological impacts:

- Advancement and standardization of IoT technologies in energy systems.

- Development and diffusion of AI/ML tools for energy optimization.

Innovative aspects of the project

The project's most impactful aspects include:

- Deployment of IoT assets across energy systems, enhancing grid intelligence.
- Integration of AI/ML tools to optimize energy flexibility and resilience.
- Adoption of federated applications for cloud-edge computing, improving scalability and interoperability.
- These innovations unlock untapped grid flexibility, create new market opportunities, and foster IoT standardization, essential for sustainable energy transitions.

Expected key exploitable results of the project

The project's most impactful aspects include:

- Deployment of IoT assets across energy systems, enhancing grid intelligence.
- Integration of AI/ML tools to optimize energy flexibility and resilience.
- Adoption of federated applications for cloud-edge computing, improving scalability and interoperability.
- These innovations unlock untapped grid flexibility, create new market opportunities, and foster IoT standardization, essential for sustainable energy transitions.

Key exploitable results and sub-key exploitable results achieved to date

- Development of a novel Digital Framework integrating IoT assets at various energy system levels.
- Implementation of advanced AI/ML tools for grid intelligence and optimization.
- Introduction of federated applications for cloud-edge continuum, enhancing scalability and interoperability.

Sub-key exploitable results under development:

- Pilot testing of IoT-enabled energy services in diverse grid environments.
- Standardization efforts for IoT data exchange and interoperability.
- Market analysis and business models for commercializing IoT-driven energy solutions.

HORIZON-CL5-2023-D3-01-15 - Supporting the green and digital transformation of the energy ecosystem and enhancing its resilience through the development and piloting of AI-IoT Edge-cloud and platform solutions

Back to projects' list

Electricity grids | Energy storage | Digitalisation

ODEON

federated data and intelligence Orchestration & sharing for the Digital Energy transitiON

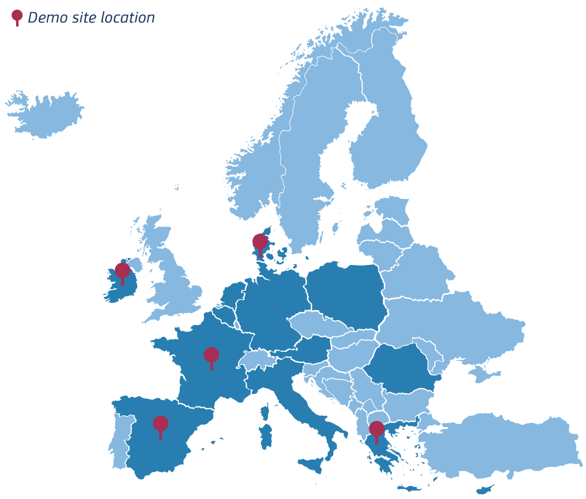
ODEON introduces a sound, reliable, scalable and openly accessible federated technological framework (i.e. ODEON Cloud-Edge Data and Intelligence Service Platform and corresponding Federated Energy Data Spaces. AI Containers, Smart Data/AIOps orchestrators) for the delivery of a wealth of services addressing the complete life-cycle of Data/AIOps and their smart spawn in federated environments and infrastructures across the continuum. It will integrate highly reliable and secure federated data management, processing, sharing and intelligence services, enabling the energy value chain actors and 3rd parties to engage in data/intelligence sharing, towards the delivery of innovative data-driven and intelligence-powered energy services in accordance to the objectives set by the DoEAP. ODEON results will be extensively validated in 5 large-scale demonstration sites in Greece, Spain, France, Denmark and Ireland involving all required value chain actors, diverse assets, heterogeneous grid and market contexts, and multi-variate climatic and socio-economic characteristics to support its successful replication and market uptake

FROM	January 2024
TO	December 2027

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
22 564 718,75 €	17 875 306,25 €	https://cordis.europa.eu/project/id/101136128

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	High Voltage Alternating Current; Micro-grid; Semiconductor devices and power converters; Monitoring and control tools
Large Scale Storage Technologies	Power to gas; Compressed air energy storage; Hydro storage; Molten salt storage
Distributed Storage Technologies	Batteries; Electric vehicles; Thermal energy production, distribution and storage

PROJECT PARTNERS' COUNTRIES



COORDINATOR	ETRA INVESTIGACION Y DESARROLLO SA (Spain)

OTHER PARTNERS

- EREVNITIKO PANEPISTIMIAKO INSTITOUTO SYSTIMATON EPIKOINONION KAI YPOLOGISTON (Greece)
- ATOS IT SOLUTIONS AND SERVICES IBERIA SL(Spain)
- DANMARKS TEKNISKE UNIVERSITET (Denmark)
- FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV (Germany)
- GIOUMPITEK MELETI SCHEDIASMOS YLOPOIISI KAI POLISI ERGON PLIROFORIKIS ETAIREIA PERIORISMENIS EFTHYNIS (Greece)
- UBITECH ENERGY (Belgium)
- FUNDACION TECNALIA RESEARCH & INNOVATION (Spain)
- SUITE5 DATA INTELLIGENCE SOLUTIONS LIMITED (Cyprus) INTRACOM SINGLE MEMBER SA TELECOM SOLUTIONS (Greece)
- MAGGIOLI SPA (Italy)
- DIACHEIRISTIS ELLINIKOU DIKTYOU DIANOMIS ELEKTRIKIS ENERGEIAS AE (Greece)
- IES R&D (Ireland)
- UNIVERSITAT POLITECNICA DE CATALUNYA (Spain)
- SPACE HELLAS ANONYMI ETAIREIA SYSTIMATA KAI YPIRESIES TILEPIKOINONIONPLIROFORIKIS ASFALEIAS -

OTHER PARTNERS	
IDIOTIKI EPICHEIRISI PAROCHIS YPERISION ASFA (Greece) • JOANNEUM RESEARCH FORSCHUNGSGESELLSCHAFT MBH (Austria) • ODIT-E (France) • FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS (Spain) • INQBIT INNOVATIONS SRL (Romania) • SICAE DE LA SOMME ET DU CAMBRAISIS (France) • CUERVA ENERGIA SLU (Spain) • COMHARCHUMANN FUINNIMH OILEAIN ARANN TEORANTA (Ireland) • TREFOR EL NET OST AS (Denmark)	• BARBARA IOT SL (Spain) • HERON SINGLE MEMBER S.A. ENERGY SERVICES (Greece) • PROSPEX INSTITUTE (Belgium) • INTERNATIONAL DATA SPACES EV (Germany) • LOGIKERS SL (Spain) • EWII A/S (Denmark) • ARTHUR'S LEGAL BV (Netherlands) • FUNDINGBOX ACCELERATOR SP ZOO (Poland) • EPL TECHNOLOGY FRONTIERS LIMITED (Cyprus) • VERGY COMMUNITY SL (Spain) • FUNDINGBOX COMMUNITIES SL (Spain)

Project Description

Context

The project is situated within the thematic priorities outlined by the European Commission, focusing on energy system transformation towards sustainability and digitalisation. It aligns with broader EU policy objectives of decarbonisation, energy efficiency, and fostering innovation for economic growth. By integrating renewable energy sources, promoting energy efficiency, and exploring low-carbon technologies like hydrogen, the project aims to contribute significantly to the EU's sustainability goals. Additionally, the project's emphasis on digitalisation through smart grid technologies and data-driven energy services aligns with EU initiatives for technological advancement and inclusion.

Project presentation, technical description and implementation

The project tackles challenges in energy system transformation by integrating renewable energy sources and enhancing flexibility. Objectives include developing a federated data and intelligence platform (ODEON) for resilient energy operations, leveraging distributed assets.

The project approach emphasizes federated data spaces and AI-driven orchestration, enabling seamless energy data sharing across stakeholders, enhancing scalability and security.

Methodologically, we'll deploy AI containers, IoT integration, and smart data orchestrators to optimize energy operations. Large-scale pilots across Europe will validate the project approach.

Key components like federated data management, AI tools, and IoT devices contribute to real-time grid monitoring and demand response, crucial for achieving decarbonization and system flexibility goals.

Project Impacts

Economic impacts:

- Increased market share for energy services.
- Enhanced revenue opportunities for energy suppliers and aggregators.
- New market opportunities for digital energy solutions.

Social impacts:

- Creation of new jobs in the energy sector.
- Improved quality of life through enhanced energy efficiency and grid resilience.
- Empowerment of energy communities and prosumers.

Environmental impacts:

- Reduction in CO_2 emissions through increased renewable energy integration.
- Energy savings from optimized grid operations and demand response.
- Resource conservation through efficient energy storage and system flexibility.

Technological impacts:

- Development and deployment of AI-driven energy management tools.
- Advancement in federated data sharing and interoperability standards.

- Innovation in digital energy technologies fostering grid resilience.

These impacts align with broader EU objectives of sustainability, digitalization, and inclusive economic growth, contributing to a resilient and decarbonized energy system.ddInnovative aspects of the project. The most innovative aspect of the project is the development of a federated technological framework (ODEON) that integrates secure data management, AI-driven intelligence, and interoperable energy services. This approach enables collaborative data sharing among stakeholders, fostering a resilient and flexible energy system essential for the Twin Transition.

Expected key exploitable results of the project

ODEON Cloud-Edge Data and Intelligence Service Platform: A scalable and reliable platform for federated data management, processing, and sharing.

Federated Energy Data Spaces: Secure and interoperable spaces facilitating data exchange among energy value chain actors.

AI Containers and Smart Data/AIOps Orchestrators: Innovative tools for AI-driven operations and analytics in federated environments.

Sub-Key Exploitable Results

Data Sharing Solutions: Tools enabling secure and efficient data sharing across energy sectors.

Intelligence-Powered Energy Services: Development of new services leveraging AI and data analytics.

Interoperability Standards: Contributions to standards enhancing cross-platform compatibility and data exchange.

Key exploitable results and sub-key exploitable results achieved to date

Development of ODEON Cloud-Edge Platform: The ODEON platform has been successfully developed and deployed, providing a foundation for federated data management and intelligence services.

Initial Implementation of Federated Energy Data Spaces: Secure and interoperable data spaces have been established, allowing for controlled data sharing among energy stakeholders.

Prototype AI Containers and Orchestrators: Early versions of AI containers and orchestrators have been tested, showcasing their potential in enabling AI-driven operations.

Sub-Key Exploitable Results Under Development

Enhanced Data Sharing Solutions: Continual improvements are underway to enhance data sharing tools for more efficient and secure exchanges.

Advanced Intelligence-Powered Energy Services: Ongoing development of new energy services leveraging AI and analytics for real-time insights and decision-making.

Standardization Efforts: Initiatives to contribute to interoperability standards for broader adoption and compatibility within the energy ecosystem.

HORIZON-CL5-2023-D3-01-10 - Supporting the development of a digital twin to improve management, operations and resilience of the EU Electricity System in support to REPowerEU

Back to projects' list

Electricity grids

MISSION

eMISsion-free HV and MV transmiSION switchgear for AC and DC

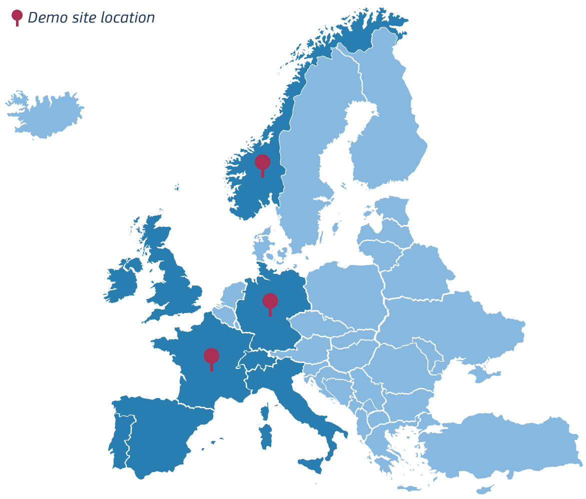
The overall objective of MISSION is to develop and demonstrate key SF6-free switchgear components forthe future AC and DC systems to enable emission-free energy transmission in a resilient and sustainabsustainable electric grid.

FROM	January 2024
TO	December 2027

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
- M€	10 398 632,46 €	https://cordis.europa.eu/project/id/101135484

TECHNOLOGIES AND SERVICES DEPLOYED		
Grid Technologies	High Voltage Alternating Current; High Voltage Direct Current; Multi-termina	

PROJECT PARTNERS' COUNTRIES



COORDINATOR	SINTEF ENERGI AS (Norway)

OTHER PARTNERS

- SINTEF ENERGI AS (Norway)
- SIEMENS ENERGY GLOBAL GMBH & CO. KG (Germany)
- G&W ITALY HOLDINGS SOCIETA A RESPONSABILITA LIMITATA (Italy)
- STATNETT SF (Norway)
- RTE RESEAU DE TRANSPORT D'ELECTRICITE (France)
- 50HERTZ TRANSMISSION GMBH (Germany)
- RED ELECTRICA DE ESPANA S.A.U.(Spain)
- SUPERNODE LIMITED (Ireland)
- WAVEC/OFFSHORE RENEWABLES - CENTRO DE ENERGIA OFFSHORE ASSOCIACAO (Portugal)
- NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET NTNU (Norway)
- EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZUERICH (Switzerland)
- THE UNIVERSITY COURT OF THE UNIVERSITY OF ABERDEEN (United Kingdom)

Project Description

Context

A vital prerequisite of the de-carbonisation is the rapid growth of renewables. In 25 more than 6 % of electrical power is expected to come from wind and solar. In existing grids MVAC and HVAC switchgear is filled with the insulation gas SF6, the world's most potent GHG with a global warming potential (GWP) of 24 3. SF6-emissions due to leakages during gas handling or defective sealings / compartments represents a significant part of the grid owners' total GHG emissions. MISSION project will develop and demonstrate three SF6-free products as key-levers for climate neutral power transmission based on the requirements defined by TSOs, filling critical gaps in future hybrid ACDC grids.

Project presentation, technical description and implementation

MISSION project will develop and demonstrate three SF6-free products as key-levers for climate neutral power transmission based on the requirements defined by TSOs, filling critical gaps in future hybridACDC grids: SF6-free HVAC circuit breaker will be developed and type tested by Siemens Energy and installed and demonstrated by Statnett in Norway and RTE in France reaching TRL 8, 2. SF6-free HVDC GIS will be developed and type tested by Siemens Energy in Germany reaching TRL 8, 3. MVDC circuit breaker will be developed and tested in relevant environment by G&W reaching TRL 6. In addition, MISSION will determine technical properties of different SF6-alternatives for application in AC and DC switchgear for high and medium voltage operation. MISSION will contribute to enable emission-free energy transmission and switchgear technology transition for a sustainable electric grid.

Project Impacts

Environmental impact:

All three switchgear technologies developed in MISSION will be fully SF6-free. The MISSION innovations will contribute to massive GHG emission reductions worldwide. Europe leads the way on SF6-free switchgear development and implementation, but from 23 onwards more nations are expected to follow suit as more restrictions will be imposed. The MISSION project targets enabling grid integration of new renewable energy production in a reliable way, while also radically changing the switchgear technology itself to become emission-free. MISSION will provide full LCA of the new technologies, not only to include the impact from SF6 reductions, but also take into account the positive and negative consequences of raw materials and the use of the switchgear from cradle to grave.

Technology impacts: MISSION's vacuum circuit breaker will contribute to the replacement of existing SF6-based switchgear and avoid new installations. MISSwill deliver a compact, reliable, and cost-effective MVDC breaker design for these applications. Its configuration permits its integration in medium voltage DC grids. With the HVDC GIS developed in MISSION, the footprint of the offshore platforms for collecting and exporting energy from offshore wind can be significantly reduced compared to conventional air-insulated switchgear: considering a 2 GW offshore platform, approximately 34% of the length and 2% of the weight can be saved, thus avoiding thousands of tonnes of valuable resources. This adds to the already significant GHG reductions from the SF6-free GIS itself.

Expected key exploitable results of the project

The MISSION project will develop three key switchgear components which eliminate the use of SF6 and address critical technology gaps for AC and DC grids:

- 42 kV AC air-insulated live-tank vacuum circuit breaker.
- 55 kV HVDC gas-insulated switchgear.
- 12 kV MVDC air insulated circuit breaker.

HORIZON-CL5-2023-D3-01-10 - Supporting the development of a digital twin to improve management, operations and resilience of the EU Electricity System in support to REPowerEU

Back to projects' list

Electricity grids | Digitalisation

TwinEU

Digital Twin for Europe

Pan-European digital twin (DT) based on federation of local twins.

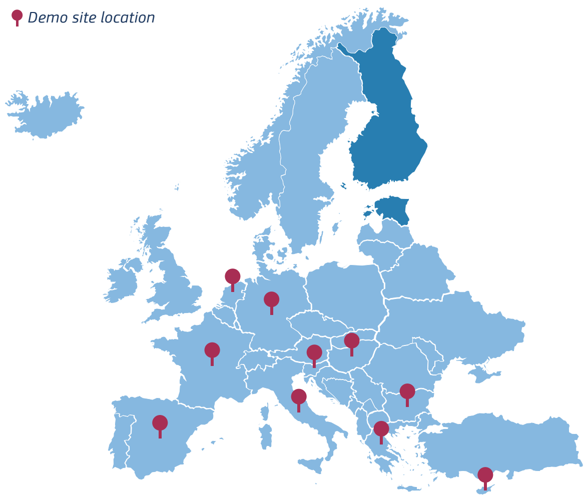
Define a set of scenarios for the use of DT.

FROM	January 2024
TO	December 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
15 000 000,00 €	15 000 000,00 €	https://cordis.europa.eu/project/id/101136119

TECHNOLOGIES AND SERVICES DEPLOYED		
	Other technologies and services	Oher technologies and ervices (Digital twin)

PROJECT PARTNERS' COUNTRIES



COORDINATOR	FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV (Germany)
OTHER PARTNERS	• TALLINNA TEHNIKAÜLIKOOL (Estonia) • AALTO KORKEAKOULUSAATIO SR (Finland) • MAJANDUS JA KOMMUNIKATSIOONIMINISTEERIUM(Estonia) • FORUM VIRIUM HELSINKI OY (Finland) • KLIIMAMINISTEERIUM (Estonia)

Project Description

Context

Need to evolve as fast as possible towards an independent and clean energy system, in particular the electrical grid. Europe needs a resilient, cybersecure, flexible and reliable electrical network, which can only be fulfilled by virtualization of the energy infrastructure thanks to digital twin technology. This cannot be performed by a single operator or even a single country but needs to be a European unprecedented action. The TwinEU has a very wide participation of grid operators from 15 countries. The project has the goal to make the process sustainable and efficient way beyond the funding cycle.

Project presentation, technical description and implementation

Lack of consensus on definition of DT and functionalities, of concrete reusable DT implementations at pan-European level, lack of agreed standardizable approach to grid modelling. Insufficient synchronization of digital models/replicas with real assets. DT needs interfaces outside energy sector for resilience assessment and planning. Link between a European DT and a European Energy Data Space is critical. Need to tst at large scale.

Technical approach: Open DTs for grid reliability and resiliency assessment; Data and Model extended interoperability; HPC-coupled federated DT Infrastructure; Dataspace adaption for pan-European DTs data & model sharing; Closed Loop Adaptive DTs; Immersive Metaverse-oriented DTs;

Methodology: adaptable federated DT ecosystem, with 3 layers: Adaptive Twins federation layer; dataspace-enabled data/models sharing infrastructure; TwinEU Service Workbench

Project Impacts

- Increase the reliability of the energy system by enhancing flexibility and efficiency of the European electricity grid.
- Improve management, maintenance, and operations of the EU Electricity System.
- Enhance dynamic monitoring of the energy system, to facilitate energy system integration, information flows, detect anomalies, forecasting demand and to address infrastructure bottlenecks.
- Improve the data exchange between TSOs and DSOs and between network operators and the market players, leveraging data exchange from prosumers.
- Creation of new services for companies and public authorities based on the digital twin.

Innovative aspects of the project

Services orchestrator layer: open interoperable DT Dataspace; federated model-management, autonomous self-learning DTs; multi-user XR development platform; service orchestrator built upon an IDSA-compliant federated catalogue.

Cyber-physical grid resilience services: static scenario-based training programs; static and dynamic security assessment tools; cybersecurity scenario analysis and modelling based on cyber-attacks simulations

Expected key exploitable results of the project

1. Open Reference architecture for a federated pan-European Digital Twin.
2. Federated Digital Twin ecosystem consisting of adaptable DT instances.
3. Extended lifecycle-oriented and spatiotemporal interoperability building blocks.
4. Adapted DataSpace Connector for enhancing data and model sharing trust.
5. Advanced Workbench to orchestrate data, models, computational resources.
6. Advanced physics-informed AI-based forecasting tool.
7. DTs for network resiliency and stability

assessment.

8. DTs for network planning (and operation).
9. DTs for stability/ cybersecurity assessment.
10. TwinEU DTs as active project in an open-source community for long term sustainability.

HORIZON-CL5-2023-D4-01-03 - Interoperable solutions for positive energy districts (PEDs), including a better integration of local renewables and local excess heat sources

Back to projects' list

Electricity grids | Energy storage | Consumers/prosumers

InterPED

INTERoperable cloud-based solution for cross-vector planning and management of Positive Energy Districts

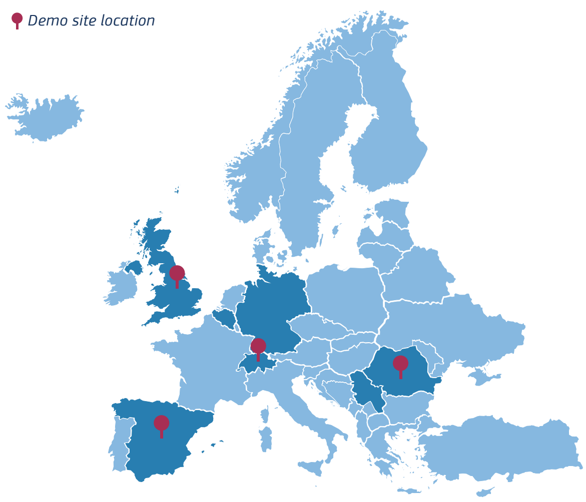
InterPED aims to enable the concept of PEDs via sector coupling, cross-vector integration, demand flexibility and consumer engagement, while improving utilisation of local RES, storage and excess/waste heat (E/WH) sources. InterPED will couple RES, storage and E/WH sources (community assets) available in the pilots with the necessary know-how and ICT expertise to ensure improved operation of PEDs and grid robustness. InterPED intends to engage the consumers via community building, RECs), representing a still largely untapped source of flexibility, while enabling them to play an active role in grid balancing.

FROM	January 2024
TO	February 2027

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
- M€	3 299 368,22 €	https://cordis.europa.eu/project/id/101138047

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	Network management; Monitoring and control tools
Market	Ancillery services; Other market services (P2P Energy Trading)
Other Technologies and Services	Energy system modelling; Life cycle assessment

PROJECT PARTNERS' COUNTRIES



COORDINATOR	R2M SOLUTION SPAIN SL (Spain)

OTHER PARTNERS

- FUNDACION TEKNIKER (Spain)
- GIROA SOCIEDAD ANONIMA (Spain)
- GRID SINGULARITY GMBH (Germany)
- INSTITUT MIHAJLO PUPIN (Serbia)
- UNIVERSITE CATHOLIQUE DE LOUVAIN (Belgium)
- LEVEL 9 (Belgium)
- SOFTWARE IMAGINATION & VISION SRL (Romania)
- MUNICIPALITY OF ALBA IULIA (Romania)
- AZIENDA ELETTRICA DI MASSAGNO (AEM) SA (Switzerland)
- HIVE POWER SA (Switzerland)
- SCUOLA UNIVERSITARIA PROFESSIONALE DELLA SVIZZERA ITALIANA (Switzerland)
- HERIOT-WATT UNIVERSITY (United Kingdom)
- Findhorn Innovation Research & Education, CIC (United Kingdom)

Project Description

Context. EU leads the way in transitioning to clean energy and reducing its carbon footprint. Cities are responsible for more than two-thirds of global energy consumption and over 7% of carbon dioxide emissions. PEDs are an essential component of a comprehensive approach to sustainable urbanization, encompassing technology, spatial planning, regulation, finance, law, social issues, and economics. A PED is an urban area with annual net zero energy import and net zero CO_2 emissions, working towards a surplus production of RES. To meet EU's energy and climate targets, as specified in European SET Plan (, cities must shift their focus from local solutions to the concept of PEDs.

Project presentation, technical description and implementation.

InterPED enables PEDs via sector coupling, cross-vector integration, demand flexibility and consumer engagement, while improving utilisation of local RES, storage and excess/waste heat sources. InterPED will couple RES, storage and E/WH sources (community assets) available in the pilots with the necessary know-how and ICT expertise to ensure improved operation of PEDs and grid robustness. This will allow InterPED's end users (aggregators, service providers, urban planners) to deliver benefits to both, grid stakeholders (DSO/TSOs) and final consumers (and prosumers). InterPED will deliver a scalable and adaptable cloud-based platform composed of analytical, modelling and optimization services for planning, supervision and control of integrated PEDs (including power, heating and cooling, mobility). Optimized PED operations will be demonstrated at four pilot sites.

Project Impacts

- Up to 1% utilization of local RES and E/WH sources.
- Min. 2% less energy import (from power grid) via improved RES, storage and E/WH exploitation.
- Sector integration services enabled via cross-vector optimization, non-energy sector coupling (e.g. mobility, indoor/thermal comfort) and optimal energy dispatching at building and district level.
- Increased RES hosting capacity to above 5% share in overall energy supply contributing.
- At least 3% of total load available for grid balancing owing to improved integration of PEDs in energy systems.
- Total grid OPEX and CAPEX reductions by up to 3% via optimal energy dispatching across multiple energy vectors and unlocked demand-side flexibility at the community level.
- Social entrepreneurship and citizen participation enabled as part of the local energy communities.
- Community building and engagement demonstrated at 4 pilot sites.

Innovative aspects of the project

- PED planning toolbox/methodology (LCC/LCA) for system planning at different scales (asset, building district).
- Innovative (cloud-based) operation management platform provided for improved and efficient operation of PEDs and integrated local energy systems, while integrating with RES, storage and E/WH sources.
- Guidelines for citizen participation and community engagement under cooperative DR strategy.

Expected key exploitable results of the project

- PED life-cycle planning tool.
- Cross-vector optimisation algorithms.
- Flexibility prediction and explotation module.
- Semantic data model and ontologies.
- Energy management analytics algorithms and methodologies focused on PEDs.
- User engagement best practices.
- Open marketplace for energy trading enabling energy communities.

HORIZON-CL5-2023-D4-01-03 - Interoperable solutions for positive energy districts (PEDs), including a better integration of local renewables and local excess heat sources

Back to projects' list

Electricity grids | Energy storage | Digitalisation

PEDvolution

Interoperable solutions to streamline PED evolution and cross-sectoral integration

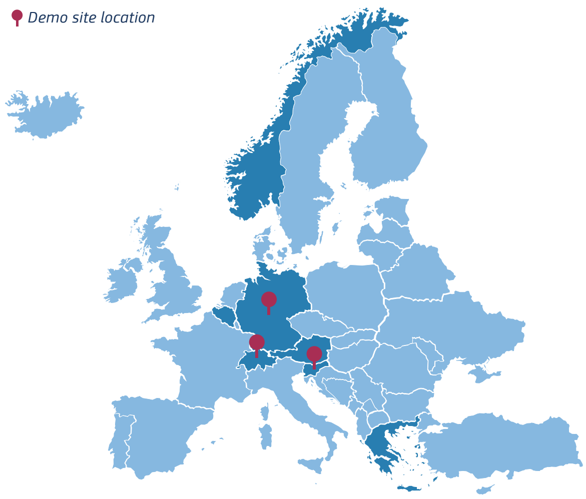
PEDvolution paves the way for cross-sectoral integration of ever-evolving PEDs through the co-development and implementation of seven interoperable solutions: 1) PED Design and Planning Toolset, 2) PED Readiness Assessment, 3) Dynamic Decision Support Guideline for PED Development, 4) PED Energy Manager, 5) Data Exchange, Integration and Interoperability Platform, 6) PED Business Models, 7) Social Innovation tool. PEDvolution solutions will design, process, optimise and strengthen the PEDs interoperability, business, societal and technological factors addressing and handling PED interaction and integration with inbound and outbound energy resources across energy and non-energy sectors.

FROM	January 2024
TO	February 2027

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
- M€	4 303 393,34 €	https://cordis.europa.eu/project/id/101138472

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response; Smart metering; Heating/cooling peak load management
Distributed Storage Technologies	Batteries; Thermal energy production, distribution and storage
Market	Infrastructure costs; Electricity market; Ancillery services
Other Technologies and Services	Energy system modelling

PROJECT PARTNERS' COUNTRIES



COORDINATOR	INLECOM INNOVATION ASTIKI MI KERDOSKOPIKI ETAIREIA (Greece)

OTHER PARTNERS

- VLAAMSE INSTELLING VOOR TECHNOLOGISCH ONDERZOEK N.V. (Belgium)
- SMART INNOVATION NORWAY AS (Norway)
- NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET NTNU (Norway)
- SYMPRAXIS TEAM P.C (Greece)
- OFFSET ENERGY ENERGETSKE RESITVEDOO (Slovenia)
- SWW WUNSIEDEL GMBH (Germany)
- ES-GEHT!-ENERGIESYSTEME GMBH (Germany)
- TECHNISCHE UNIVERSITAET WIEN (Austria)
- INTRACOM SINGLE MEMBER SA TELECOM SOLUTIONS (Greece)
- ELEKTRO GORENJSKA PODJETJE ZA DISTRIBUCIJO ELEKTRICNE ENERGIJE DD (Slovenia)
- ZUKUNFTSENERGIE NORDOSTBAYERN GMBH (Germany)
- GORENJSKE ELEKTRARNE PROIZVODNJA ELEKTRIKE DOO (Slovenia)
- ZURCHER HOCHSCHULE FUR ANGEWANDTE WISSENSCHAFTEN (Switzerland)
- STADT WINTERTHUR (Switzerland)

Project Description

Context

PEDvolution will enable and boost EU-PED participation in the energy system by releasing fully interoperable data-driven platforms and energy planning solutions. PEDvolution promotes social change for the just energy transition offering more cost-efficient, fair, and inclusive clean energy. PEDvolution solutions contribute to affordable energy, circular and green economy and will enable PEDs to evolve and adapt in a changing and challenging environment, protecting their citizens from energy poverty, delivering products and services of the highest quality, thus supporting Europe to gain power in the global energy competition while preserving its values and socio-economic way of life,

Project presentation, technical description and implementation

PEDvolution aspires to induce change on the urban energy ecosystem across Europe, enabling an integrated and interoperable approach that goes beyond mere technological aspects. Seven interoperable PED focused tools, methodologies, services and products, addressing the intricate, complex and dynamic environment that characterizes the constant evolution of PEDs will be developed. At least six real-life PEDs across Europe, supported by PED co-developers will provide the testbed, demonstration and validation environment for the solutions, paving the way for replication, upscaling and commercialization. An interoperability platform for integrating assets within PEDs but also with the wider energy system, (including the grid, energy markets, and other urban systems), building on open data standards and protocols will facilitate the deployment of the tools on PED assets.

Project Impacts

Technological/Scientific: Demonstrating fully interoperable solutions able to support PEDs in different maturity stages, to evolve and better adapt to their context, being an active part of the energy system. Increased availability of tools, guides and interoperable solutions for planning, design, development and management of Positive Energy Districts (PEDs). Improved integration of energy (e.g. distributed renewable energy generation, waste heat utilisation, storage) and non-energy sectors (e.g. mobility) within PEDs. Improved integration of PEDs in energy systems and improved contribution of PEDs to energy grid robustness regarding dependencies to energy supplies. Sector coupling enabled by digitalization and secure data exchange. PED readiness assessment methodologies.

Societal: Empowering citizens and PEDs with energy literacy, engagement, trust and social entrepreneurship to participate in the energy market, enabling social change in the energy transition. Increased social entrepreneurship and citizen participation and engagement in energy communities. Increased participation of consumers and energy communities in the value chain of the energy system.

Economic: Co-defining innovative business models and social innovations for PEDs, valorising the energy generated by PED assets,optimising energy consumption, reducing costs and thus fighting energy poverty. Explore the potential of energy market participation, demand response services, carbon credits, and other revenue streams

Expected key exploitable results of the project

1. PED Design and Planning Toolset.
2. Dynamic Decision Support Guidelines.
3. PED Energy Manager.
4. Data Exchange, Integration & Interoperability Platform.
5. PED Readiness Assessment.
6. PED Business Models Innovation Tool.
7. PED Social Innovation Tool.

HORIZON-CL5-2022-D2-01-09 - Physics and data-based battery management for optimised battery utilisation (Batteries Partnership)	Back to projects' list

Digitalisation | System integration

BATMAX

Battery management by multi-domain digital twins

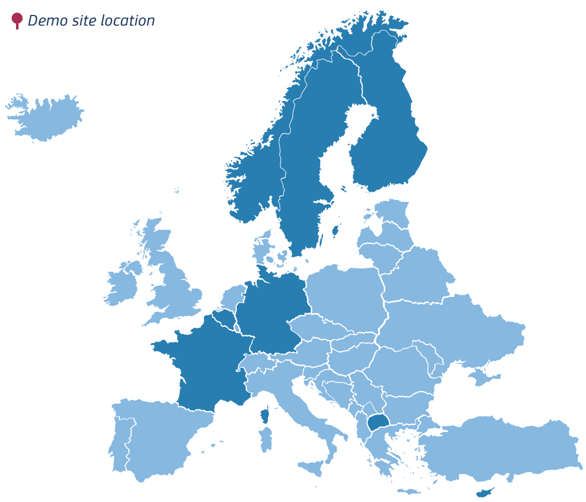
The BATMAX project focuses on advancing battery management through digital twin technology. It aims to enhance battery performance, safety, and reliability by integrating physics-based modelling and AI. The project will develop a framework combining experimental and operational data to optimize battery usage and reduce life-cycle costs. Key objectives include achieving a 10% increase in battery lifetime, 20% performance boost in specific scenarios, and significant cost savings. Research areas include data integration, numerical modelling, and predictive diagnostics for improved battery efficiency and sustainability in energy storage and mobility applications.

FROM	May 2023
TO	October 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
4 994 575,50 €	4 994 575,50 €	https://cordis.europa.eu/project/id/101104013

TECHNOLOGIES AND SERVICES DEPLOYED		
	Distributed Storage Technologies	Batteries

PROJECT PARTNERS' COUNTRIES



COORDINATOR	TEKNOLOGIAN TUTKIMUSKESKUS VTT OY (Finland)

OTHER PARTNERS

- SINTEF AS (Norway)
- SINTEF ENERGI AS (Norway)
- FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV (Germany)
- RISE RESEARCH INSTITUTES OF SWEDEN AB (Sweden)
- AVESTA BATTERY & ENERGY ENGINEERING (Belgium)
- COMPANY FOR MANUFACTURING TRADE ANDSERVICES AVESTA BATERI AND ENERDZIINZINERING DOOEL IMPORT-EXPORT SKOPJEZ (North Macedonia)
- CORVUS ENERGY AS (Norway)
- VALMET AUTOMOTIVE EV POWER OY (Finland)
- LUMENCY (Belgium)
- ELECTRICITE DE FRANCE (France)
- RTD TALOS LIMITED (Cyprus)
- RISE FIRE RESEARCH AS (Norway)

Project Description

Context

The BATMAX project aligns with European Commission priorities in energy storage innovation and sustainability. It contributes to advancing clean energy technologies essential for achieving climate goals. By focusing on battery management using digital twin technology, BATMAX supports digitalization and efficiency in energy systems, promoting economic growth and competitiveness. The project's outcomes will enhance battery performance, safety, and lifetime, driving progress towards a low-carbon economy and sustainable energy transition.

Project presentation, technical description and implementation

The BATMAX project aims to address key technological challenges in battery management by leveraging digital twin technology. Objectives include enhancing battery performance, safety, and reliability through advanced data integration and modelling. The project approach integrates physics-based modelling with AI to create digital twins that predict battery behavior and optimize usage. This innovative approach differs from traditional methods by offering real-time insights and adaptive control strategies. The methodology involves data collection from experimental and operational sources, model development using advanced numerical techniques, and validation through rigorous testing. Key components like sensor technology and advanced algorithms contribute to achieving optimized battery utilization, extended lifetime, and reduced life-cycle costs.

Project Impacts

Economic impacts:

- Increased efficiency and performance of batteries leading to reduced life-cycle costs.
- Potential for new market opportunities and increased competitiveness in energy storage sectors.

Social impacts:

- Creation of skilled job opportunities in battery technology and digitalization.
- Enhanced safety and reliability of battery systems benefitting workers and end-users.

Environmental impacts:

- Reduced environmental footprint through optimized battery utilization and extended lifetime.
- Contribution to sustainability goals by promoting efficient energy storage solutions.

Technological impacts:

- Advancement of digital twin technology for battery management, facilitating innovation in predictive diagnostics and control.
- Potential for knowledge transfer and adoption of advanced data-driven approaches in energy systems.

Other impacts:

- Improved energy security and reliability, supporting the transition to clean energy sources.
- Increased awareness and adoption of sustainable practices in battery management across industries.

Innovative aspects of the project

The most impactful and innovative aspect of the BATMAX project is the utilization of digital twin technology for battery management. This approach integrates physics-based modelling with real-time data to create virtual representations of batteries, enabling predictive diagnostics and optimization. It revolutionizes battery management by enhancing performance, safety, and efficiency, ultimately driving advancements in sustainable energy storage solutions.

Expected key exploitable results of the project

- Development of a novel digital twin framework for battery management.
- Enhanced battery performance optimization tools based on physics-based models and AI.
- Commercializable software and algorithms for predictive diagnostics and maintenance.

Sub-key exploitable results

- Detailed battery performance analytics and optimization strategies.
- Prototypes of advanced battery management systems integrating digital twin technology.
- Documentation and guidelines for implementing digital twin-based battery management solutions in various industries.

Key exploitable results and sub-key exploitable results achieved to date

- Development of a novel digital twin framework for battery management.
- Enhanced battery performance optimization tools based on physics-based models and AI.
- Commercializable software and algorithms for predictive diagnostics and maintenance.

Sub-key exploitable results

- Detailed battery performance analytics and optimization strategies.
- Prototypes of advanced battery management systems integrating digital twin technology.
- Documentation and guidelines for implementing digital twin-based battery management solutions in various industries.

HORIZON-CL5-2022-D2-01-09 - Physics and data-based battery management for optimised battery utilisation (Batteries Partnership)

Back to projects' list

Digitalisation

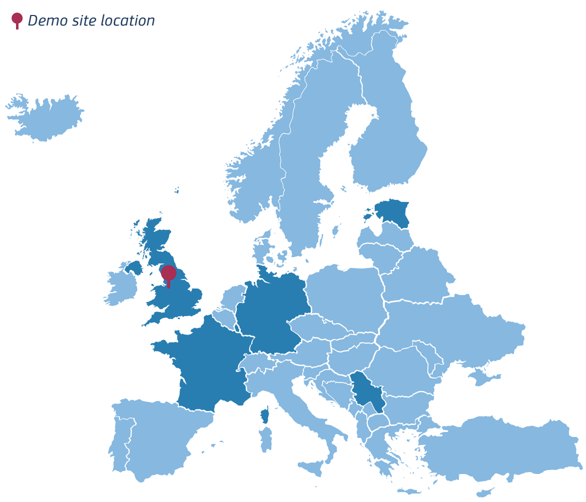
ENERGETIC

Next Generation Battery Management System Based On Data Rich Digital Twin

The EU's goal of achieving a carbon-neutral economy by 2050 requires a significant expansion of renewable energy sources, with energy storage playing a crucial role. Second-life batteries can contribute to the advancement of an electrified, decarbonised society. However, to ensure safe and efficient battery operation, battery management systems (BMS) require improved data and battery models. To address this, the EU-funded ENERGETIC project leverages AI to develop an enhanced BMS suitable for both transportation and stationary applications. This innovative system optimises battery usage, ensuring reliability, power, and safety across all operational modes. The project employs cutting-edge approaches, blending physics and data-based methods at the software and hardware levels, allowing it to predict battery lifespan and diagnose degradation using transparent AI models.

FROM	June 2023
TO	August 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
4 170 167,50€	4 170 167,50€	https://cordis.europa.eu/project/id/101103667

TECHNOLOGIES AND SERVICES DEPLOYED		PROJECT PARTNERS' COUNTRIES
Distributed Storage Technologies	Batteries, Electric vehicles, Thermal energy production, distribution and storage, Flywheels, Other distributed storage technologies	

COORDINATOR	INSTITUT NATIONAL DES SCIENCES APPLIQUEES, STRASBOURG (France)

OTHER PARTNERS

- ALTRAN PROTOTYPES AUTOMOBILES (France)
- COMMUNAUTE D' UNIVERSITES ET ETABLISSEMENTS UNIVERSITE BOURGOGNE - FRANCHE – COMTE (France)
- UNIVERSITE DE TECHNOLOGIE DE BELFORT – MONTBELIARD (France)
- UNIVERSITE DU LUXEMBOURG (Luxembourg)
- ELECTRICITE DE FRANCE (France)
- GBA ZABALA CONSEIL EN INNOVATION SA (France)
- HOCHSCHULE KARLSRUHE (Germany)
- TAJFUN HIL DRUSTVO SA OGRANICENOM ODGOVORNOSCU ZA ISTRAZIVANJE, PROIZVODNJU, TRGOVINU I USLUGE NOVI SAD (Serbia)
- TALLINNA TEHNIKAÜLIKOOL (Estonia)
- POWERUP (France)
- FORSEE POWER (France)
- UNIVERSITY OF BATH (United Kingdom)
- COVENTRY UNIVERSITY (United Kingdom)

Project Description

Context

The EU's goal of achieving a carbon-neutral economy by 2050 requires a significant expansion of renewable energy sources, with energy storage playing a crucial role. Second-life batteries can contribute to the advancement of an electrified, decarbonised society. However, to ensure safe and efficient battery operation, battery management systems (BMS) require improved data and battery models. To address this, the EU-funded ENERGETIC project leverages AI to develop an enhanced BMS suitable for both transportation and stationary applications. This innovative system optimises battery usage, ensuring reliability, power, and safety across all operational modes. The project employs cutting-edge approaches, blending physics and data-based methods at the software and hardware levels, allowing it to predict battery lifespan and diagnose degradation using transparent AI models.

Project presentation, technical description and implementation

ENERGETIC project aims to develop the next generation BMS for optimizing batteries' systems utilisation in the first (transport) and the second life (stationary) in a path towards more reliable, powerful and safer operations. ENERGETIC project contributes to the field of translational enhanced sensing technologies, exploiting multiple Artificial Intelligence models, supported by Edge and Cloud computing. ENERGETIC's vision not only encompasses monitoring and prognosis the remaining useful life of a Li-ion battery with a digital twin, but also encompasses diagnosis by scrutinising the reasons for degradation through investigating the explainable AI models. This involves development of new technologies of sensing, combination and validation of multiphysics and data driven models, information fusion through Artificial Intelligence, Real time testing and smart Digital Twin development. Based on a solid and interdisciplinary consortium of partners, the ENERGETIC R&D project develops innovative physics and data-based approaches both at the software and hardware levels to ensure an optimised and safe utilisation of the battery system during all modes of operation.

Project Impacts

Scientific:

- Creating high quality knowledge: 10% of peer-reviewedpublications as a core contribution to the field, contributing to SoA.
- Strengthening human capital in R&I: 100% of post doc and PhD from ENERGETIC will access to better working positions and at least 25-40% will have better working conditions based on skills and trainings received.
- Fostering diffusion of knowledge and Open Science: 1 follow up projects building on ENERGETIC results within next FP + side collaborations with other EU funded projects in the field.

Economic:

- Generating innovation-based growth: Creation, growth & market share of companies having developed innovations.
- Creating more and better jobs: increase up to 250 jobs by 2031.
- Societal:
- Addressing EU policy priorities through R&I: Improve policies through recommendations for predictive maintenance.
- Strengthening the uptake of innovation in society: 20% increase engagement with end-users and citizens by 2030.

Innovative aspects of your project

- The ENERGETIC R&D project develops innovative physics and data-based approaches both at the software and hardware levels to ensure an optimised and safe utilisation of the battery system during all modes of operation.
- Innovative smart BMS integrating performance

results from a novel digital-twin based on an ensemble of hybrid explainable AI and expert models.

- Sensors:

  - Thermal sensors, the resulting product would be a proven technology configuration and methodology for generating previously unobtainable in-cell thermodynamic characterisation data.

  - Ultrasound sensors: Production of integrated ultrasonic sensors and an associated methodology for determining SoC and providing information on SoH of cells.

  - Use of thermal cameras as an additional source of information for analysing the heat propagation in cells.

- New approach for battery degradation assessment using Multiphysics modelling and data models able to predict SoX values while staying interpretable and explainable to the user ensuing a user/model mutual trust.
- Integration of AI models with real-time testing.
- Resilient edge and cloud computing. Managing large volumes and real time data, global architecture including IoT sensors, Edge computing servers and Cloud storage.
- New methods and guidelines as recommendations for battery predictive maintenance at European level.

Expected key exploitable results of the project.

- KER 1: Embedded in-cell temperature sensors capable of accurately monitoring internal thermodynamic phenomena; and ultrasonic transducers capable of determining cell SoC and aging through density measurement .
- KER 2: Combined physical and data models to trace degradation over lifetime.
- KER 3: Multiphysics modelling and data models to predict SoX for users.
- KER 4: Deployed AI models examples with real-time tests.
- KER 5: A hybrid innovative and smart digital twin based BMS.
- KER 6: Edge and Cloud computing with 5G connectivity for IoT.
- KER 7: Recommendations for battery predictive maintenance.

HORIZON-CL5-2022-D2-01-09 - Physics and data-based battery management for optimised battery utilisation (Batteries Partnership)

Back to projects' list

Digitalisation

NEMO

NExt-generation MOdels for advanced battery electronics

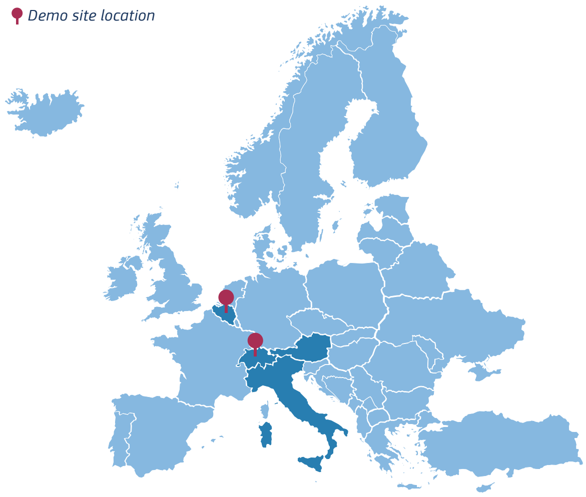
NEMO project aims at advancing the state of the art of battery management systems (BMS) by engaging advanced physics-based and data-driven battery models and state estimation techniques. Towards achieving this goal, the consortium tends to provide efficient software and hardware to handle, host, process, and execute these approaches within high-end local processors and cloud computing.

FROM	May 2023
TO	April 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
4 903 103,75 €	4 903 103,75 €	https://nemoproject.eu/

TECHNOLOGIES AND SERVICES DEPLOYED		
Other technologies and services	Other technologies and services (Battery storage system for electromobitlity and stationary)	

PROJECT PARTNERS' COUNTRIES



COORDINATOR	VRIJE UNIVERSITEIT BRUSSEL (Belgium)
OTHER PARTNERS	• INFINEON TECHNOLOGIES AUSTRIA AG (Austria) • TECHNISCHE UNIVERSITAET GRAZ (Austria) • FONDAZIONE ICONS (Italy) • IAV GMBH INGENIEURGESELLSCHAFT AUTO UND VERKEHR (Germany) • TTTECH AUTO AG (Austria) • CSEM CENTRE SUISSE D'ELECTRONIQUE ET DE MICROTECHNIQUE SA - RECHERCHE ET DEVELOPPEMENT (Switzerland) • TTTECH COMPUTERTECHNIK AG (Austria)

Project Description

Context. NEMO benefits from a wide range of sensor information acquired at high frequencies in addition to dedicated electrochemical impedance spectroscopy (EIS) sensors which allow for the identification of ongoing electrochemical reactions inside each battery cell. Capable hardware for storing and processing such measurements will be provided by the tier 1 members of this industry onboard the consortium.

Project presentation, technical description and implementation

The availability of diverse physical information on batteries from onboard measurement makes room for developing cutting-edge performance, lifetime, and safety battery models and state estimators within NEMO, and validating them on two different BMS configurations. Physics-based performance model parameters continuously get updated as the battery ages, so that performance and safety state indicators maintain the least possible error. The data-driven approaches exploit mathematical algorithms to be trained upon the large datasets made available from historical or laboratory-generated battery information. Combinations of coupled physics-based and data-driven approaches are also foreseen to be implemented within NEMO as another innovation of the project to propose next-generation BMS.

Project Impacts

Solutions offered by NEMO considerably extend battery life and make the battery system safer within long-term operation since every individual cell is monitored, controlled, and studied. NEMO's ambitious solutions for stationary and automotive use cases are expected to be validated by industrial partners and to take a considerable share of the market in later years.

Expected key exploitable results of the project

NEMO New BMS-architecture, physics and data driven models, battery state estimation algorithms, BMS driver and data handling firmware, cloud developments, and Model and algorithm integration.

HORIZON-CL5-2022-D2-01-09 - Physics and data-based battery management for optimised battery utilisation (Batteries Partnership)

Back to projects' list

Energy storage | Decarbonisation

NEXTBMS

NEXT-generation physics and data-based Battery Management Systems for optimised battery utilization

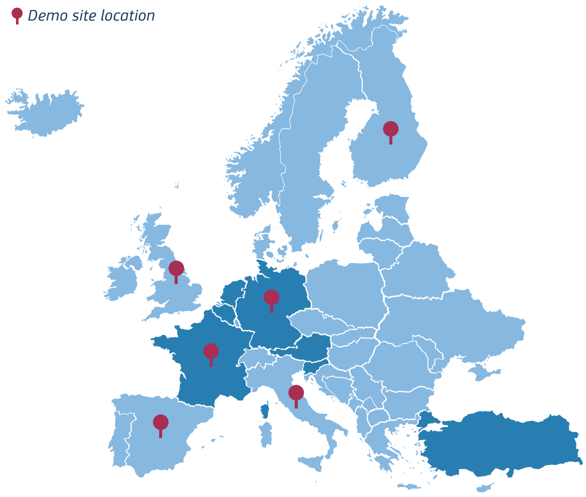
Developing physics-based battery models for accurate performance prediction.
Implementing data-driven approaches to enhance battery efficiency and lifespan.

FROM	June 2023
TO	November 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
4 998 318,25 €	4 998 318,25 €	https://nextbms.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Distributed Storage Technologies	Batteries

PROJECT PARTNERS' COUNTRIES



COORDINATOR	AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH (Austria)

OTHER PARTNERS

- NEDERLANDSE ORGANISATIE VOOR TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK TNO (Netherlands)
- UNIVERZA V LJUBLJANI (Slovenia)
- VRIJE UNIVERSITEIT BRUSSEL (Belgium)
- UNIRESEARCH BV (Netherlands)
- AVL LIST GMBH (Austria)
- AVL SOFTWARE AND FUNCTIONS GMBH (Germany)
- AVL ARASTIRMA VE MUHENDISLIK SANAYI VE TICARET LIMITED SIRKETI (Türkiye)
- ROBERT BOSCH GMBH (Germany)
- NXP SEMICONDUCTORS AUSTRIA GMBH & CO KG (Austria)
- ELECTRICITE DE FRANCE (France)
- TOFAS TURK OTOMOBIL FABRIKASI ANONIM SIRKETI (Türkiye)
- UNIVERSITAET REGENSBURG (Germany)

Project Description

Context

The NEXTBMS project is aligned with the European Commission's priorities for sustainability and decarbonisation, specifically targeting advancements in battery technology to support the transition to renewable energy sources in transportation. It contributes to the EU's goal of achieving climate neutrality by 2050 by focusing on efficient battery management systems. The project emphasizes sustainability through the development of safe, durable, and efficient batteries, which are essential for reducing carbon emissions in the transport sector. Additionally, the research supports broader digitalization efforts by leveraging data-driven approaches to optimize battery utilization, aligning with

Project presentation, technical description and implementation

Objectives: Develop advanced BMS technologies to enhance battery safety, lifespan, and efficiency.

Approach: Combines physics-based insights with data analytics for accurate battery state estimation and predictive maintenance.

Methodology: Multidisciplinary approach integrating electrochemistry, sensors, and data analytics for experimental validation and real-world testing.

Key Components: Utilizes advanced sensors, predictive algorithms, and AI for optimized battery performance, supporting decarbonization efforts in transportation.

Project Impacts

Economic Impacts:

- Enhanced competitiveness in the transportation sector through improved battery technologies.
- Increased market demand for sustainable transportation solutions.

Social Impacts:

- Job creation and skill development in the renewable energy and transportation sectors.
- Improved quality of life by promoting cleaner and greener mobility options.

Environmental Impacts:

- Reduced carbon emissions and air pollutants from transportation.
- Increased adoption of renewable energy sources, contributing to climate mitigation.

Technological Impacts:

- Advancement of battery management systems (BMS) for optimized energy storage.
- Development and dissemination of innovative technologies for sustainable transportation.

Other Impacts:

- Enhanced public awareness and acceptance of electric vehicles and renewable energy solutions.
- Contribution to EU objectives for climate neutrality and sustainable energy transitions.

Innovative aspects of the project

The innovative aspect of the NEXTBMS project lies in developing advanced battery management systems (BMS) that optimize battery utilization through physics and data-based approaches. This project focuses on enhancing safety, lifespan, and efficiency, crucial for sustainable transportation and renewable energy integration, contributing significantly to decarbonization goals.

Expected key exploitable results of the project

- Advanced Battery Management System (BMS) Software.
- Battery Modelling and Simulation Tools.
- Optimized Battery Utilization Framework.
- Safety and Efficiency Enhancements.

Sub-Key Exploitable Results:

- Licensing of BMS Software.
- Consulting Services.

- Training and Workshops.
- These results will drive innovation in battery technology, benefiting electric vehicles and renewable energy systems.

Key exploitable results and sub-key exploitable results achieved to date

Advanced Battery Management System (BMS) Software Development: development of prototype BMS software with enhanced safety and efficiency features.

Battery Modelling and Simulation Tools: creation of battery modelling and simulation tools for optimizing battery utilization.

Preliminary Safety Enhancements: initial safety enhancements integrated into the BMS software.

Sub-Key Exploitable Results in Progress:

Licensing Strategy: developing a strategy for licensing BMS software to industry partners.

Commercialization Plan: drafting plans for commercializing battery modelling and simulation tools.

HORIZON-CL5-2022-D4-01-01 - Demand response in energy-efficient residential buildings

Back to projects' list

Electricity grids | Energy storage | Digitalisation

DEDALUS

Data-driven Residential Energy Carrier-agnostic Demand Response Tools and Multi-value Services

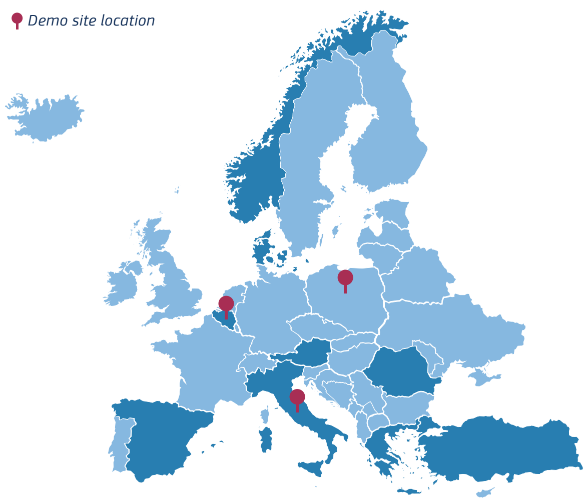
DEDALUS will design, develop and demonstrate SSH-driven multi-value energy carrier-agnostic micro (home/apartment)-to macro(building & district-scale) participatory Demand Response (DR) ecosystem, aimed to: (a) facilitate and scale up residential energy consumers massive participation to DR; (b) adapt to a variety of different mono-carrier (electricity, heat) or multi-carrier synergetic scenarios (electricity vs heat and natural gas) at building/district scale, while strengthening social interactions within respective communities.

FROM	May 2023
TO	April 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
7 359 075,00 €	5 999 801,25 €	www.best-storage.eu

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response; Smart appliances; Smart metering; Heating/cooling peak load management
Grid Technologies	High Voltage Alternating Current; High Voltage Direct Current; Multi-terminal; Micro-grid; Semiconductor devices and power converters; High Voltage Direct Current breaker; Grid inertia; Network management
Large Scale Storage Technologies	Power to gas; Compressed air energy storage; Hydro storage; Molten salt storage
Distributed Storage Technologies	Batteries; Electric vehicles; Thermal energy production, distribution and storage; Flywheels
Generation Technologies	Wind turbines; Photovoltaic; Biogas; Micro-generation
Market	Electricity market; Ancillery services

PROJECT PARTNERS' COUNTRIES



COORDINATOR: ENGINEERING - INGEGNERIA INFORMATICA SPA (Italy)

OTHER PARTNERS:

- ETHNICON METSOVION POLYTECHNION (Greece)
- FUNDACION CARTIF (Spain)
- UNIVERSITA POLITECNICA DELLE MARCHE (Italy)
- ARCELIK A.S. (Türkiye)
- COMSENSUS, KOMUNIKACIJE IN SENZORIKA, DOO (Slovenia)
- OURPOWER ENERGIEGENOSSENSCHAFT SCE MIT BESCHRANKTER HAFTUNG (Austria)
- GREEN-POINT 62 GMBH (Austria)
- BLUEPRINT ENERGY SOLUTIONS GMBH (Austria)
- FAELLESBO (Denmark)
- NEOGRID TECHNOLOGIES APS (Denmark)
- EUROPEAN GREEN CITIES APS (Denmark)
- HERON SINGLE MEMBER S.A. ENERGY SERVICES (Greece)
- DOMX IDIOTIKI KEFALAIOUCHIKI ETAIREIA (Greece)
- ISTITUTO PER SERVIZI DI RICOVERO E ASSISTENZA AGLI ANZIANI (Italy)
- DYNAME SRL (Italy)
- CENTRE INTERNACIONAL DE METODES NUMERICS EN ENGINYERIA (Spain)
- PRODUCTORA ELECTRICA URGELLENCA SA (Spain)
- ROMUR RENOVALBES SL (Spain)
- CENTRICA BUSINESS SOLUTIONS BELGIUM (Belgium)
- UNIVERSITATEA TEHNICA CLUJ-NAPOCA (Romania)
- SMART INNOVATION NORWAY AS (Norway)
- FONDAZIONE ICONS (Italy)

Project Description

Context. The project aligns with key priorities of the European Commission, focusing on sustainability, digitalisation, and economic growth in the energy sector. It addresses the transition towards cleaner energy systems by integrating renewable energy sources and promoting energy efficiency. Through digitalisation, the project aims to enhance grid management, consumer engagement, and market efficiency. By involving consumers and communities, it fosters inclusivity and empowers prosumers. This supports broader EU objectives of decarbonisation, energy security, and innovation-driven economic development.

Project presentation, technical description and implementation

The DEDALUS project aims to revolutionize residential energy demand response (DR) by developing a versatile, data-driven ecosystem.

The project objectives are to:

1. Enable widespread participation in DR by residential consumers.

2. Adapt DR strategies for various energy scenarios (electricity, heat, natural gas) at different scales.

3. Strengthen community engagement through energy-related activities.

The project approach is unique because it:

- Integrates social science with AI to design effective incentives and behaviors.
- Develops DR-ready smart appliances with open APIs.
- Utilizes Energy DataSpace and blockchain for secure, interoperable data exchange.
- Implements digital twins for personalized DR planning.
- Tailors flexibility models for specific user needs, like comfort-based solutions.

Project Impacts

Economic impacts:

- Increased market share in residential energy demand response solutions.
- New business models and revenue streams for energy service providers.

Social impacts:

- Enhanced community engagement and participation in energy management.
- Improved quality of life through comfort-based energy flexibility.

Environmental impacts:

- Reduced carbon emissions and reliance on fossil fuels.
- Energy savings and increased efficiency in residential energy use.

Technological impacts:

- Development and adoption of AI-driven energy management tools.
- Advancements in data-driven demand response technologies.

Other impacts:

- Increased resilience of residential energy systems to grid disruptions.
- Policy recommendations for promoting sustainable energy practices.

Innovative aspects of the project

- Social Science Framework: Integrating behavioral insights into demand response strategies.
- AI-based Consumer Clustering: Customizing energy solutions for diverse consumer groups.
- Data-driven Services: Leveraging digital twins for personalized demand response.
- Interoperable Energy DataSpace: Ensuring privacy-preserving data governance.
- These innovations enhance residential participation in demand response and promote sustainable energy practices.

Expected key exploitable results of the project

- AI-driven Demand Response Tools: Advanced tools for optimized demand response leveraging AI algorithms.
- DR-ready Smart Appliances: Integration of open APIs enabling smart appliances to participate in demand response.
- Digital Twins for Consumers: Development of digital twins to enable personalized and comfort-based demand response.
- Flexibility Management Tools: Tools for efficient management of flexibility assets in building and district energy communities.
- Energy DataSpace Adaptation: Adapting Energy DataSpace for extended interoperability and privacy-preserving data governance.
- Business Sandbox for Sharing Economy: Creation of a business sandbox with innovative sharing economy-based models for energy services.

Key exploitable results and sub-key exploitable results achieved to date

- AI-driven Demand Response Tools: Developed and validated AI algorithms for optimized demand response strategies.
- DR-ready Smart Appliances: Successfully integrated open APIs with smart appliances for demand response participation.
- Digital Twins for Consumers: Prototyped and implemented digital twins to personalize demand response based on consumer comfort.
- Energy DataSpace Adaptation: Adapted Energy DataSpace for improved interoperability and privacy-preserving data governance.

Sub-key exploitable results in progress

- Flexibility Management Tools: Developing tools for effective flexibility management in building and district energy communities.
- Business Sandbox for Sharing Economy: Establishing a business sandbox with innovative sharing economy-based models for energy services.

These achievements and ongoing developments contribute to enhancing residential demand response capabilities and promoting sustainable energy practices.

HORIZON-CL5-2022-D4-01-01 - Demand response in energy-efficient residential buildings

Back to projects' list

Electricity grids | Energy storage | Digitalisation

DR-RISE

Demand Response - Residential Innovation for a Sustainable Energy system

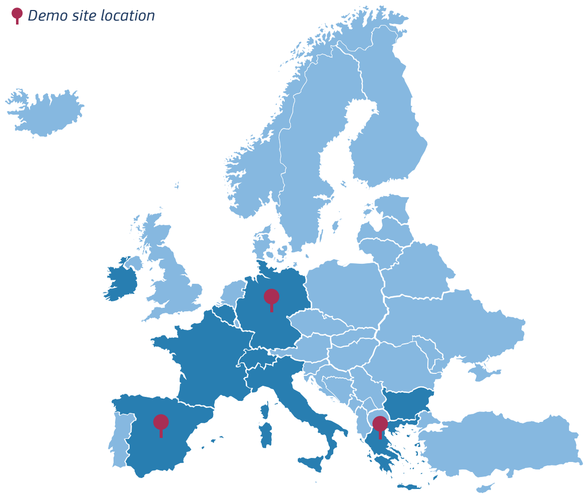
DR-RISE's main objective is to demonstrate the benefits of residential demand response (DR), not only for the end-consumers but for the overall energy system and the actors involved. The project will offer a holistic set of tools and services with a twofold objective: increase energy efficiency via optimal management and demonstrate the benefits of DR. The platform will be showcased in three different EU countries, gathering diverse environments (e.g., pre-existing energy communities, urban blocks of flats, low-income households, etc.). The approach is completely aligned with the EU's vision to place the citizens at the heart of the solution and empower them so that they can make self-aware decisions.

FROM	June 2023
TO	May 2027

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
7 045 815,00 €	5 894 433,75 €	https://cordis.europa.eu/project/id/101104154

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response; Smart appliances; Smart metering
Distributed Storage Technologies	Batteries; Electric vehicles
Generation Technologies	Photovoltaic
Market	Electricity market; Ancillery services; Other market services (Demand Response, Aggregation, Energy communities)
Other Technologies and Services	Energy system modelling

PROJECT PARTNERS' COUNTRIES



COORDINATOR	IDENER RESEARCH & DEVELOPMENT AGRUPACION DE INTERES ECONOMICO (Spain)

OTHER PARTNERS

- CALLE EARLY OVINGTON 24-8 (Spain)
- FUNDACION CTIC CENTRO TECNOLOGICO PARA EL DESARROLLO EN ASTURIAS DE LAS TECNOLOGIAS DE LA INFORMACION (Spain)
- KOINONIKI SYNETAIRISTIKI EPICHEIRISI SYLLOGIKIS KAI KOINONIKIS OFELEIAS ILEKTRA ENERGY KOINONIKI SYNETAIRISTIKI EPICHEIRISI ANANEOSIMON PIGO (Greece)
- STAM SRL (Italy)
- TECHNISCHE UNIVERSITAT DORTMUND (Germany)
- ADVANTIC SISTEMAS Y SERVICIOS SL (Spain)
- CROWDHELIX LIMITED (Ireland)
- DGS SPA (Italy)
- ELECTRODISTRIBUTION GRID WEST AD (Bulgaria)
- YUGOIZTOCHNOEVROPEYSKA TEHNOLOGICHNA KOMPANIA OOD (Bulgaria)
- SMART ENERGY EUROPE (Belgium)
- VOLTALIS SA (France)
- TRILATERAL RESEARCH LIMITED (Ireland)
- SCUOLA UNIVERSITARIA PROFESSIONALE DELLA SVIZZERA ITALIANA (Switzerland)

Project Description

Context. DR-RISE targets the untapped potential of residential DR to advance the energy transition, emphasizing user privacy, comfort, and engagement. By offering tools and services for end-consumers to actively participate in the energy market, the project approach fosters sustainability through innovative DR solutions, digitalisation via smart asset optimisation (consumption, generation and storage), and economic growth by enabling informed energy decisions. Tailored to individual needs, the project prioritises privacy and security by design, as well as GDPR compliance, aligning with broader European policy objectives.

Project presentation, technical description and implementation

PEST barriers will be analysed from the inception following the recommendations of the ESGTF to overcome them.

• ***Political factors:*** the regulatory framework adoption across the Member States. Regulation and business models will be addressed from the start and continued throughout the project.

• ***Economic factors:*** related with the profitability and viability of the solution. A two-level optimisation is envisioned as a viable solution that meets the interest of all stakeholders.

• ***Social factors:*** lack of trust and collaboration, acceptance of the solution, and unfair models can lead to DR aversion. A co-creation process will ensure the citizens' needs are covered and allow addressing their concerns directly thanks to their feedback.

• ***Technological factors:*** standardisation and interoperability will be crucial pillars for a wider implementation and making the impacts more significant.

Project Impacts

Economic Impacts

- Increased direct revenues: Enhancing economic benefits for end-consumers through optimal energy management and other market agents (e.g., TSO, DSO, aggregators) thanks to the reduction of peak demand through DR strategies.
- New market entrance: Exploring new business models for demand-response, facilitating market entry for residential DR services.
- Increased market share: Expanding the adoption of DR services in residential sectors.
- Market expansion for energy communities: Facilitating new opportunities for energy communities to participate in the energy market through DR initiatives.

Social Impacts

- Mitigation of energy poverty: Making energy more affordable through efficient use and participation in DR programs, directly benefiting economically disadvantaged groups.
- User empowerment: Enhancing end-consumer knowledge and control over their energy consumption and participation in the energy market.
- Informed decisions as active market players: Providing consumers with the tools and information needed to make educated choices regarding their energy use and DR participation.
- New jobs created: Generating employment opportunities in the development, implementation, and maintenance of DR services.

Environmental Impacts

- Decreased CO_2 and other pollutants: Reducing emissions through efficient energy use and increased renewable energy sources (RES) integration.
- Energy savings: Achieving significant energy savings in the residential sector through optimized DR strategies.

- Resources savings: Minimizing resource consumption by leveraging existing household infrastructure for DR.

Technological Impacts

- Development and diffusion of new technologies: Implementing innovative DR strategies and control modes for residential assets.
- Enhanced asset control and aggregation approaches: Enabling advanced management of residential energy resources for DR.
- Innovation in energy management systems: Developing new solutions for energy aggregation, forecasting, and real-time response to enhance grid stability and efficiency.

Expected key exploitable results of the project

- Overall DR-RISE combined solution.
- User Smart Node.
- Aggregator Smart Node.
- Optimisation methods and tools for Smart Grids.
- Forecasting algorithms.
- Social Innovation Management Guidelines.
- Social Innovation for DR-scenarios application.
- XAI solutions for DR.
- XAI methodologies.
- Data Governance methodologies.
- UIs for energy applications.
- Compatibility solutions for DR applications.
- Optimised houses and aggregator DR networks.
- Knowledge on smart grids and DR regulation frameworks.
- Energy Helix.

HORIZON-CL5-2022-D3-03-04 - Integrated wind farm control	Back to projects' list
Digitalisation	System integration

SUDOCO

Sustainable resilient data-enabled offshore wind farm and control co-design

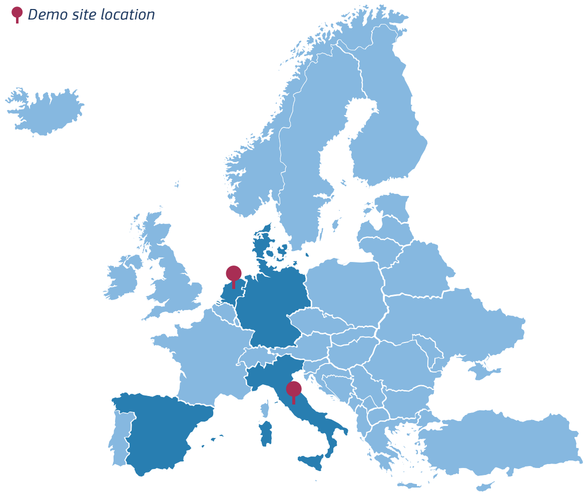
The mission of the SUstainable resilient Data-enabled Offshore wind farm and control CO-design (SUDOCO) project is to develop an open-source physics-informed data-enabled wind farm control platform which has its foundations in existing and new experimental datasets. This novel software platform will integrate: 1) multiple wind farm flow control techniques and structural health monitoring; 2) value functions able to account for both time-varying inflow and market conditions; 3) farm-wide system optimization, 4) a high level of (cyber)security.

FROM	October 2023
TO	September 2027

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
5 769 120,00 €	5 769 120,00 €	https://sudoco.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response
Grid Technologies	Network management; Monitoring and control tools

PROJECT PARTNERS' COUNTRIES



COORDINATOR	TECHNISCHE UNIVERSITEIT DELFT (Netherlands)

OTHER PARTNERS

- YOUWIND CAPITAL SL (Spain)
- DANMARKS TEKNISKE UNIVERSITET (Denmark)
- TECHNISCHE UNIVERSITAET MUENCHEN (Germany)
- FONDAZIONE ICONS (Italy)
- SHELL GLOBAL SOLUTIONS INTERNATIONAL BV (Netherlands)
- POLITECNICO DI MILANO (Italy)
- SOWENTO GMBH (Germany)

Project Description

Context

Wind energy is crucial for realizing climate neutrality, energy independence, and energy security. With the increased penetration of renewables in the electricity grid, there is a strong need for control technology to determine the number of electrons to produce and their destination (e.g., grid, storage, hydrogen) for maximum value to the energy system. Whereas the technology available on the market exclusively maximizes the energy yield, the future lies with optimization for cost of valued energy (COVE), which considers energy security, storage, fluctuating electricity prices, turbine component wear, and turbine lifetime.

Project presentation, technical description and implementation

The project will use key aspects and insights in wind farm operation to develop the Control Room of the Future that will allow operators to control wind farm output and loads by minimizing the COVE. SUDOCO will combine novel dynamic control algorithms, hybrid physics-based and data-driven models for the design of physical farms considering their governing control laws, which are safeguarded against adversarial threats and third-party fraud. The project data-driven integrated control tool chain will be trained, validated and optimized using several high-fidelity datasets.

Project Impacts

Will reduce the cost of valued energy with 1%

Innovative aspects of the project

SUDOCO will target a COVE reduction of 1%, and includes means to minimize environmental impact as well as address the variability of the wind resource. SUDOCO will deliver the first intelligent integrated wind farm control and design solution for reliable, safe, and cost-effective operation of large bottom-fixed and floating offshore wind farms.

Expected key exploitable results of the project

1. Integrated wind farm flow control solution, including annual energy production vs loads balancing controller.
2. Novel infrastructure for high-fidelity simulations with closed-loop wind farm control.
3. Load and health models of the wind farm control strategies.
4. Economic models for COVE and environmental (LCA) models for offshore wind farm.
5. Innovative algorithm to quickly approximate the optimal yaw angles for co-design applications.

HORIZON-CL5-2022-D3-03-04 - Integrated wind farm control

Back to projects' list

Electricity grids | Digitalisation | System integration

TWAIN

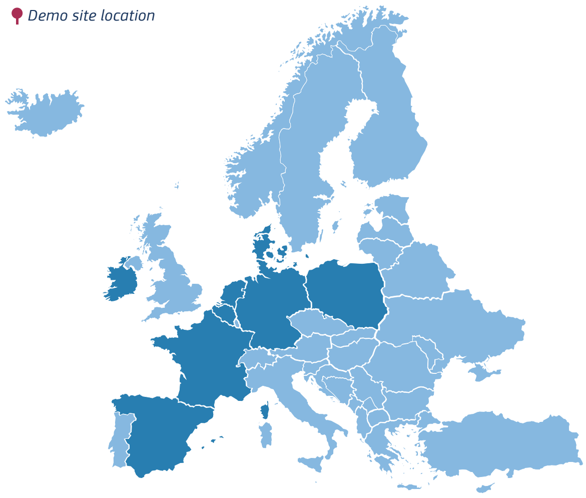
Integrated, Value-based and Multi-objective wind farm control powered by Artificial Intelligence

The project aims to enhance wind farm control using digital innovations to achieve stable, secure, and cost-effective energy production. Key objectives include developing advanced control systems to optimize energy output, reduce maintenance costs, extend turbine lifespan, and enhance cybersecurity. Measurable outcomes include improved farm performance, reduced operational costs, and increased reliability of wind energy systems. This project contributes to advancing renewable energy technologies for sustainable energy production.

FROM	November 2023
TO	October 2027

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
5 998 642,50 €	5 998 642,50 €	https://cordis.europa.eu/project/id/101122194

TECHNOLOGIES AND SERVICES DEPLOYED		PROJECT PARTNERS' COUNTRIES
Generation Technologies	Wind turbines	



COORDINATOR	ASOCIACION CENTRO TECNOLOGICO CEIT (Spain)

OTHER PARTNERS

- ANKER ENGELUNDS VEJ 101 (Denmark)
- FUNDACION CENER (Spain)
- TECHNISCHE UNIVERSITEIT DELFT (Netherlands)
- TECHNISCHE UNIVERSITAET MUENCHEN (Germany)
- F6S NETWORK IRELAND LIMITED (Ireland)
- CAPITAL ENERGY ENGINEERING SL (Spain)
- BELGISCH LABORATORIUM VAN ELEKTRICITEITSINDUSTRIE (Belgium)
- ENGIE GREEN FRANCE (France)
- ELECTRICITE DE FRANCE (France)
- RAMBOLL DEUTSCHLAND GMBH (Germany)
- SOFTSERVE POLAND SP ZOO (Poland)
- RAMBOLL DANMARK AS (Denmark)

Project Description

Context

The project on integrated wind farm control aligns with European Commission priorities focusing on sustainable energy, digitalization, and economic growth. It addresses the need for innovative solutions to enhance renewable energy systems, ensuring stability, reliability, and cybersecurity. By advancing wind farm control technologies, the project contributes to Europe's transition towards clean and efficient energy systems, supporting sustainability goals while leveraging digital innovations for economic and technological advancement. This initiative aligns with EU strategies promoting renewable energy and technological innovation for a greener and more resilient energy sector.

Project presentation, technical description and implementation

Challenges and Objectives: Maximize stability and reliability of output, Reduce operational and maintenance costs, Predict failures and damages to improve maintenance.

Technical Approach: Utilization of artificial intelligence for optimized control, Development of open-source tools for widespread adoption, Collaboration with Horizon 2020 projects to expand impact.

Methodology: Experiments and measurements for data-driven development, Integration of predictive analytics into control systems.

Key Technologies: Advanced control algorithms, Data analytics for predictive maintenance, Cybersecurity to protect control systems.

Project Impacts

Economic Impacts:

- Increased energy production efficiency.
- Cost savings through predictive maintenance.
- Enhanced competitiveness of wind energy.

Social Impacts:

- Improved job quality and safety in wind energy sector.
- Enhanced workforce skills and expertise.
- Contribution to sustainable energy practices.
- Environmental Impacts:
- Reduced carbon emissions through optimized operations.
- Minimized environmental impact of wind farms.
- Preservation of natural resources.

Technological Impacts:

- Advancement in AI-driven wind farm control technologies.
- Development of open-source tools for wind energy sector.
- Integration of large-scale wind turbines into digital control systems.

Innovative aspects of the project

The project's innovation lies in advanced digital wind farm control, optimizing stability and cybersecurity while maximizing energy output and reducing maintenance costs. It pioneers AI-driven prognostic tools for failure prediction and develops open-source solutions for broader industry adoption, setting the stage for large-scale turbine integration and enhancing wind energy competitiveness.

Expected key exploitable results of the project

Advanced Wind Farm Control System: Develop innovative digital controls for enhanced stability and performance.

Sub-key: AI-driven algorithms for optimal energy generation and load reduction.

Predictive Maintenance Tools: Create data-driven tools for early turbine issue detection.

Sub-key: Open-source software for predictive maintenance adoption.

Cybersecurity Solutions: Implement robust measures for wind farm system security.

Sub-key: Guidelines for cybersecurity in wind energy integration.

Open Source AI Solution: Release accessible AI solution for wind energy optimization.

Sub-key: Comprehensive documentation for effective utilization.

Key exploitable results and sub-key exploitable results achieved to date

Advanced Wind Farm Control Prototype: Developed and validated prototype for digital wind farm control system.

Sub-key: Initial testing shows promising stability improvements.

Early Predictive Maintenance Tools: Initial framework established for data-driven predictive maintenance.

Sub-key: Algorithms being refined for accurate turbine issue detection.

Cybersecurity Guidelines: Drafted preliminary cybersecurity guidelines for wind farm operations.

Sub-key: Collaboration ongoing to enhance security measures.

AI Optimization Tool: Initial version of open-source AI solution for wind energy optimization created.

Sub-key: Documentation under development to facilitate adoption and understanding.

HORIZON-CL5-2022-D3-03-04 - Integrated wind farm control

Back to projects' list

Digitalisation

WILLOW

Wholistic and Integrated digitaL tools for extended Lifetime and profitability of Offshore Wind farms

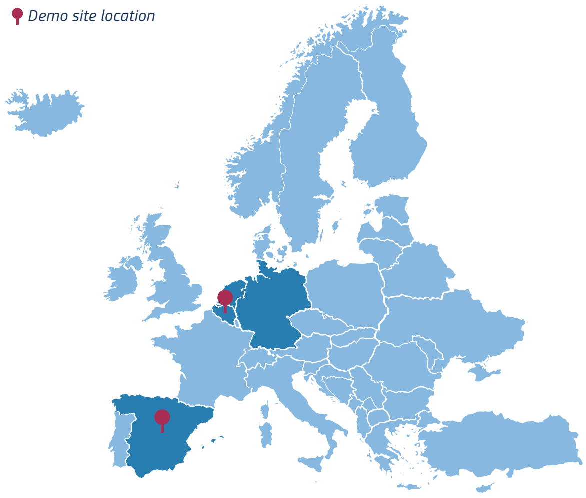
WILLOW integrated system will provide an open-source, data-driven smart curtailment solution to the Wind Farm Operators with the basis of an integrated Wind Farm Control system looking for a trade-off between the power production and the lifetime consumption. With this aim WILLOW pretends to design a novel Structural Health Monitoring System able to provide high quality data to perform a reliable fleet life assessment using physical models and AI methods which will be used for decision-making and maintenance scheduling.

FROM	October 2023
TO	September 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
5 816 861,25 €	5 816 861,25 €	https://cordis.europa.eu/project/id/101122184

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Smart appliances; Smart metering
Grid Technologies	Monitoring and control tools

PROJECT PARTNERS' COUNTRIES



COORDINATOR	CORDEEL NV (BELGIUM)

OTHER PARTNERS

- ASOCIACION CENTRO TECNOLOGICO CEIT (Spain)
- SINTEF ENERGI AS (Norway)
- SIRRIS HET COLLECTIEF CENTRUM VAN DE TECHNOLOGISCHE INDUSTRIE (Belgium)
- VRIJE UNIVERSITEIT BRUSSEL (Belgium)
- FLANDERS MAKE (Belgium)
- C-CUBE INTERNATIONAL BV (Netherlands)
- WOLFEL ENGINEERING GMBH + CO. KG (Germany)
- ALERION TECHNOLOGIES SL (Spain)
- 24SEA (Belgium)
- TECNICAS Y SERVICIOS DE INGENIERÍA, S.L. (Spain)
- NORTHER (Belgium)
- CLUSTER DE ENERGIA (Spain)

Project Description

Context

Nowadays the operation of offshore wind farms is not ideal. It's important to deal with problems like the fluctuating conditions of the wind availability and power grids demand. Additionally, the harsh environmental conditions affect considerably and negatively the structure health of the wind turbines. On top of that, the excessive downregulation and frequent start-stop events affect the fatigue life of the structure and components. We can say that the turbines are operating in off-design conditions. Aligned with these problems, the project proposes the WILLOW approach, which is based on the design of an integrated system able to provide an open-source data-driven smart curtailment tool.

Project presentation, technical description and implementation

WILLOW project is structured in three technical Work Packages focused on:

- The design of a global Structural Health Monitoring (SHM) system for the tower/transition piece and foundations considering fatigue, pitting corrosion and coating degradation by using physical and virtual sensors combined with Machine Learning techniques.
- The design of prognosis tools to predict the consumed lifetime (CL) and remaining useful life (RUL) by combining SCADA and SHM data using physical models and ML methods. Anomaly detection methods based on historical data considering damages and prognosis data.
- The design of a decision-making support tool for smart power dispatch in curtailed conditions and O&M scheduling. To determine how much power to be extracted from each turbine in present, near and far future to satisfy grid, market and lifetime constraints.

Project Impacts

Reduction of 5% on the inspection costs; 2% of lifetime extension in WFs designed with 25 years of lifetime; Expectation of reducing noise pollution by 4%; Up to 1% reduction of LCOE, between 3.5 and 4.5€/MWh

Innovative aspects of the project

- Detection and quantification of pitting corrosion using ultrasound sensors in combination with electrochemical sensors and accelerometers, applying virtual sensing to consider loads and fatigue.
- Evaluation and forecasting of coating condition.
- Farmwide loads and corrosion prognosis.
- Farmwide and data driven lifetime assessment.
- Smart curtailment tool and smart power dispatch providing more efficient O&M scheduling.

Expected key exploitable results of the project

- KER1. WILLOW's open source data-driven tools;
- KER2. WILLOW's digital and physical tools, as well as interoperable frameworks and controls;
- KER3. WILLOW's novel Structural Health Monitoring (SHM) system at turbine level;
- KER4. New R&D projects;
- KER5. Training contents based on WILLOW outcomes;
- KER6. Standardisation guidelines;
- KER7. Publications.

HORIZON-CL5-2022-D3-03-04 - Integrated wind farm control

Back to projects' list

Electricity grids | Digitalisation | Decarbonisation

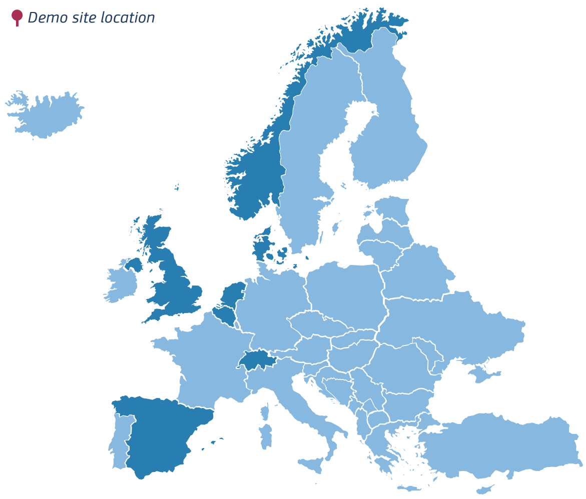
ICONIC

Smart, Aware, Integrated Wind Farm Control Interacting with Digital Twins

The consortium aims to develop innovative digital and physical tools to achieve fundamental breakthroughs for the integrated control of wind farms, considering the whole physical system at farm, turbine, and component levels, in particular the complex aerodynamic interactions among turbines. The proposed integrated control solutions will be demonstrated by an extensive validation study via high-fidelity simulation models, experiments at a national-level wind tunnel, historical operational data, and real-world wind farm field tests.

FROM	December 2023
TO	November 2027

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
3 897 447,50 €	3 897 447,50 €	https://cordis.europa.eu/project/id/101122329

TECHNOLOGIES AND SERVICES DEPLOYED		PROJECT PARTNERS' COUNTRIES
Other Technologies and Services	Digital Twins; Integrated Wind Farm Control, Next-Gen Wind Farm Sim Tools, AI-Powered Lifetime Management, Validations	

COORDINATOR	UNIVERSITEIT GENT (Belgium)

OTHER PARTNERS

- NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET NTNUAALBORG UNIVERSITET (Denmark)
- KATHOLIEKE UNIVERSITEIT LEUVEN (Belgium)
- IKERLAN S. COOP (Spain)
- C-POWER NV (Belgium)
- EDR & MEDESO AS (Norway)
- LAU LAGUN BEARINGS SL (Spain)
- SKF BV (Netherlands)
- ZF WIND POWER ANTWERPEN NV (Belgium)
- EMBOTECH AG (Switzerland)
- THE UNIVERSITY OF WARWICK (United Kingdom)
- IMPERIAL COLLEGE OF SCIENCE TECHNOLOGY AND MEDICINE (United Kingdom)
- BP INTERNATIONAL LIMITED (United Kingdom)
- THORNTON BANK MAINTENANCE SERVICES

Project Description

Context

The consortium aims to develop innovative digital and physical tools to achieve fundamental breakthroughs for the integrated control of wind farms, considering the whole physical system at farm, turbine, and component levels, in particular the complex aerodynamic interactions among turbines. The proposed integrated control solutions will be demonstrated by an extensive validation study via high-fidelity simulation models, experiments at a national-level wind tunnel, historical operational data, and real-world wind farm field tests.

Project presentation, technical description and implementation

The project goal is to create new digital and physical tools to achieve groundbreaking, integrated control of wind farms. This initiative focuses on understanding and optimizing the entire physical system, from the overall farm to individual turbines and components, emphasizing the aerodynamic interactions between turbines. The proposed solutions will be demonstrated by an extensive validation study via high-fidelity simulation models, experiments at a national-level wind tunnel, historical operational data, and real-world wind farm field tests.

Through these efforts, ICONIC aims to establish and pioneer new realms of knowledge and industrial leadership in key digital, enabling, and emerging technologies. ICONIC aims to directly contribute to Europe's Key Strategic Orientations C and A, paving the way for intelligent integrated wind farm control and delivering next-generation technologies for the wind energy sector.

Project impacts

Wind energy is an issue on which the EU and the whole world can add clean growth and sustainable development About 116 GW of new wind farms are expected to be installed in Europe from 2022-2026. However, wind farms' operating efficiency is still severely constrained, and significant research & application gaps still exist, as follows:

- Needs of an innovative, scalable, practically applicable wind farm (WF) control system to fully understand the effects of aerodynamic interactions between turbines under time-varying environmental conditions.
- Needs of multi-objective handling abilities to mitigate different kinds of loads, achieve optimal fatigue distribution under different tasks, and ensure safe operation even under abnormal conditions.
- Needs of efficient digital and physical tools to significantly enhance data collection, data mining and virtual sensing, providing comprehensive information far beyond physical measurement level.
- Needs of comprehensive validations and demonstrations (e.g. dedicated experiments and real-world field tests) for new technologies. This should particularly consider the benefits and changes to lifetime management and LCOE.

Innovative aspects of your project

ICONIC aims to fill all the above gaps, delivering disruptive technologies to achieve fundamental breakthroughs for wind farm O&M, enabling the transformation towards next-gen wind farm control approaches while meeting the core needs and requirements of wind farm owners, original equipment manufacturers (OEM), and critical component manufacturers to unleash the full potential of wind energy and maximise the economic & environmental benefits.

The core ambition of ICONIC is to deliver an innovative AI-based, data-powered, integrated wind farm control system. Here "integrated" means control strategies covering farm, turbine, and component levels while fully considering the influence of aerodynamic interactions between turbines on farm-wide power production. ICONIC's control system will be able to not only maximise the farm power production and support the ancillary services for the main grid, but also mitigate the turbine and component loads and support the lifetime management and the decision-making of wind farms. This system will be hybrid – it will make full use of wind farm flow and wind turbine physics, and employ and develop state-of-the-art machine learning innovations to capture and cognise information that cannot be explicitly reflected by physics and measurements. It will be hierarchical – it will handle complex tasks via an easy-to-implement manner with minimised requirements in extensions and adjustments of current wind farm management systems. On the one hand, it will be fully functional with the mainstream wind farm/specifications without requiring new sensors/measurements. On the other hand, it will have interfaces (with plug-in plug-out features) for additional data from digital twins and new sensors to achieve control enhancement. All these designs will enable the results from ICONIC to be a paradigm in AI-enhanced wind energy operating systems in the near future.

Expected key exploitable results of the project

- Develop new wind farm control tools to improve wind farm operations leveraging AI innovations.
- Investigate turbine control solutions with load-reduction abilities to deliver farm-wide objectives.
- Develop digital twins and physical tools for awareness and control enhancement considering remaining useful life assessment of wind turbine key components.
- Validate and exploit the integrated control system and digital twins via wind tunnel tests, historical operational data, dedicated test rigs, and field tests, and bring ICONIC's key innovations to TRL 5.

HORIZON-CL5-2022-D4-02-04 - Smart-grid ready and smart-network ready buildings, acting as active utility nodes (Built4People)

Back to projects' list

Electricity grids | Energy storage | Digitalisation

EVELIXIA

Smart Grid-Efficient Interactive Buildings

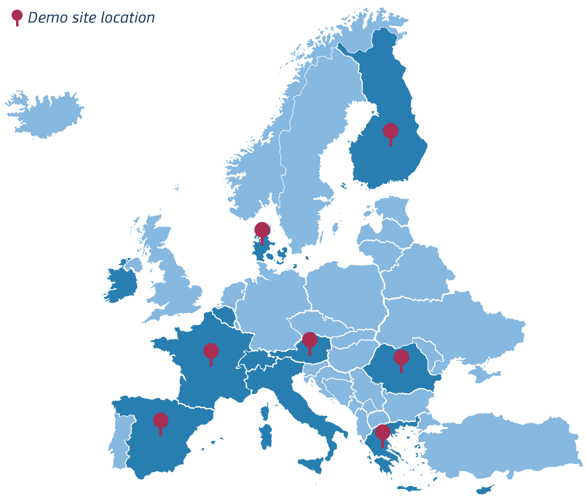
EVELIXIA project aims to realize Buildings as Active Utility Nodes (BAUNs), rendering the EU Building stock as: a) energy efficient; b) connected, by facilitating a two-way communication between the grid and the occupants, capitalizing on flexible technologies; c) smart, by utilizing analytics supported by sensors and controls to co-optimize efficiency, flexibility, and occupant preferences; and d) flexible, reducing, shifting, or modulating energy use according to occupant needs, while considering utility signals. EVELIXIA structures the advancement of its solutions along five Innovation Pathways which will be integrated, deployed, and validated at 7 large-scale, real- life pilots.

FROM	October 2023
TO	September 2027

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
10 320 789,09 €	8 189 865,05 €	https://cordis.europa.eu/project/id/101123238

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	Network management ; Monitoring and control tools
Distributed Storage Technologies	Batteries ; Thermal energy production, distribution and storage
Generation Technologies	Photovoltaic ; Solar thermal

PROJECT PARTNERS' COUNTRIES



COORDINATOR	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS (Greece)

OTHER PARTNERS

- RINA CONSULTING SPA (Italy)
- COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES (France)
- FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS (Spain)
- UBITECH ENERGY (Belgium)
- ELLINIKI ETAIREIA ENERGEIAKIS OIKONOMIAS (Greece)
- IES R&D (Ireland)
- UNIVERSITA DEGLI STUDI DI GENOVA (Italy)
- SOLVUS CYPRUS LIMITED (Cyprus)
- R2M SOLUTION (France)
- ENERGIEINSTITUT AN DER JOHANNES KEPLER UNIVERSITAT LINZ VEREIN (Austria)
- FACHHOCHSCHULE BURGENLAND GMBH (Austria)
- EUROPAISCHES ZENTRUM FUR ERNEUERBARE ENERGIE GUSSING GMBH (Austria)
- ENERGIE GUSSING GMBH (Austria)
- OEKO ENERGIE STREM REGISTRIERTE
- GENOSSENSCHAFT MIT BESCHRAENKTER HAFTUNG (Austria)
- PINK GMBH - ENERGIE- UND SPEICHERTECHNIK (Austria)

OTHER PARTNERS	
	• UNIVERSITATEA TEHNICA CLUJ-NAPOCA (Romania) • DISTRIBUTIE ENERGIE ELECTRICA ROMANIA SA (Romania) • TERMOFICARE NAPOCA SA (Romania) • ENTECH (France) • SYNDICAT DEPARTEMENTAL D'ENERGIE ET D'EQUIPEMENT DU FINISTERE (France) • EUROPEAN GREEN CITIES APS (Denmark) • KOLSTRUP BOLIGFORENING (Denmark) • AABENRAA FJERNVARME A.M.B.A. (Denmark) • SUSTAIN SOLUTIONS APS (Denmark) • NEOGRID TECHNOLOGIES APS (Denmark) • GENIKO NOSOKOMEIO PTOLEMAIDAS BODOSAKEIO (Greece) • DIMOTIKI EPICHEIRISI TILETHERMANSIS PTOLEMAIDAS-DIMOU EORDAIAS (DETIP) (Greece) • DIACHEIRISTIS ELLINIKOU DIKTYOU DIANOMIS ELEKTRIKIS ENERGEIAS AE (Greece) • BLUENERGY REVOLUTION SCRL (Italy) • ESTACION DE INVIERNO MANZANEDA SA • (Spain) • FUNDACION INSTITUTO TECNOLOGICO DE GALICIA (Spain) • NTT DATA EUROPE & LATAM GREEN ENGINEERING SL (Spain) • TURUN AMMATTIKORKEAKOULU OY (Finland) • NAANTALIN ENERGIA OY (Finland) • HAUTE ECOLE SPECIALISEE DE SUISSE OCCIDENTALE (Switzerland) • FORSCHUNG BURGENLAND GMBH (Austria)

Project Description

Project Impacts

Scientific: New breakthrough scientific discoveries on how to improve energy efficiency of buildings through increased levels of smartness, Scientific advancements on building digitalization and smartification of buildings, Creation of new knowledge on SSH issues relevant to buildings smartification (incl. user satisfaction, acceptance etc.).

Societal: Contribute to Fit for 55 (also accounting REPowerEU) and Built4People goals, as well as the deployment of positive energy districts in EU, Support smartification of the EU-building stock: >2.8 M m2 of floor area per year of EU building stock to improve its SRI by +47% (on average), Support building stock decarbonization – Long-term GHG reductions (during operation) triggered by EVELIXIA > 25 ktCO2eq/y, More EU buildings with better IEQ, More sustainable living – Offer tailored-made solution packages considering individual needs and preferences.

Economic/Technological: Long-term (after 2030) enrgy savings that can be triggered by EVELIXIA ≥80 GWh/y, Support building digitalization: >2.8 M m2 of floor area per year of EU building stock to acquire a BIM-digital twin, Facilitate the penetration of high shares of RE without affecting energy system stability, Support a more standardized, consolidated and integrated building smartification process in EU.

Innovative aspects of the project

EVELIXIA defines 5 Innovation Pathways (IP):

- IP1 “Building-to-Grid (B2G) Services”.
- IP2 “Grid-to-Building (G2B) Services”.
- IP3 “Human-to-Building Interfaces & Interactivity”.
- IP4 “Systems Interoperability”.
- IP5 “Innovative HW as Flexibility Enablers” and delivers 29 relevant Innovative technology Solutions (IS) that move beyond the current State of the Art in the field.

Those IS had been previously validated (TRL4-5) and will be further developed and tested reaching TRL6-7.

Expected key exploitable results of the project

- KER1: EVELIXIA Platform.
- KER2: Autonomous Building Digital Twin.
- KER3: Autonomous District Digital Twin.
- KER4: Stakeholders Interaction Platform.
- KER5: Interoperability and Abstraction Services. KER6: Geothermal Wall System.
- KER7: Window solar shading control using recycled PV cell, KER8: V2G EV Charger.
- KER9: Power-to-hydrogen-to-power compact system.
- KER10: Hybrid long-term storage system.
- KER11: Decentralized DHW preparation solution “Ennerbox”.
- KER12: Building Aggregator Service (BAS), KER13: “ESesoft platform”.

HORIZON-CL5-2022-D4-02-04 - Smart-grid ready and smart-network ready buildings, acting as active utility nodes (Built4People)

Back to projects' list

Electricity grids | Energy storage | Digitalisation

WeForming

Buildings as Efficient Interoperable Formers of Clean Energy Ecosystems

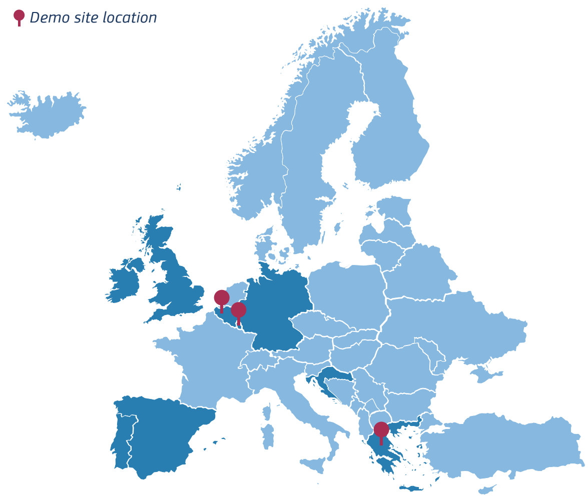
The WeForming project aims to revolutionize energy management in buildings by focusing on intelligent grid-interactive efficient buildings (iGEBs). It will develop innovative solutions to harmonize energy processes, enabling seamless integration into broader energy networks and markets. Key objectives include digitalizing building operations, optimizing energy processing, and ensuring buildings can adapt intelligently in multi-energy environments. Measurable impacts include enhanced building efficiency, reduced energy consumption, optimized grid interaction, and accelerated adoption of iGEBs in smart cities, contributing to sustainable urban living. Key research areas encompass energy system

FROM	October 2023
TO	September 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
11 994 576,25 €	8 693 363,25 €	https://cordis.europa.eu/project/id/101123556

TECHNOLOGIES AND SERVICES DEPLOYED	
Large Scale Storage Technologies	Power to gas; Compressed air energy storage; Hydro storage; Molten salt storage
Grid Technologies	High Voltage Alternating Current; High Voltage Direct Current; Micro-grid; Network management; Monitoring and control tools
Distributed Storage Technologies	Batteries; Electric vehicles; Thermal energy production, distribution and storage
Generation Technologies	Wind turbines; Photovoltaic; Biogas; Micro-generation

PROJECT PARTNERS' COUNTRIES



COORDINATOR	EUROPEAN DYNAMICS ADVANCED INFORMATION TECHNOLOGY AND TELECOMMUNICATION SYSTEMS SA (Greece)

OTHER PARTNERS

- LUXEMBOURG INSTITUTE OF SCIENCE AND TECHNOLOGY (Luxembourg)
- REGULATORY ASSISTANCE PROJECT (Belgium)
- F6S NETWORK IRELAND LIMITED (Ireland)
- HARDWARE AND SOFTWARE ENGINEERING EPE (Greece)
- HOLISTIC IKE (Greece)
- IKO DEVELOPMENT (Luxembourg)
- SUDSTROUM S.A R.L. & CO S.E.C.S. (Luxembourg)
- CIRCU LI-ION S.A. (Luxembourg)
- GENCELL LTD (Israel)
- USEFUL GRAVITY LDA (Portugal)
- MOVIDA-EMPREENDIMENTOS TURISTICOS SA (Portugal)
- CENTRO DE INVESTIGACAO EM ENERGIA REN - STATE GRID SA (Portugal)
- GRID ONE D.O.O. (Croatia)
- SMART ISLAND KRK DRUSTVO S OGRANICENOM ODGOVORNOSCU ZA PROJEKTIRANJE,GRADENJE I USLUGE (Croatia)
- SVEUCILISTE U ZAGREBU FAKULTET ELEKTROTEHNIKE I RACUNARSTVA(Croatia)
- WINGEST(Belgium)

OTHER PARTNERS	
	• FLEXIDE ENERGY SRL(Belgium) • UNIVERSITE DE LIEGE(Belgium) • CUERVA ENERGIA SLU(Spain) • SCHNEIDER ELECTRIC ESPANA SA(Spain) • AGGREGERING SL(Spain) • VERGY COMMUNITY SL(Spain) • FUNDACION INSTITUTO INTERNACIONAL DE INVESTIGACION EN INTELIGENCIA ARTIFICIAL Y CIENCIAS DE LA COMPUTACION(Spain) • UNIVERSIDAD DE MALAGA(Spain) • KARLSRUHER INSTITUT FUER TECHNOLOGIE(Germany) • FZI FORSCHUNGSZENTRUM INFORMATIK(Germany) • STADTWERKE KARLSRUHE GMBH(Germany) • BES-BADISCHE ENERGIE-SERVICEGESELLSCHAFT MBH(Germany) • QBOTS ENERGY LTD(United Kingdom)

Project Description

Context

The project "WeForming" aligns with the European Commission's priorities for sustainability, digitalisation, and energy transition. It focuses on transforming energy management in buildings to enhance sustainability and efficiency. By integrating buildings into the energy ecosystem through digital tools and smart technologies, the project supports EU objectives for clean energy and climate action. It addresses inclusion by optimizing energy use for all, promoting economic growth through innovative solutions, and fostering a more sustainable and resilient urban environment in line with EU policies.

Project presentation, technical description and implementation

The "WeForming" project addresses challenges in energy management within buildings by creating intelligent grid-interactive efficient buildings (iGEBs) that integrate with broader energy systems. The project focuses on interoperability using digital tools like SCADA, AI, and blockchain, prioritizing cybersecurity. The project approach emphasizes holistic energy management and sustainable business models. Key components such as smart meters and energy management systems optimize energy use and integrate buildings into smart grids. This project's innovative focus lies in creating interoperable, efficient buildings that contribute to a more integrated and sustainable energy ecosystem.

Project Impacts

Economic impacts:

- Increased market share for smart building technologies.
- New business opportunities in the smart cities sector.
- Improved economic viability of sustainable building investments.

Social impacts:

- Creation of new jobs in the renewable energy and smart building sectors.
- Enhanced quality of life through energy-efficient and comfortable buildings.
- Promotion of cultural shifts towards sustainable urban living.

Environmental impacts:

- Reduction in carbon dioxide emissions from energy-efficient buildings.
- Energy savings through optimized energy management.
- Resource efficiency and reduced environmental footprint of urban areas.

Technological impacts:

- Development and deployment of innovative digital tools for smart building management.
- Integration of interoperable technologies into urban energy systems.
- Advancement of energy management systems

and grid-interactive technologies.

Innovative aspects of the project. The most innovative aspect of the "WeForming" project is its focus on Intelligent Grid-interactive Efficient Buildings (iGEBs) that seamlessly integrate with the energy ecosystem. This approach leverages advanced digital technologies and interoperable architectures to optimize building operations, fostering energy flexibility and sustainability within smart cities. By transforming buildings into active nodes in the energy network, WeForming pioneers a new era of energy-efficient urban living.

Expected key exploitable results of the project

Intelligent Grid-interactive Efficient Buildings (iGEBs): Development and deployment of innovative iGEB solutions for optimized energy management and interoperability.

Interoperable Architectures: Validation and adaptation of leading-edge interoperable architectures for seamless integration of iGEBs into smart city grids.

Business Models and Market Adoption: Design and validation of sustainable business models to facilitate market adoption of iGEB technologies.

Smart City Integration: Integration of iGEBs as modular units within smart cities, addressing non-technical barriers for widespread deployment.

Key exploitable results and sub-key exploitable results achieved to date

Intelligent Grid-interactive Efficient Buildings (iGEBs): Development of prototype iGEB solutions demonstrating optimized energy management and interoperability.

Interoperable Architectures Validation: Successful adaptation and validation of interoperable architectures for integrating iGEBs into smart city grids.

Business Model Development: Initial design and testing of sustainable business models to facilitate market acceptance of iGEB technologies.

Pilot Demonstrations: Conducted pilot demonstrations showcasing the integration of iGEBs as modular units in smart city environments.

HORIZON-CL5-2022-D3-01-13: Energy system modelling, optimisation, and planning tools	Back to projects' list
Digitalisation	System Integration

MOPO

Comprehensive, Fast, User-Friendly and Thoroughly Validated Open-Source Energy System Planning Framework

mopo

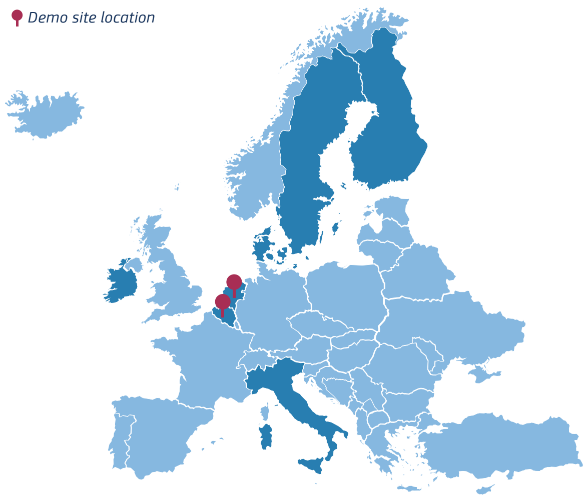
The Mopo project aims to develop an innovative energy system modelling toolset for sustainable and resilient planning. It combines data production, scenario management, and sector-specific optimization, based on existing tools like Spine Toolbox and SpineOpt. Mopo will provide an open-access, high-resolution Pan-European dataset for adaptable energy planning. It targets significant adoption by network operators and public bodies, enhancing their modeling capabilities. The modular design ensures wide applicability across various energy planning contexts, aiming for substantial sector-wide adoption within two years after completion.

FROM	January 2023
TO	December 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
5 996 580,00 €	5 996 580,00 €	https://www.tools-for-energy-system-modelling.org/

TECHNOLOGIES AND SERVICES DEPLOYED		
Other Technologies and Services	Energy system modelling	

PROJECT PARTNERS' COUNTRIES



COORDINATOR	TEKNOLOGIAN TUTKIMUSKESKUS VTT OY (Finland)
OTHER PARTNERS	• Danmarks Tekniske Universitet (Denmark) • Nederlandse Organisatie voor toegepastnatuurwetenschappelijk onderzoek (Netherlands) • Katholieke Universiteit Leuven (Belgium) • University College Dublin (Ireland) • Kungliga Tekniska högskolan (Sweden) • Stichting Netherlands eScience Center (Netherlands) • EPRI Europe DAC (Ireland) • Energy Reform ltd. (Ireland) • Ministerie van Infrastructuur en Waterstaat (Netherlands) • Vlaamse Instelling voor Technologisch Onderzoek (Belgium) • Fondazione ICONS (Italy) • Fluxys Belgium SA (Belgium) • Fortum Power and Heat Oy (Finland)

Project Description

Context

The Mopo project aligns with the EU's focus on sustainable, secure energy supply, addressing priorities in digitalization, sustainability, and inclusion. It responds to the EC's Green Deal and digital agenda by advancing energy system modeling tools for a resilient, carbon-neutral future. Through innovative data management and sector optimization, Mopo supports the transition to a digital, inclusive economy, fostering economic growth and energy sector modernization. This initiative embodies the EU's ambition for a sustainable, technologically advanced, and inclusive society.

Project presentation, technical description and implementation

The Mopo project addresses the integration of diverse energy sources into resilient systems, utilizing Spine Toolbox and SpineOpt for advanced energy modeling. This innovative approach surpasses existing solutions with its adaptability, user-friendliness, and comprehensive scenario management. The project combines theoretical modeling, data analysis, and case studies to optimize energy sector planning. An open-access, high-resolution Pan-European dataset supports detailed analyses. Key technologies include a multi-user data management system, sector-specific optimization models, and visualization tools, facilitating the EU's energy transition. Mopo's modular design ensures seamless integration with current systems, offering a scalable solution for network operators and public authorities, aligning with EU sustainability and digitalization goals.

Project Impacts

Economic Impacts: *n*ew market opportunities in sustainable energy.

Social Impacts: Creating of high-quality jobs in green tech and renewable energy sectors. Improved quality of life through sustainable and reliable energy systems.

Environmental Impacts: Significant reduction in CO2 emissions. Promotes water and energy savings, contributing to resource efficiency.

Technological Impacts: Acceleration of the development and adoption of advanced energy system modeling tools.

Other Impacts: Support to EU policies on sustainability, digitalisation, and inclusion. Enhancement of public and private sector collaboration in energy planning and implementation.

Innovative aspects of the project

MOPO revolutionizes energy modeling by generalizing and standardizing data flow from sector-specific pipelines to any tool, enhancing compatibility, openness, and information sharing. Incorporating Spine Toolbox and SpineOpt, it sets a new standard for flexible, comprehensive energy planning. This approach not only fosters technological innovation but also aligns with the EU's sustainability goals by facilitating a unified, adaptable framework for carbon-neutral strategies.

Expected key exploitable results of the project

- Comprehensive modeling framework uniting Spine Toolbox and SpineOpt for energy system analysis.
- Open-access dataset for EU-wide energy planning with high spatial and temporal resolution.
- Modular, adaptable tools for specific stakeholder needs in energy system design.
- Data management system ensuring integrity and traceability in a collaborative setting.
- Sector-specific optimization models with detailed physics for realistic energy representations.
- User-friendly visualization for effective data presentation and decision-making.
- Training programs to support tool adoption among network operators and public authorities.
- Policy guidance based on project outcomes to steer EU energy strategies towards sustainability.

Key exploitable results and sub-key exploitable results achieved to date

Current Key Exploitable Results:

- Working version of the energy modeling framework openly available: Integration of Spine Toolbox and SpineOpt, with implemented development on capabilities, speed, and user-friendliness

Sub-Key Exploitable Results in Development:

- Sector-specific models: Initial models for renewable energy sources and demand-side management are being validated.
- Visualization tools: Early designs for dashboards and reporting tools to simplify the interpretation of complex data sets.
- Educational materials: Draft materials for courses and online training modules are being compiled to facilitate widespread adoption of the toolset.

HORIZON-CL5-2022-D3-01-13: Energy system modelling, optimisation, and planning tools

Back to projects' list

Energy storage | Digitalisation | Consumers/prosumers

iDesignRES

Integrated Design of the Components of the Energy System to Plan the Uptake of Renewable Energy Sources: An Open Source Toolbox

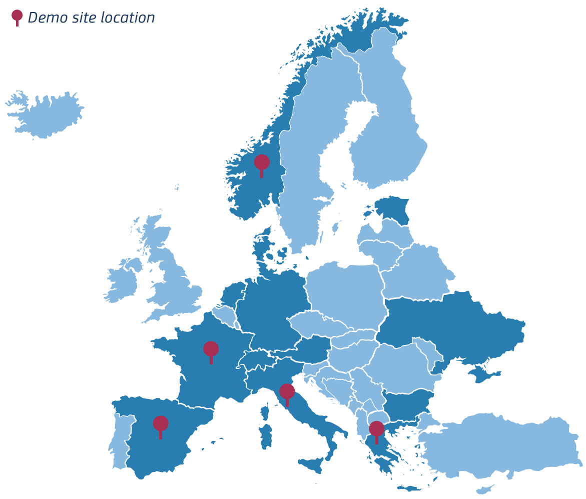
Project "iDesignRES" develops open-source toolboxes for planning and optimizing low and zero-emission energy adoption at regional and European scales. Objectives include user-friendly online tools, high-resolution energy models, and optimized investment strategies. Key outcomes: enhanced renewable energy uptake, improved system planning, and increased stakeholder collaboration for sustainable transitions.

FROM	October 2023
TO	September 2027

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
6 015 690,00 €	6 015 690,00 €	https://cordis.europa.eu/project/id/101095849

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	High Voltage Alternating Current; Micro-grid; Network management; Monitoring and control tools
Generation Technologies	Wind turbines; Photovoltaic; Solar thermal; Biogas; Micro-generation

PROJECT PARTNERS' COUNTRIES



COORDINATOR	NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET NTNU (Norway)

OTHER PARTNERS

- NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET NTNU (Norway)
- TECHNISCHE UNIVERSITAT BERLIN (Germany)
- E3-MODELLING AE (Greece)
- SINTEF ENERGI AS (Norway)
- INTERNATIONALES INSTITUT FUER ANGEWANDTE SYSTEMANALYSE (Austria)
- ELECTRICITE DE FRANCE (France)
- UNIVERSIDAD DE LA IGLESIA DE DEUSTO ENTIDAD RELIGIOSA (Spain)
- FUNDACION TECNALIA RESEARCH & INNOVATION (Spain)
- AALBORG UNIVERSITET (Denmark)
- EUROQUALITY SAS(France)
- TECHNISCHE UNIVERSITAET WIEN (Austria)
- ELEKTROENERGIEN SISTEMEN OPERATOR EAD(Bulgaria)
- LOMBARDY ENERGY CLEANTECH CLUSTER (Italy)
- DIMOSIA EPICHEIRISI ILEKTRISMOU ANONYMI ETAIREIA (Greece)
- NORD POOL AS (Norway)
- INDEPENDENT POWER TRANSMISSION OPERATOR SA (Greece)
- ASOCIACION CLUSTER DE INDUSTRIAS
- DEMEDIO AMBIENTE DE EUSKADI (Spain)
- DIXI GROUP LLC (Ukraine)
- INSTITUTE FOR ECONOMIC RESEARCH ANDPOLICY CONSULTING CIVIC ORGANISATION (Ukraine)
- MINISTERIE VAN ECONOMISCHE ZAKEN EN KLIMAAT (Netherlands)
- FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV (Germany)
- PAUL SCHERRER INSTITUT (Switzerland)

Project Description

Context

The project aligns with key European Commission priorities, focusing on energy system transition towards sustainability and decarbonisation. It addresses objectives related to renewable energy adoption, digitalisation of energy systems, and integration of energy sources. By promoting sustainable energy solutions, the project contributes to Europe's climate goals, enhances energy security, fosters innovation, and supports economic growth. This aligns with EU policies promoting clean energy technologies, digital transformation, and inclusive energy systems for all citizens.

Project presentation, technical description and implementation

The project addresses challenges in integrating renewable energy by developing open-source tools for energy planning and optimization. The project aims to democratize energy system modeling with accessible, modular tools and a cloud-based platform. Leveraging multi-physics modeling and investment optimization, our approach emphasizes standardized data structures for collaboration and performance. Key components like multi-carrier grid planning and renewable energy models will enhance sustainability and efficiency.

Project Impacts

Economic impacts:

- Increased adoption of renewable energy technologies.
- Cost savings for energy planning and grid operations.
- Improved market competitiveness for energy providers.

Social impacts:

- Enhanced job creation in renewable energy sectors.
- Improved quality of life through sustainable energy practices.
- Increased access to energy planning tools for communities.

Environmental impacts:

- Reduced carbon emissions and air pollutants.
- Conservation of water resources through efficient energy management.
- Energy savings and resource conservation.

Technological impacts:

- Development and dissemination of open-source energy planning tools.
- Advancement of multi-physics energy system modeling.
- Integration of renewable energy sources into existing grids.

Innovative aspects of the project

The innovative aspects of the project include the development of open-source toolboxes for renewable energy planning, offering user-friendly, high-resolution energy system models. This approach enables public authorities and network operators to optimize low-emission energy adoption across various scales, promoting transparency and accessibility in energy system modeling and planning.

Expected key exploitable results of the project

- Open-source toolboxes for renewable energy planning.
- Multi-physics component energy models.
- Comprehensive energy system modeling.
- Long-term multi-carrier grid planning.
- Investment and operation optimization tools.
- Standardized data structure for energy system modeling.
- Cloud-based platform for online energy system model execution.
- Visualisation tools for scenario results and policy informatics.

Key exploitable results and sub-key exploitable results achieved to date

- Development of open-source toolboxes for renewable energy planning
- Multi-physics component energy models
- Comprehensive energy system modeling
- Long-term multi-carrier grid planning
- Investment and operation optimization tools
- Establishment of a standardized data structure for energy system modeling
- Implementation of a cloud-based platform for online energy system model execution
- Visualization tools for scenario results and policy informatics

HORIZON-CL5-2022-D3-01-14 - Thermal energy storage solutions

Back to projects' list

Electricity grids | Energy storage | System integration

BEST-Storage

Building Energy Efficient Systems Through Short and Long Spectrum Thermal Energy Storage

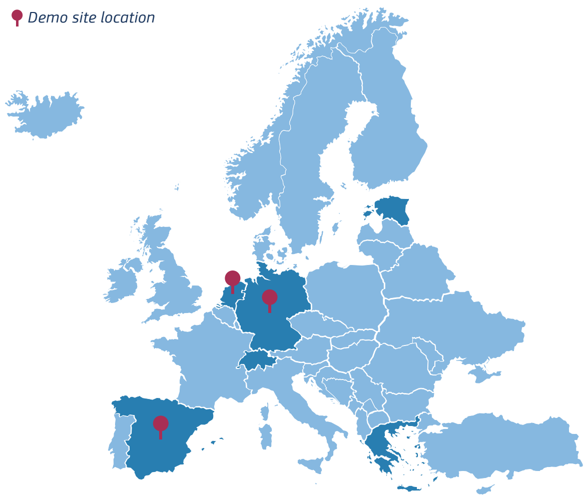
Heating accounts for approximately half of the electricity consumed by buildings, and the increasing use of heat pumps further impacts electricity consumption and peak demand. However, technologies for storing renewables for long periods remain rare and costly. There is a need for seasonal storage solutions, particularly during cold winters. The EU-funded BEST-Storage project will develop both long- and short term high-energy density storage solutions. These include a thermo-chemical and loss-free storage technology for seasonal storage, and two phase-change materials slurry concepts and vacuum-insulated water storage, for cold and warm applications, respectively, to shift peak load demands. The project will integrate these storage solutions into smart-building energy management systems to reduce operating costs for short-term applications.

FROM	January 2023
TO	December 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
5 472 550,00 €	4 797 535,00 €	www.best-storage.eu

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response
Grid Technologies	Network management, monitoring, and control tools
Distributed Storage Technologies	Thermal Energy Storage, Photovoltaic
Generation Technologies	Ancillary Services

PROJECT PARTNERS' COUNTRIES



COORDINATOR: SOLINTEL M & P SL (Spain)

OTHER PARTNERS

- FUNDACION TECNALIA RESEARCH & INNOVATION (TECNALIA) (Spain)
- ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS (CERTH) (Greece)
- TECHNISCHE UNIVERSITAT BERLIN (TUB)(Germany)
- FUNDACION TEKNIKER (TEKNIKER) (Spain)
- NEWTON ENERGY SOLUTIONS BV (NEWTON) (Netherlands)
- EUROPEAN HEAT PUMP ASSOCIATION (EHPA) (Belgium)
- AVANZARE INNOVACION TECNOLOGICA SL (AVAN) (Spain)
- MITTETULUNDUSUHING TARTU REGIOONI ENERGIAAGENTUUR (TREA) (Estonia)
- GIROA SOCIEDAD ANONIMA (GIR) (Spain)
- OST - OSTSCHWEIZER FACHHOCHSCHULE (Switzerland)
- SCUOLA UNIVERSITARIA PROFESSIONALE DELLA SVIZZERA ITALIANA (Switzerland)

Project Description

Context

The project involves addressing the high energy demand of buildings, particularly for thermal purposes, which accounts for a significant portion of global electricity consumption. The project aims to develop efficient energy storage solutions to meet this demand, focusing on both short-term and long-term storage options. Additionally, the project seeks to integrate these storage solutions into smart building energy management systems to optimize energy usage and reduce peak loads

Project presentation, technical description and implementation

The project, BEST-Storage, aims to develop and implement innovative energy storage solutions for buildings to address high energy demand for thermal purposes. These solutions include both short-term and long-term storage options, such as thermo-chemical material (TCM) storage, phase change material (PCM) slurry systems, and vacuum insulated water storage. By decoupling power delivery and energy storage, the project enables modular and cost-effective storage solutions. The technical implementation involves optimizing storage designs, developing control algorithms, and integrating storage systems into smart building energy management systems. Through these efforts, the project seeks to improve energy efficiency, reduce peak loads, and minimize environmental impacts.

Project Impacts

1. Replicability: The modular design of the storage solutions facilitates scalability and cost-effectiveness, making them replicable in different settings. This allows for widespread adoption of energy storage technologies and promotes the deployment of similar solutions in other buildings and contexts.

2. Socio-economics: The implementation of model predictive control algorithms enables efficient management of heating and cooling demands, leveraging electricity prices to incentivize peak load shifting. This fosters the development of prosumer business models and contributes to economic savings for consumers.

3. Environment: By reducing peak electricity demand and optimizing energy system efficiency, the project helps mitigate negative environmental impacts associated with high energy consumption. It also enhances the integration of renewable energy sources, thereby reducing reliance on fossil fuels and lowering greenhouse gas emissions.

4. Market Transformation: The project leverages digital utility market transformations by implementing optimal control strategies and model predictive controls. This positions the developed storage solutions as valuable components for new energy services, promoting flexibility, network optimization, cost reduction, and energy savings in the market.

Innovative aspects of your project

1. Decoupling Power and Energy Storage: By decoupling power delivery and energy storage, the project enables modular and cost-effective storage solutions. This approach eliminates the need for heat exchangers inside storage vessels, enhancing scalability, flexibility, and design options.

2. Thermo-Chemical Material (TCM) Storage: Introducing a novel thermo-chemical storage concept utilizing aqueous NaOH as the sorption material, the project achieves efficient energy storage for extended periods. This innovative approach addresses the need for long-term energy storage solutions, particularly in seasonal applications.

3. Phase Change Material (PCM) Slurry Storage: Implementing PCM slurry systems for energy storage at specific temperature ranges, the project offers a versatile solution for daily storage needs. This technology enables peak load shifting and covers cooling demands during peak hours, contributing to energy efficiency and cost savings.

4. Vacuum Insulated Water Storage: Utilizing vacuum insulation technology in water storage solutions, the project achieves efficient thermal energy storage for both warm and cold applications. This approach ensures minimal heat loss, enhancing the overall performance and effectiveness of the storage systems.

5. Smart Control Systems: Integrating advanced control algorithms into building energy management systems, the project enhances the operational efficiency of storage solutions. These control systems optimize energy usage based on electricity prices, enabling economic rewards for peak load management and off-peak consumption.

Expected key exploitable results of the project

1. Thermo-Chemical Material (TCM) Storage Technology: The development of an efficient and cost-effective TCM storage solution utilizing aqueous NaOH as the sorption material, suitable for long-term energy storage applications.

2. Phase Change Material (PCM) Slurry Storage Systems: Innovative PCM slurry systems designed for daily energy storage, capable of covering peak cooling loads and shifting electricity consumption to off-peak periods.

3. Vacuum Insulated Water Storage Solutions: Implementation of vacuum insulated water storage technologies for warm and cold applications, enabling efficient thermal energy storage with minimal heat loss.

4. Smart Control Algorithms: Advanced control algorithms integrated into building energy management systems to optimize energy usage based on electricity prices, facilitating peak load management and cost savings.

5. Modular and Scalable Storage Solutions: Development of storage concepts that decouple power delivery and energy storage, allowing for modular and scalable storage systems with enhanced flexibility and design options.

Key exploitable results and sub-key exploitable results achieved to date

1. Thermo-Chemical Material (TCM) Storage Technology:

- Optimization of aqueous NaOH sorption material for enhanced heat and mass transfer rates.
- Reduction of vessel volume by 3% and increase in energy density by 5% compared to current TCM storage designs.
- Cost reduction of storage per kWh by 1%.

2. Phase Change Material (PCM) Slurry Storage Systems:

- Development of PCM slurry systems capable of storing energy at temperatures ranging from 6-12°C.
- Achievement of energy density in the range of 17-35 kWh/m3.
- Successful demonstration of peak cooling load coverage and electricity consumption shifting capabilities.

3. Vacuum Insulated Water Storage Solutions:

- Implementation of vacuum insulated water storage technologies for warm and cold applications.
- Efficient thermal energy storage with minimal heat loss, contributing to energy savings and peak load management.

4. Smart Control Algorithms:

- Integration of advanced control algorithms into building energy management systems.
- Optimization of energy usage based on electricity prices, leveraging peak load management strategies.

5. Modular and Scalable Storage Solutions:

- Development of storage concepts decoupling power delivery and energy storage.
- Modular and scalable storage systems offering flexibility in design and operation.

HORIZON-CL5-2022-D3-01-14 - Thermal energy storage solutions

Back to projects' list

Energy Storage	Consumers/Prosumers	System Intehration

THUMBS UP

Thermal Energy Storage Solutions to optimally manage Buildings and unlock their Grid Balancing and Flexibility Potential

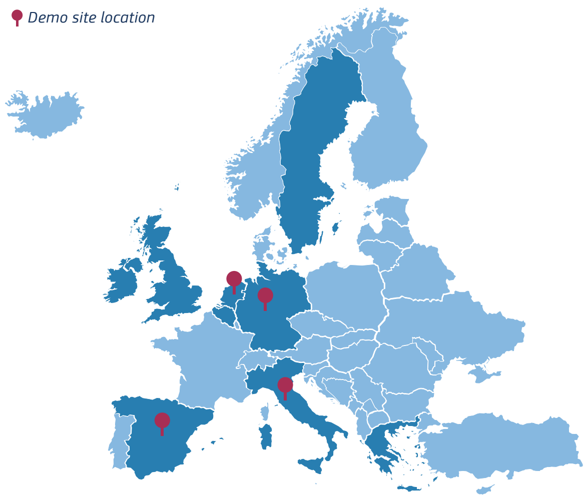
The THUMBS UP project aims to develop thermal energy storage (TES) solutions for EU buildings to enhance energy efficiency and grid flexibility. It includes technology development, integration, validation, and modeling. Objectives: TES technology development, integration with building systems, validation in diverse sites, and replication studies. Measurable outcomes: replicability, socio-economic benefits, environmental contributions, market transformation, and policy promotion for TES adoption.

FROM	January 2023
TO	December 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
7 631 369,00 €	6 369 819,25 €	https://www.thumbsupstorage.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response; Smart appliances;Smart metering
Grid Technologies	High Voltage Alternating Current; Micro-grid; Network management; Monitoring and control tools
Distributed Storage Technologies	Batteries; Electric vehicles; Thermal energy production, distribution and storage

PROJECT PARTNERS' COUNTRIES



COORDINATOR	VEOLIA SERVICIOS LECAM SOCIEDAD ANONIMA UNIPERSONAL (LE)

OTHER PARTNERS

- FUNDACIÓN CARTIF (Spain)
- UNIVERSITA DEGLI STUDI DI GENOVA (Italy)
- CONSIGLIO NAZIONALE DELLE RICERCHE (Italy)
- UNIVERSIDAD DE LLEIDA (Spain)
- algoWatt SpA (Italy)
- PLUSS ADVANCED TECHNOLOGIES BV (Netherlands)
- SORPTION TECHNOLOGIES GMBH (Germany)
- GRADYENT B.V. (Netherlands)
- ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS (Greece)
- JOHANNEBERG SCIENCE PARK AB (Sweden)
- I-TES SRL (Italy)
- GRID SINGULARITY GMBH (Germany)
- UNIVERSITA DEGLI STUDI DI MESSINA (Italy)
- UBITECH ENERGY (Belgium)
- NANOPHOS ANONIMI EMPORIKI ETAIRIA ANAPTIXIS KAI YPIRESION (Greece)
- THE ECONOMIC AND SOCIAL RESEARCH
- INSTITUTE LBG (Ireland)
- POLITECNICO DI TORINO (Italy)
- THE UNIVERSITY OF BIRMINGHAM (United Kingdom)
- INSTITUTE LBG (Ireland)

Project Description

Context

The project addresses key priorities outlined by the European Commission, focusing on sustainability, digitalization, and inclusion. With a strong emphasis on energy efficiency and renewable integration, it aligns with EU goals for reducing CO2 emissions and advancing clean energy transitions. By promoting technological innovation and consumer engagement, it contributes to economic growth and resilience. Moreover, the project underscores the importance of system integration and cross-sector collaboration, essential for building a more flexible and interconnected energy landscape in Europe.

Project presentation, technical description and implementation

The project aims to address the technological challenge of optimizing thermal energy storage (TES) solutions in buildings to enhance energy efficiency and grid flexibility. Its objectives include developing TES solutions at daily and weekly levels, integrating them into buildings for increased efficiency, and leveraging power-to-heat approaches. What sets THUMBS UP apart is the focus on innovative TES technologies, such as FractLES and sorTES, offering scalability and cost-effectiveness. The project methodology involves parallel development of these technologies, integration with building energy management systems, and validation in real demo sites. These technologies contribute by storing and releasing thermal energy as needed, reducing energy consumption, and enhancing grid balancing capabilities.

Project Impacts

Economic impacts:

- Increased market share for thermal energy storage solutionsNew market entrance for TES technologies.
- Increased revenue opportunities for project partners.

Social impacts:

- Creation of new jobs in the field of energy efficiency and TES technology development.
- Enhanced quality of life through improved building comfort and reduced energy costs.

Environmental impacts:

- Decreased CO2 emissions through reduced energy consumption in buildings.
- Energy savings resulting from optimized thermal energy storage solutions.
- Promotion of renewable energy integration and sustainability.

Technological impacts:

- Development and diffusion of innovative thermal energy storage technologies.
- Advancement of building energy management systems.

Other impacts:

- Contribution to the EU's climate and energy objectives.
- Demonstration of the feasibility and scalability of TES solutions in buildings.

Innovative aspects of your project

The most impactful aspect of the project is the development of novel thermal energy storage solutions tailored for buildings. By integrating these solutions seamlessly into existing infrastructures, the project unlocks the potential for significant energy savings and grid flexibility, thus advancing the transition towards sustainable and efficient buildings.

Expected key exploitable results of the project

- Development of innovative thermal energy storage solutions for building.s
- Integration of thermal energy storage systems with building energy management systems (BEMS).
- Demonstration of the effectiveness of thermal energy storage in real-world building

environments.

- Validation of short-term and long-term thermal energy storage technologies.
- Deployment of virtual tools for coordinating building systems with district heating networks and electrical grids.

Key exploitable results and sub-key exploitable results achieved to date

- Development of FractLES and sorTES thermal energy storage technologies.
- Integration of FractLES and sorTES with building energy management systems (BEMS).
- Validation of FractLES and sorTES technologies at TRL 6 level.
- Deployment of FractLES and sorTES in real demo sites for validation at TRL 7 level.
- On-going development of virtual tools for system coordination with district heating networks and electrical grids.

HORIZON-CL5-2022-D3-01-14 - Thermal energy storage solutions	Back to projects' list

Electricity grids | Energy storage | Decarbonisation

ECHO

Efficient Compact Modular Thermal Energy Storage System

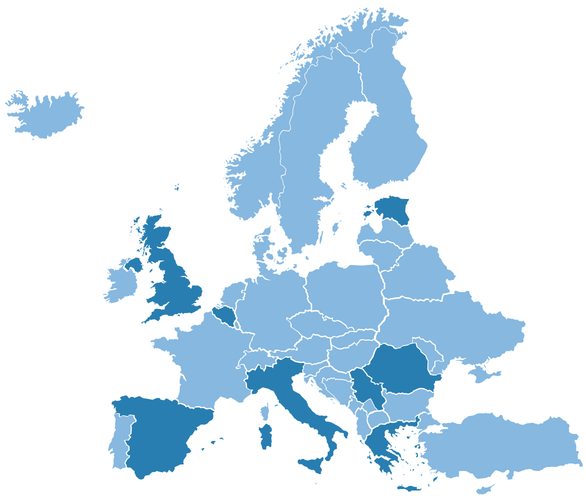
The project's goal is to develop and demonstrate novel modular, compact, high performances and Plug&Play thermal energy storage (TES) solutions for heating, cooling and domestic hot water (DWH) production, able to provide electricity load shifting with meaningful peak shaving of the thermal and electric load demands.ECHO project will provide a key tool for thermal energy storage in the context of sector coupling and provision of flexibility of demand. ECHO system will be adapted to the different energetic scenarios. Additionally, its modularity will allow to use the concept in different scales, from small apartments to larger buildings.

FROM	January 2023
TO	December 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
7 066 920,00 €	6 169 498,00 €	https://echo-euproject.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response; Heating/ cooling peak load management
Distributed Storage Technologies	Thermal energy production, distribution and storage

PROJECT PARTNERS' COUNTRIES



COORDINATOR	CNR (Italy)

OTHER PARTNERS

- BEWARRANT (Belgium)
- GENERACION DE ENERGIAS ALTERNATIVAS SL (Spain)
- UNIVERSITA DEGLI STUDI DI FERRARA (Italy)
- PHASE CHANGE MATERIAL PRODUCTS LTD (UK)
- UNIVERSITAT POLITECNICA DE VALENCIA (Spain)
- THE UNIVERSITY OF NOTTINGHAM (UK)
- INSTITUT MIHAJLO PUPIN (Serbia)
- FUNDACION TECNALIA RESEARCH & INNOVATION (Spain)
- ISTANBUL TEKNIK UNIVERSITESI (Turkey)
- SANHUA INTERNATIONAL EUROPE SL (Spain)
- UNIVERSITA DEGLI STUDI DI PADOVA (Italy)
- GREEN ENERGY SOLUTIONS CONSULTANT SRL (Romania)
- HIREF SPA (Italy)
- EUROPEAN HEAT PUMP ASSOCIATION (Belgium)
- IDEAKIM KIMYA INSAAT ITHALAT IHRACAT SANAYI AS (Turkey)
- GEMINIS TOOLS S.L. (Spain)

Project Description

Context.

Energy storage is one of the key factors to reach EU aims to be climate-neutral by 25, with a net-zero greenhouse gas (GHG) emissions economy. The decarbonisation and the transition to clean energy sources, together with the improvement of the energy efficiency, will bring to a severe change in the employed energy systems. The potentialities of thermal energy storage (TES) systems, able to provide electricity load shifting by mean of energy conversion and storage, can help in developing flexible energy systems, managing the intrinsically intermittent nature of renewable energy sources.

Project presentation, technical description and implementation

The ECHO project consists of 5 interrelated pillars, following a holistic approach with the activities grouped by type and organized in a logical sequence from research over innovation to demonstration and evaluation. Communication, dissemination and exploitation of results run in parallel over the other four pillars.

1. Analysis of the different energy scenarios in Europe and of the building stock characterisation to individuate the fundamental parameters for the TES design.

Project Impacts

ECHO will demonstrate the impact of TES on European Society, through the exploitation of different materials and technologies, simulating a wide use of these systems in the future (ECHOTSS).

ECHO TES device can be sized according to the energy demand of the building, the energy sources and the available space. The project will enable network-scale integration and maximization of TES impact on flexibility/balancing markets, thus providing a key benefit to network operators as well as socio-economic well-being of end-users/building owners

The innovative ECHO TES solutions will contribute to the mitigation of climate change.

All the necessary actions will be done to build the social acceptance of new energy technologies and increase participation of consumers in energy markets.

ECHO results can help in the energy transition.

Innovative aspects of your project

ECHO project wants to define a smart, flexible, plug&play, modular energy storage solution to match the energy demand with the energy supply. It will be based on advanced materials and technological solutions (from the multi-parameters approach for agent-based simulation (ECHOTSS approach) to TCMs, PCMs, HPs…), improving results from the research and industrial fields and exploring new ideas.

Expected key exploitable results of the project

Several KERs are expected from ECHO, as new know-how on PCMs, heat pumps and refrigerants, extensive know-how derived from new field applications regarding integration of TES systems based on TCMs and PCMs in conventional HVAC systems, installation of one TES prototype and three democases, a data-driven control algorithms for multi-source buildings with TES, an innovative TCM reactor design and fabrication of TCM pellets. Moreover, the results will led to new know-how on energy systems simulation in the context of storage for sector coupling applications, innovative algorithms based on Machine Learning to optimize systems and processes in the former context, a simulator (ECHOTSS) based on Multiagent Simulation to characterize the effect of small-scale storage aggregation strategies in realistic grid operations.

HORIZON-CL5-2022-D3-01-14 - Thermal energy storage solutions

Back to projects' list

Energy storage | Digitalisation | Consumers/Prosumers

HYSTORE

Hybrid Services from Advanced Thermal Energy Storage Sytems

The HYSTORE project develops innovative thermal energy storage (TES) concepts for heating/cooling systems and DHW. It aims to increase energy density, lower costs, and integrate TES into energy systems. Measurable outcomes include cost reduction, load shifting, demand-response potential, energy savings, and environmental benefits, contributing to sustainability.

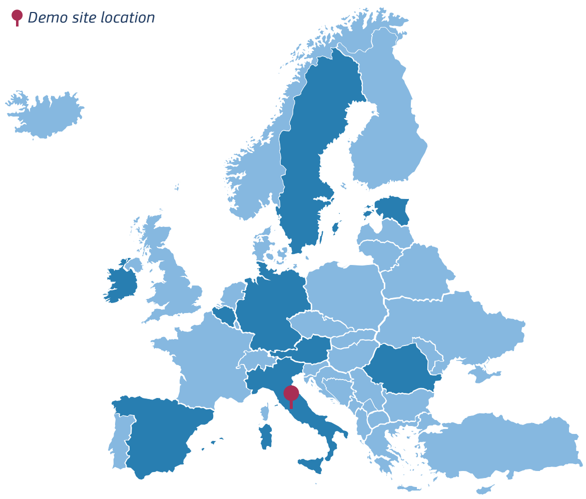
FROM	January 2023
TO	December 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
8 769 951,13 €	7 313 464,26 €	https://hystore.eu/

TECHNOLOGIES AND SERVICES DEPLOYED

Grid Technologies	High Voltage Alternating Current; High Voltage Direct Current; Micro-grid; Network management
Large Scale Storage Technologies	Compressed air energy storage; Hydro storage; Molten salt storage
Distributed Storage Technologies	Wind turbines; Photovoltaic; Biogas

PROJECT PARTNERS' COUNTRIES



COORDINATOR	ARMENGOL & ROS CONSULTORS I ASSOCIATS SLP (Spain)

OTHER PARTNERS

- CONSIGLIO NAZIONALE DELLE RICERCHE (Italy)
- KUNGLIGA TEKNISKA HOEGSKOLAN (Sweden)
- RUBITHERM TECHNOLOGIES GMBH (Germany)
- AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH (Austria)
- OCHSNER WARMEPUMPEN GMBH (Austria)
- PINK GMBH (Austria)
- SORPTION TECHNOLOGIES GMBH (Germany)
- INOVA LAB (Italy)
- STAM (Italy)
- MASTON AB (Sweden)
- DUBLIN CITY UNIVERSITY (Ireland)
- ACCADEMIA EUROPEA DI BOLZANO (Italy)
- R2M SOLUTION (Italy)
- UNIVERSITY COLLEGE DUBLIN (Ireland)
- CENTRAL DE RESERVES DE MONTSERRAT
- RAAL (Romania)
- EUROPEAN INNOVATION MARKETPLACE

Project Description

Context

The HYSTORE project addresses critical gaps in thermal energy storage (TES) technology, aligning with EU priorities for sustainability, digitalization, and economic growth. By advancing TES solutions, it contributes to decarbonization efforts, enhances energy efficiency, and promotes the integration of renewable energy sources. Furthermore, the project fosters innovation in digital tools and technologies, promoting inclusion by empowering consumers and communities to actively participate in the energy transition. Overall, HYSTORE aligns with the European Commission's objectives to create a cleaner, more sustainable, and digitally-enabled energy system.

Project presentation, technical description and implementation

HYSTORE aims to revolutionize thermal energy storage (TES) by developing innovative solutions based on phase change materials (PCM) and thermal conductivity materials (TCM). These solutions target various heating/cooling applications with higher energy density and lower costs. The project unique approach focuses on rigorous testing and integration into existing systems, ensuring reliability and scalability. Key components like PCM and TCM materials, coupled with advanced control systems, enable the provision of hybrid energy and power services, supporting sustainable energy systems and promoting grid flexibility.

Project Impacts

Economic impacts:

- Increased market share in thermal energy storage solutions.
- New revenue streams from hybrid energy and power services.

Social impacts:

- Creation of new skilled jobs in the energy sector.
- Improved quality of life through enhanced heating and cooling solutions.

Environmental impacts:

- Decreased CO2 emissions through increased energy efficiency.
- Energy savings and resource conservation.
- Technological impacts:
- Development and diffusion of innovative PCM and TCM materials.
- Advancement of smart aggregator and multi-service platform technology.

Other impacts:

- Promotion of grid flexibility and integration of renewable energy sources.

Innovative aspects of the project

The most innovative aspect of the project lies in the development and validation of novel thermal energy storage (TES) concepts using PCM and TCM solutions. These concepts enable hybrid energy and power services, integrating heating/cooling configurations with smart aggregation. This approach fosters sustainability by optimizing energy use and reducing CO2 emissions while enhancing grid flexibility and consumer empowerment.

Expected key exploitable results of the project

- Development and validation of four innovative sets of thermal energy storage (TES) concepts based on PCM and TCM solutions.
- Creation of an open-source multi-service platform and a smart aggregator for hybrid energy and power services.
- Pre-defined and standardized guidelines for lower design and installation efforts.
- Integration of TES with grid-level aggregators for load shifting and peak load reduction.
- Demonstration of TES solutions in different climates and use case contexts, achieving TRL 6/7.
- Innovative business and contractual schemes for Capacity as a Service, enabling consistent earnings for stakeholders.

Key exploitable results and sub-key exploitable results achieved to date

- Development and validation of novel thermal energy storage (TES) concepts using PCM and TCM solutions.
- Creation of an open-source multi-service platform and a smart aggregator for hybrid energy and power services.
- Establishment of pre-defined and standardized guidelines for lower design and installation efforts.
- Integration of TES with grid-level aggregators for load shifting and peak load reduction.
- Demonstration of TES solutions in various climates and use case contexts, reaching TRL 6/7.
- Progress towards innovative business and contractual schemes for Capacity as a Service, facilitating consistent earnings for stakeholders.

HORIZON-CL5-2022-D3-01-12: Replicable solutions for a cross sector compliant energy ecosystem

Back to projects' list

Electricity grids | Digitalisation | Consumers/prosumers

OPENTUNITY

OPENing the electricity ecosystem to multiple actors in order to have a real decarbonization opporTUNITY

opentunity

Power grids in a number of European Member States usually feature high prices and a high dependence on carbon-based energy sources. The EU-funded OPENTUNITY project aims to change this by creating a flexible and adaptable energy ecosystem that reduces interoperability barriers and focuses on standards that help reduce emissions and costs. To achieve its goals, the project will utilise novel methodologies and software modules to support grid operators, market actors and prosumers. The proposed ecosystem will use technologies that support better grid management and boost grid flexibility allowing the grid to match future changes and to stay updated with the help of grid players.

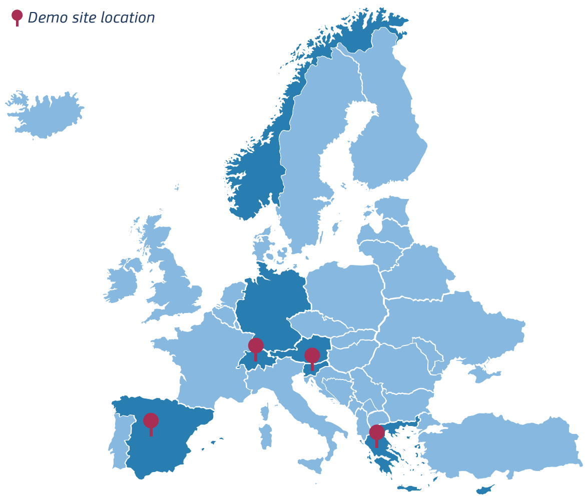
FROM	January 2023
TO	December 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
10 802 543,75 €	8 497 465,63 €	https://opentunityproject.eu/

TECHNOLOGIES AND SERVICES DEPLOYED

Technologies for consumer	Demand response; Smart appliances
Grid Technologies	Network management; Monitoring and control tools.

PROJECT PARTNERS' COUNTRIES



COORDINATOR	ETRA INVESTIGACION Y DESARROLLO SA (Spain)

OTHER PARTNERS

- EREVNITIKO PANEPISTIMIAKO INSTITOUTO SYSTIMATON EPIKOINONION KAI YPOLOGISTON (Greece)
- ENERGY WEB DEVHUB GMBH (Germany)
- HYPERTECH KENTRO EPISTIMONIKON KAI TECHNOLOGIKON EREVNON AEIFORIAS ASTIKI MI KERDOSKOPIKI ETAIREIA (Greece)
- UNIVERZA V LJUBLJANI (Slovenia)
- DIACHEIRISTIS ELLINIKOU DIKTYOU DIANOMIS ELEKTRIKIS ENERGEIAS AE (Greece)
- ESTABANELL Y PAHISA ENERGIA SA (Spain)
- ESTABANELL Y PAHISA IMPULSA (Spain)
- JOANNEUM RESEARCH FORSCHUNGSGESELLSCHAFT MBH (Austria)
- ASOCIACION ESPANOLA DE NORMALIZACION (Spain)
- NODES AS (Norway)
- KOLEKTOR SETUP, STORITVE ENERGETSKEGA UPRAVLJANJA, D.O.O. (Slovenia)
- AMIBIT, ENERGETSKI SISTEMI, D.O.O. (Slovenia)
- ELEKTRO PRIMORSKA, PODJETJE ZA DISTRIBUCIJO ELEKTRICNE ENERGIJE DD (Slovenia)
- AVANT CAR POSLOVNI INZENIRING DOO (Slovenia)
- ELEKTRO LJUBLJANA PODJETJE ZADISTRIBUCIJO ELEKTRICNE ENERGIJE D.D. (Slovenia)
- INDEPENDENT POWER TRANSMISSION OPERATOR SA (Greece)
- BLUE SUN AUTOMATION LIMITED (Cyprus)
- AZIENDA ELETTRICA DI MASSAGNO (AEM) SA (Switzerland)
- HIVE POWER SA(Switzerland)
- SCUOLA UNIVERSITARIA PROFESSIONALE DELLA SVIZZERA ITALIANA (Switzerland)

Project Description

Context

The flexibility ecosystem proposed in OPENTUNITY can be seen as a digital environment where different actors from the energy sector combine their strengths in order to unleash the benefits that flexiblity can provide. These benefits apply to the electricity grids themselves and to prosumers -whatever their size-, the latter in the form of prices reduction.

Project presentation, technical description and implementation

OPENTUNITY's mission is to create a flexibility ecosystem reducing interoperability barriers and favouring the use of standards in order to decarbonize EU grids and put the end-user in the spotlight. Grid operators, prosumers, market actors etc. will be supported by OPENTUNITY via innovative methodologies backed by advanced, interoperable software modules, in order to provide them with new features and services related to: 1) Technologies to boost flexibility in prosumer's environment; 2) Technologies for grid operators to better manage grid operations). OPENTUNITY will also evolve, adapt and integrate an energy-specialized dataspace in which actors from different fields will share services and find synergies among them in order to create a reliable energy system in which different verticals (electromobility, gas, OEM etc.) will be able to seamlessly collaborate with each other.

Project Impacts

Thanks to a smart, efficient end-to-end planning, monitoring and control of power networks as the OPENTUNITY does, electricity markets benefit from an overall system costs reduction coming from reduced system power losses, lower number and duration of outages or lower investment in peak demand.

All these system costs are recovered in regulated markets through network tariffs which are paid and supported by electricity customers. So, in general, all savings will translate into a decrease in the unit price of electricity, and consequently in the electricity bill.

By means of OPENTUNITY project, the consortium plans to contribute to solve the issues related to climate change and environment by means of facilitating the integration of distributed renewable generation sources (DER), and the increase in energy efficiency of power grids. Thus, OPENTUNITY will contribute to the EU aim of achieving the integration of large share of renewables exceeding 5% by 23. OPENTUNITY innovations will support the integration of renewable sources into the distribution grid by addressing the challenges that this implies, such as the instabilities in the network, due to this intermittent energy sources.

Innovative aspects of the project

The utilization of the most updated AI trends in order to provide new functionalities and services to grid operators and prosumers in order to reduce their OPEX and CAPEX.

Expected key exploitable results of the project

- Technologies for Grid Operators.
- Technologies for prosumers.

HORIZON-CL5-2022-D3-01-12: Replicable solutions for a cross sector compliant energy ecosystem

Back to projects' list

Digitalisation | Consumers/prosumers | System integration

RESONANCE

Replicable and Efficient Solutions for Optimal Management of Cross-sector Energy

1. Creating a plug-and-play framework for tailored Customer Energy Manager (CEM) solutions.
2. Implementing hybrid modeling approaches for flexible assets and baseline loads.
3. Developing consumer-centric Artificial Intelligence for automated demand response.
4. Enhancing interoperability, trust, security, and privacy in energy management.

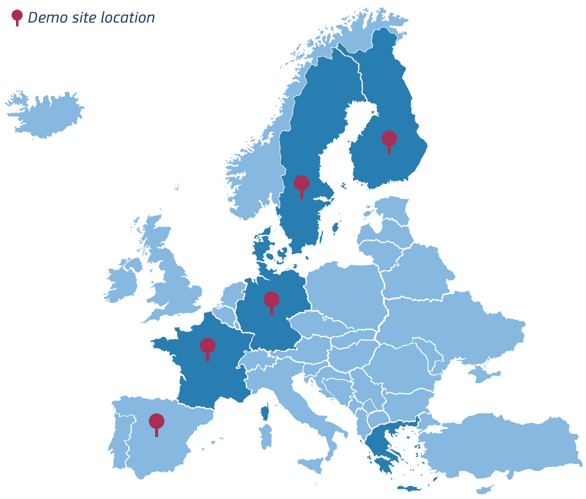
Measurable outcomes include increased efficiency in demand-side flexibility, consumer empowerment, reduced carbon emissions, and technological advancements in energy management. The project addresses topics such as software development, AI integration, and market integration.

FROM	January 2023
TO	December 2025

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
10 230 321,50 €	8 032 034,75 €	https://www.resonance-project.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response; Smart appliances
Distributed Storage Technologies	Batteries; Electric vehicles; Thermal energy production, distribution and storage
Generation Technologies	Wind turbines; Photovoltaic; Solar thermal; Biogas

PROJECT PARTNERS' COUNTRIES



COORDINATOR	VTT TECHNICAL RESEARCH CENTRE OF FINLAND LTD [VTT] (FI)
OTHER PARTNERS	CAVERION SUOMI OYJ (FI) ATHENS UNIVERSITY OF ECONOMICS AND BUSINESS (EL) FORTISS GMBH (DE) TRIALOG SAS (FR) CHECKWATT AB (SE) ENERIM OY (FI) INSTITUT "JOŽEF STEFAN" (SI) SMART COM D.O.O. (SI) EUROPEAN DYNAMICS S.A. (EL) CONSOLINNO ENERGY GMBH (DE) BOVLABS (FR) IN-JET (DK) CLUBE (EL) ECE D.O.O. (SI) AMIBIT, ENERGETSKI SISTEMI, D.O.O. (SI) MÖLNDAL ENERGI AB (SE) ELEKTRO CELJE D.D. (SI) MUNICIPALITY OF EORDAIA (EL)

Project Description

Context

The project aligns with the European Commission's priorities by addressing sustainability, digitalization, and inclusion. It focuses on integrating energy systems, promoting renewable energy, and enhancing grid resilience. By empowering consumers and communities, it fosters inclusion and supports the EU's transition to a clean, digitalized, and resilient energy system, contributing to economic growth and environmental sustainability.

Project presentation, technical description and implementation

The project aims to address the challenge of optimizing demand-side flexibility management of distributed assets. Key objectives include:

1. Developing a software framework for plug-and-play solutions in demand-side flexibility management.

2. Enabling easy tailoring of Customer Energy Manager (CEM) solutions for consumers and prosumers.

3. Revolutionizing demand-side flexibility management by empowering consumers to actively participate in the energy ecosystem.

4. Creating a deterministic demand response to optimize consumer benefits.

Project Impacts

Economic impacts: Increased market share through the introduction of innovative demand-side flexibility management solutions, leading to increased revenues for stakeholders.

Social impacts: Creation of new job opportunities in the energy sector, especially in the development and deployment of plug-and-play solutions. Enhanced quality of life for consumers through optimized energy usage and cost savings.

Environmental impacts: Reduction in carbon emissions and other pollutants due to optimized energy consumption and increased integration of renewable energy sources.

Technological impacts: Development and dissemination of new software frameworks and AI algorithms for demand-side flexibility management, contributing to technological innovation in the energy sector.

Other impacts: Improved energy security and resilience, as well as increased consumer empowerment and participation in the energy market.

Innovative aspects of the project

The most innovative aspect of RESONANCE lies in the development of a plug-and-play software framework for demand-side flexibility management. This approach allows for easy integration and customization of solutions, empowering consumers to actively participate in the energy market and optimize their energy usage.

Expected key exploitable results of the project

- Plug-and-play software framework for demand-side flexibility management.
- Customizable Customer Energy Manager (CEM) solutions tailored for diverse consumer needs.
- Hybrid modeling approach for flexible assets and baseline loads with minimal human effort.
- Optimal control algorithms for smart appliances, accommodating customer preferences and market settings.
- Consumer-centric Artificial Intelligence for automated demand response.
- Improved interoperability, trust, security, and privacy through standardized solutions and protocols.

Key exploitable results and sub-key exploitable results achieved to date

- Development of plug-and-play software framework for demand-side flexibility management.
- Establishment of customizable Customer Energy Manager (CEM) solutions tailored for diverse consumer needs.
- Implementation of hybrid modeling approach for

flexible assets and baseline loads with minimal human effort.

- Integration of optimal control algorithms for smart appliances, accommodating customer preferences and market settings.
- Progress in implementing consumer-centric Artificial Intelligence for automated demand response.
- Advancements in improving interoperability, trust, security, and privacy through standardized solutions and protocols.

HORIZON-CL5-2022-D3-01-12: Replicable solutions for a cross sector compliant energy ecosystem

Back to projects' list

Electricity grids | Energy storage | Digitalisation

GLocalFlex

A Global as well as Local Flexibility Marketplace to Demonstrate Grid Balancing Mechanisms through Cross-sectoral Interconnected and Integrated Energy Ecosystems enabling Automatic Flexibility Trading

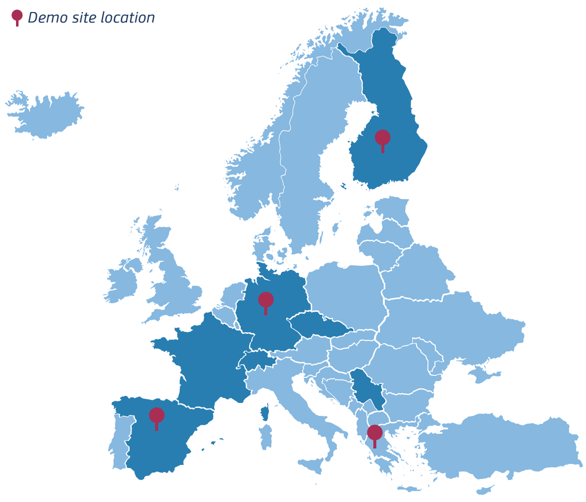
GLocalFlex aims to establish a global and local flexibility marketplace for demand-response solutions, facilitating the horizontal scaling of flexible local energy systems. Key objectives include accelerating demand flexibility services deployment, identifying interoperability standards, and creating new business models for flexible systems. The project focuses on promoting consumer participation, utilizing digital technologies, and achieving automated flexibility trading. Measurable outcomes include increased RES integration, reduced emissions, and enhanced energy market transformation, fostering cross-pilot energy trading and addressing policy challenges.

FROM	January 2023
TO	December 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
10 284 518,28 €	8,957,646.25 €	https://glocalflex.eu/

TECHNOLOGIES AND SERVICES DEPLOYED		
Grid Technologies		Semiconductor devices and power converters; Protections; Network management; Monitoring and control tools; Large-scale
Large Scale Storage Technologies		Power to gas
Distributed Storage Technologies		Batteries
Generation Technologies		Wind turbines

PROJECT PARTNERS' COUNTRIES



COORDINATOR	TEKNOLOGIAN TUTKIMUSKESKUS VTT OY (Finland)

OTHER PARTNERS

- WITHSECURE OYJ (FINLAND)
- TECHNISCHE UNIVERSITÄT DORTMUND (GERMANY)
- CONSTRUCCIONES GARCIA RAMA SL (SPAIN)
- PRIVANOVA SAS (FRANCE)
- FUNDACION CTIC (SPAIN)
- MAINFLUX LABS D.O.O. (SERBIA)
- STATUTÁRNÍ MĚSTO KLADNO (CZECH)
- CENTRE SCIENTIFIQUE ET TECHNIQUE DU BATIMENT (FRANCE)
- SKARTA ENERGY OY (FINLAND)
- UTAJÄRVEN KUNTA (FINLAND)
- CESKE VYSOKE UCENI TECHNICKE V PRAZE (CZECH)
- FUNDACIÓN TECNALIA RESEARCH AND INNOVATION (SPAIN)
- S.W.W. WUNSIEDEL GMBH (GERMANY)
- EF. RUHR GMBH (GERMANY)
- ELECTRICITE DE FRANCE (EDF)
- FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS (SPAIN)
- OFFICE PUBLIC DE L'HABITAT VALLEE SUD HABITAT (FRANCE)
- V-ZUG AG (SWITZERLAND)
- CSEM CENTRE SUISSE D'ELECTRONIQUE ET DE MICROTECHNIQUE SA - RECHERCHE ET DEVELOPPEMENT (SWITZERLAND)
- FUNDACION ASTURIANA DE LA ENERGIA (SPAIN)
- NANO GREEN S.R.O. (CZECH)
- EDP ESPANA SA (SPAIN)
- SYSTEM EVERGREEN AG (SWITZERLAND)

Project Description

Context.

The GLocalFlex project aims to address key priorities identified by the European Commission, including sustainability, digitalization, and inclusion. By developing a global and local flexibility marketplace, it promotes the integration of demand-response solutions and services to enhance the flexibility of local energy systems. This aligns with the EU's objectives of increasing renewable energy usage, fostering digital innovation, and empowering consumers in the energy transition. Additionally, the project fosters cross-sectoral collaboration and promotes the adoption of interoperable solutions, contributing to the overall resilience and efficiency of the energy grid.

Project presentation, technical description and implementation.

GLocalFlex addresses the challenge of mobilizing demand-response solutions for scaling flexible local energy systems globally. Objectives include prompt horizontal scaling through a flexibility marketplace, fostering consumer participation, and promoting interoperable solutions. Unlike existing methods, GLocalFlex enables automated flexibility trading through open, interoperable marketplaces and IT tools, ensuring easy access and low barriers for consumers. Methodology includes selecting modular standards and tools, developing a catalogue for appliances and flexibility services, and demonstrating replicability of systems and services across different countries. Key components like demand response, smart appliances, and grid technologies contribute to achieving flexibility and promoting sustainable energy practices.

Project Impacts

Economic impacts:

- Increased market opportunities for demand-response solutions and flexibility trading.
- Enhanced revenue streams for participants in the flexibility marketplace.
- Facilitated entry into new geographical markets through scalable solutions.

Social impacts:

- Creation of new job opportunities in the energy sector, particularly in demand-response services.
- Improved quality of life for consumers through increased control over energy consumption and costs.

Environmental impacts:

- Reduction in CO_2 emissions through the integration of renewable energy sources and increased energy efficiency.
- Conservation of resources by optimizing energy usage and promoting sustainable practices

Technological impacts:

- Development and dissemination of innovative technologies for demand-response management and flexibility trading.
- Advancement of digitalization in the energy sector through interoperable IT tools and smart grid solutions.

Innovative aspects of the project

The most innovative aspect of GLocalFlex is the establishment of a global and local flexibility marketplace, enabling automatic flexibility trading across interconnected energy ecosystems. This approach fosters widespread participation of consumers and prosumers in the energy market, promoting scalability, interoperability, and automation, thus revolutionizing traditional energy trading practices.

Expected key exploitable results of the project

- Development of a global and local flexibility marketplace platform.
- Establishment of interoperable energy smart home appliances and devices.
- Creation of a catalogue for appliances and flexibility services.
- Implementation of demand response solutions and services.

- Deployment of smart metering technologies.
- Integration of digital tools for grid management and forecasting.
- Facilitation of cross-border collaboration in wholesale and flexibility markets.
- Empowerment of energy communities for collective flexibility trading.
- Development of skills and knowledge among consumers and prosumers.

Key exploitable results and sub-key exploitable results achieved to date

- Establishment of the global and local flexibility marketplace platform prototype.
- Successful integration of interoperable energy smart home appliances and devices.
- Development of a preliminary catalogue for appliances and flexibility services.
- Initial implementation of demand response solutions and services in pilot sites.
- Deployment of smart metering technologies in selected locations.
- Integration of digital tools for grid management and forecasting in test environments.
- Initial steps towards facilitating cross-border collaboration in wholesale and flexibility markets.
- Commencement of community empowerment initiatives for collective flexibility trading.
- Early-stage development of skills and knowledge among consumers and prosumers.

HORIZON-CL5-2022-D3-01-11: Demonstration of innovative forms of storage and their successful operation and integration into innovative energy systems and grid architectures

Back to projects' list

Electricity grids | Energy Storage | Digitalisation

SINNOGENES

Storage INNOvations for Green ENErgy Systems

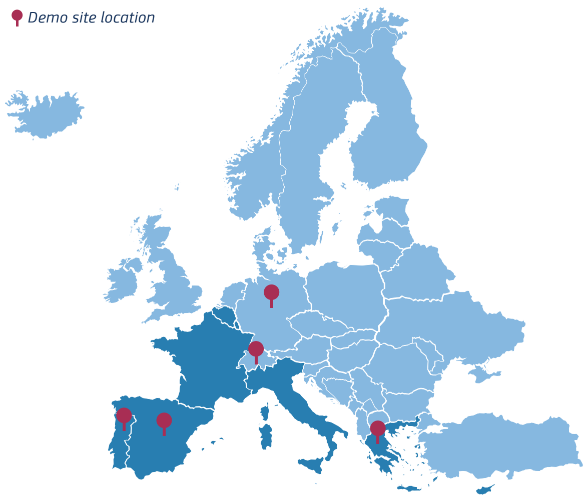
SINNOGENES aims to transform energy storage for a greener future. It focuses on developing and showcasing the SINNO energy toolkit, a versatile suite of technologies like batteries, flywheels, and power-to-gas systems. These solutions will be applied across various sectors, boosting reliance on renewables and reducing carbon emissions. Additionally, SINNOGENES integrates these innovations into real-world scenarios, enhancing energy efficiency, resilience, and flexibility. Engaging diverse sectors, it offers practical, scalable, and economically viable models for energy storage adoption, crucial for sustainable energy systems.

FROM	January 2023
TO	December 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
9 687 547,56 €	7 964 444,00 €	https://sinnogenes.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	Micro-grid
Large Scale Storage Technologies	Power to gas, Hydro storage
Distributed Storage Technologies	Batteries, Electric vehicles, Thermal energy production, distribution and storage, Flywheels
Market	Ancillery services

PROJECT PARTNERS' COUNTRIES



COORDINATOR	**UNISYSTEMS LUXEMBOURG SARL UNISY (Luxembourg)**

OTHER PARTNERS

- UNISYSTEMS LUXEMBOURG SARL (Luxembourg)
- UNI SYSTEMS SYSTIMATA PLIROFORIKIS MONOPROSOPI ANONYMI EMPORIKI ETAIRIA (Greece)
- UBITECH ENERGY (Belgium)
- ARTELYS (France)
- RINA CONSULTING SPA (Italy)
- FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS (Spain)
- FONDAZIONE BRUNO KESSLER (Italy)
- METAMIND INNOVATIONS IKE (Greece)
- CINTECH SOLUTIONS LTD (Cyprus)
- UNIVERSITA DEGLI STUDI DI GENOVA (Italy)
- CAPWATT, S.A. (Portugal)
- INESC TEC - INSTITUTO DE ENGENHARIADE SISTEMAS E COMPUTADORES, TECNOLOGIA E CIENCIA (Portugal)
- UNIVERSIDADE DO PORTO (Portugal)
- FUNDACION CARTIF (Spain)
- CENTRO DE INVESTIGACIONES ENERGETICAS, MEDIOAMBIENTALES Y TECNOLOGICAS-CIEMAT (Spain)
- INSTRUMENTACION Y COMPONENTES SA (Spain)

Project Description

Context

SINNOGENES drives the imperative for sustainable energy systems, emphasizing innovative storage solutions amidst environmental sustainability goals and increased renewable energy reliance. Urged by climate change, it focuses on revolutionizing energy storage, acknowledging its pivotal role in grid integration, reliability, and green resource utilization. SINNOGENES aims to advance storage innovations, fostering efficient and environmentally responsible energy systems, crucial for global sustainability efforts.

Project presentation, technical description and implementation

SINNOGENES focuses on activities that redefine the landscape of energy storage technologies. At the forefront is the development of the SINNO toolkit, a suite encompassing thermal, electrochemical, electrical, and mechanical storage systems. The toolkit aims to integrate storage technologies, optimizing their collective potential for energy arbitrage, peak shaving, and flexibility services. The uniqueness lies in its versatility, catering to different geographical areas and sectors. SINNOGENES does not just introduce isolated technologies but creates a toolkit that harmonizes energy storage solutions with local renewable sources, bolstering the resilience and sustainability of energy systems. SINNOGENES is demonstrating the impact of these innovations through 6 pilots spanning in diverse settings, from industrial parks in Portugal to sea buckthorn processing plants in Germany.

Project Impacts

Economic Growth: By fostering innovation in energy storage technologies, SINNOGENES stimulates economic growth and enhances the competitiveness of European industries in the global market.

Cost Reduction: The adoption of efficient energy storage solutions results in reduced energy costs for end-users, industries, and communities, leading to economic savings and increased affordability.

Community Engagement: SINNOGENES engages with diverse communities through demonstration campaigns, raising awareness about sustainable energy solutions and fostering community participation in the energy transition.

Knowledge Sharing: By disseminating project findings and best practices, SINNOGENES promotes knowledge sharing and capacity building among stakeholders, empowering communities to adopt sustainable energy practices.

Cultural Transformation: SINNOGENES contributes to a cultural shift towards sustainable living by demonstrating the viability and benefits of renewable energy integration and fostering a sense of environmental stewardship.

Carbon Emissions Reduction: The adoption of renewable energy and energy storage technologies facilitated by SINNOGENES leads to significant reductions in greenhouse gas emissions, contributing to climate change mitigation efforts.

Innovation Acceleration: SINNOGENES drives technological innovation in energy storage, leading to the development of advanced storage solutions with improved efficiency, performance, and scalability.

Technological Transfer: Through collaboration and knowledge exchange among project partners, SINNOGENES facilitates the transfer of technology and expertise, enabling the wider adoption of innovative energy storage solutions.

Market Transformation: SINNOGENES' demonstration of the feasibility and effectiveness of energy storage technologies catalyzes market transformation, accelerating the transition towards a more sustainable and resilient energy system.

Innovative aspects of the project

The most impactful aspect of SINNOGENES lies in its comprehensive approach to energy storage innovation, integrating diverse technologies into a versatile toolkit. This holistic solution not only addresses current energy challenges but also fosters resilience and sustainability in the face of evolving environmental and economic landscapes, positioning SINNOGENES at the forefront of the green energy revolution

Expected key exploitable results of the project

SINNOGENES aims to deliver a comprehensive set of Key Exploitable Results (KERs) driving innovation in energy storage. The SINNO Energy Toolkit optimizes renewable energy use in industrial microgrids, enhances district heating efficiency, and provides flexibility to local energy communities. Integrated control of storage and renewables maximizes energy efficiency in industrial settings, while virtualized investment planning streamlines decisions for operators. Mobility services benefit from optimized cross-energy carrier storage. Various technologies, including redox flow batteries, flywheels, and ultracapacitors, offer diverse storage solutions. Power-to-gas conversion and heat storage address surplus energy utilization. Business models facilitate energy storage adoption, ensuring a sustainable energy future.

Key exploitable results and sub-key exploitable results achieved to date

As of now, SINNOGENES is transitioning from the initial phase that has focused on analyzing technical and market compliance requirements, formulating use cases based on stakeholders' input, to the second phase that includes the designing the IT architecture for the SINNO energy toolkit. At the same time the partners already develop the tools for various applications so as to be ready for their integration into the toolkit, and prepared for demonstration activities, including the installation of assets and the IT architecture. This progression marks a crucial step in moving from planning to the active development and implementation stage of the project.

HORIZON-CL5-2022-D3-01-11: Demonstration of innovative forms of storage and their successful operation and integration into innovative energy systems and grid architectures

Back to projects' list

Energy storage | System integration | Decarbonisation

i-STENTORE

innovative Energy Storage TEchnologies TOwards increased Renewables integration and Efficient Operation

The i-STENTORE project focuses on advancing energy storage technologies for increased renewables integration and efficient operation. It aims to develop hybrid energy storage systems, assess diverse storage solutions, and create an umbrella framework for their optimization. Key activities include integrating various energy storage technologies, designing a versatile ICT framework, conducting diverse pilots, and evaluating socio-economic and environmental impacts. Measurable outcomes include increased renewables penetration, decreased air pollution, enhanced market participation of storage, and policy recommendations for sustainable energy transition.

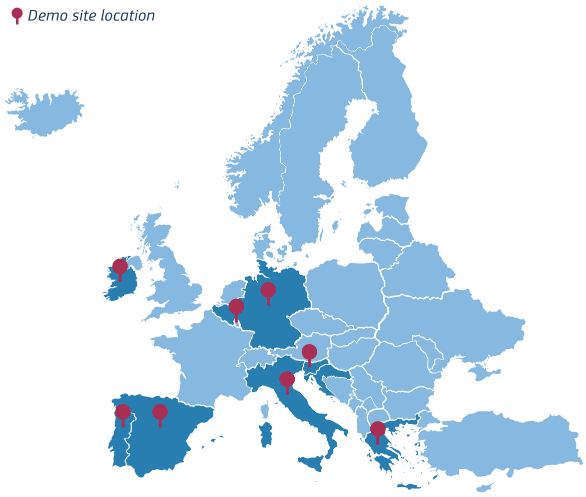
FROM	January2023
TO	December 2025

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
9 991 850,95€	8 098 455,43 €	https://istentore.eu/

TECHNOLOGIES AND SERVICES DEPLOYED

Grid Technologies	High Voltage Alternating Current, High Voltage Direct Current, Multi-terminal, Micro-grid, Semi-conductor devices and power converters, Protections, High Voltage Direct Current breaker, Grid inertia, Network management, Monitoring and control tools
Large Scale Storage Technologies	Power to gas, Compressed air energy storage, Hydro storage
Distributed Storage Technologies	Batteries, Electric vehicles, Thermal energy production, distribution and storage, Flywheels
Generation Technologies	Wind turbines, Photovoltaic, Solar thermal, Biogas, Tidal energy, Micro-generation, Floating offshore wind, Floating offshore PV, Ocean thermal energy conversion

PROJECT PARTNERS' COUNTRIES



COORDINATOR

EUROPEAN DYNAMICS LUXEMBOURG SA (Luxembourg)

OTHER PARTNERS

- ENGINEERING - INGEGNERIA INFORMATICA S.P.A. (ENG) (ITALY
- LUXEMBOURG INSTITUTE OF SCIENCE AND TECHNOLOGY (LIST) (LUXEMBOURG)
- FRAUNHOFER GESELLSCHAFT ZUR FÖRDERUNG DER ANGEWANDTEN FORSCHUNG EV (FHG) (GERMANY)
- NATIONAL TECHNICAL UNIVERSITY OF ATHENS (NTUA) (GREECE)
- BIOECONOPMY & ENVIRONMENTAL CLUSTER OF WESTERN MACEDONIA (CLUBE) (GREECE)
- F6S NETWORK IRELAND LIMITED (F6S) (IRELAND)
- EMPRESA DE ELECTRICIDADE DA MADEIRA S.A. (EEM) (PORTUGAL)
- INESC TEC - INSTITUTO DE ENGENHARIA SISTEMAS E COMPUTADORES, TECNOLOGIA E CIÊNCIA (INESC) (PORTUGAL)
- VASCO DA GAMA COLAB - ENERGY STORAGE - ASSOCIACAO (VGLAB)
- REEFILLA S.R.I (REEF) (ITALY)
- NIO GMBH (NIO) (GERMANY)
- CENTRE FOR RESEARCH & TECHNOLOGY HELLAS (CERTH) (GREECE)
- ORIZON A.T.C. (HOR) (GREECE)
- COMSENSUS, KOMUNIKACIJE IN SENZORIKA, D.O.O. (COMS) (SLOVENIA)
- STEKLARNA HRASTNIK DRUZBA ZA PROIZV PROIZVODNJO STEKLENIH IZDELKOV D.O.O. (HRAS) (SLOVENIA)
- CUERVA ENERGIA S.L.U. (MECSA) (SPAIN)
- AGGREGERING S.L. (AGG) (SPAIN)
- ENERGY STORAGE SOLUTIONS S.L. (E22) (SPAIN)
- CUADROS ELECTRICOS NAZARENOS S.L. (CEN) (SPAIN)
- UNIVERSIDAD CARLOS III DE MADRID (UC3M) (SPAIN)
- UNIVERSIDAD DE MALAGA (UMA) (SPAIN)(PORTUGAL)
- UNIVERSITÀ DEGLI STUDI DI NAPOLI FEDERICO II (UNINA) (ITALY)
- SAMSO S.P.A. (SAMSO) (ITALY)
- GREEN POWER STORAGE SOLUTIONS (GPSS) S.A. (LUXEMBOURG)
- STUDIO ELEKTRONIKE RIJEKA D.O.O. (STER) (CROATIA)
- REGULATORY ASSISTANCE PROJECT (RAP) (BELGIUM)

Project Description

Context

The i-STENTORE project aligns closely with the European Commission's priorities outlined in the European Green Deal, aiming to foster sustainability and decarbonization in the energy sector. By introducing innovative energy storage technologies and proposing hybrid energy storage systems, the project contributes to increasing the integration of renewables and enhancing the flexibility of the power system. Furthermore, i-STENTORE addresses the objectives of digitalization by developing an umbrella framework for assessing efficient energy storage solutions, leveraging digital tools and technologies for smart grid management. This initiative also promotes economic growth by strengthening the Eu

Project presentation, technical description and implementation

The i-STENTORE project tackles energy storage challenges by innovating hybrid solutions for renewable integration. Its approach stands out with diverse storage tech integration, advanced ICT frameworks, and regulatory evaluations. Key components like Li-ion batteries and wind turbines drive grid stability and resilience, fostering a sustainable energy transition.

Project Impacts

Economic impacts:

- Increased market share for energy storage solutions.
- Expansion of the European storage value chain.
- New revenue streams for storage operators.

Social impacts:

- Creation of new jobs in the renewable energy sector.
- Enhanced quality of life through increased access to sustainable energy.

Environmental impacts:

- Reduced CO2 emissions through increased renewable energy integration.
- Decreased reliance on fossil fuels.

Technological impacts:

- Development and diffusion of innovative energy storage technologies.
- Advancements in grid stability and resilience.

Other impacts:

- Promotion of sustainability and circular economy principles.

Innovative aspects of the project

The most innovative aspect of i-STENTORE lies in the introduction of hybrid energy storage systems (HESS) and the development of an umbrella framework for assessing energy storage solutions. This approach enhances grid flexibility, promotes multi-purpose energy storage applications, and strengthens the European storage value chain, ultimately accelerating the transition towards a sustainable and resilient energy system.

Expected key exploitable results of the project

- Development of hybrid energy storage systems (HESS) for increased grid flexibility.
- Establishment of an umbrella framework for assessing energy storage solutions.
- Creation of new business models for storage operators and stakeholders.
- Integration of diverse storage technologies into a versatile ICT-driven platform.
- Validation of enhanced connectivity and optimization of multiple systems across various sectors.
- Demonstration of stand-alone and hybrid storage systems in diverse climatic conditions and renewable potential.
- Identification of new revenue streams and market opportunities for energy storage deployment.

Expected key exploitable results of the project

- Successful development of hybrid energy storage systems (HESS) incorporating various storage technologies.
- Establishment of an effective umbrella framework for assessing energy storage solutions.
- Creation of innovative business models for storage operators and stakeholders.
- Integration of diverse storage technologies into a versatile ICT-driven platform.
- Validation of enhanced connectivity and optimization of multiple systems across various sectors.
- Demonstration of stand-alone and hybrid storage systems in diverse climatic conditions and renewable potential.
- Identification of new revenue streams and market opportunities for energy storage deployment.

Sub-key exploitable results currently in progress:

- Further refinement and optimization of HESS technologies.
- Continued validation and testing of the ICT-driven platform.
- Exploration of additional market opportunities and revenue streams for energy storage deployment.

HORIZON-CL5-2022-D3-01-11: Demonstration of innovative forms of storage and their successful operation and integration into innovative energy systems and grid architectures

Back to projects' list

Electricity Grids | Energy Storage | System Integration

AGISTIN

Advanced Grid Interface for innovative STorage INtegration

AGISTIN will enable industrial grid users to rapidly deploy renewables through advanced integration of innovative energy storage technologies at the interface with the grid.

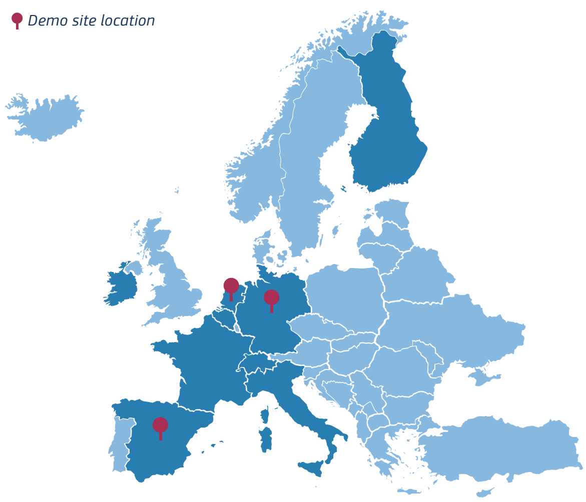
FROM	January 2023
TO	December 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
8 788 273,75 €	7 930 450,25 €	https://www.agistin.eu/

TECHNOLOGIES AND SERVICES DEPLOYED

Grid Technologies	Multi-terminal; Semiconductor devices and power converters; Network management; Monitoring and control tools
Large Scale Storage Technologies	Power to gas; Hydro storage
Distributed Storage Technologies	Batteries
Generation Technologies	Photovoltaic

PROJECT PARTNERS' COUNTRIES



COORDINATOR	EPRI EUROPE DAC (Ireland)

OTHER PARTNERS

- UNIVERSITAET KASSEL - UNI KASSEL (Germany)
- RTE RESEAU DE TRANSPORT D'ELECTRICITE (France)
- FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV - FHG (Germany)
- FUNDACION CARTIF - CARTIF (Spain)
- CENTRO DE INVESTIGACIONES ENERGETICAS, MEDIOAMBIENTALES Y TECNOLOGICAS-CIEMAT – CIEMAT (Spain)
- SHELL GLOBAL SOLUTIONS INTERNATIONAL BV (Netherlands)
- UNIVERSITAT POLITECNICA DE CATALUNYA – UPC (Spain)
- GEYSER BATTERIES OY (Finland)
- INFRAESTRUCTURES DE LA GENERALITAT DE CATALUNYA SA - I.CAT (Spain)
- EUROPEAN ASSOCIATION FOR STORAGE OF ENERGY (Belgium)
- RINA CONSULTING SPA - RINA-C (Italy)
- EIDGENÖSSISCHE TECHNISCHE HOCHSCHULE ZÜRICH –
- ETH (Switzerland)

Project Description

Context

The rapid and widescale deployment of renewables and electrification of society presents an era-defining challenge for grid operators to develop and operate the grid reliably. In European grids such as Ireland, Germany and the Netherlands, challenges for grid development, grid access, network congestion, operations with low inertia grids, human capital and supply chain threaten to impede the realisation of decarbonisation goals, despite the best effort of grid operators. Energy storage is the key resource that is needed to orchestrate and integrate industrial processes and largescale renewables. Advanced storage integration methods are needed to resolve issues for grid users and operators.

Project presentation, technical description and implementation

Challenges:

- Reducing pressure on grid connection capacity and grid reinforcement requirements.
- Enabling economical integration of more renewables through DC coupling.
- Supporting the grid by providing advanced grid services.
- Avoiding delay in the electrification and decarbonisation of society.

Ambition:

- Demonstrate 3 innovative forms of energy storage.
- Develop and demonstrate advanced grid interfaces (AGI) to integrate energy storage.
- Enable industrial grid users to minimise grid access needs.
- Test and demonstrate the integration of innovative storage through an AGI with three impactful use cases.
- Provide guidance needed to realise the cost, reliability and sustainability benefits.

AGISTIN will follow a five-step methodology that is focused on developing the proposed storage and integration concepts to TRL 7.

Project Impacts

Demonstrating beyond-SoA storage technologies as well as beyond-SoA grid interfaces, enables AGISTIN to realise a drastic transformation of the energy sector, surpassing the limitations of current storage inte-gration approaches that impede access to the flexibility needed to reach net-zero from deep sector coupling. The overall impact realised with the AGISTIN project is focused on the intersection of industrial grid users and the grid operators. Immediate benefits from the project accrue to four main stakeholder groups addressed in the demonstrators, i.e. grid operators (TSOs and DSOs) and industry encompas-sing electrolysis operators, large pumping facilities and fast EV chargers.

The AGISTIN results go beyond the applicability in the mentioned sectors, they address processes and systems and products, improving their competitiveness and creating new business opportunities for the large group of all industrial sites using and producing electricity and all grid operators in Europe as well as worldwide.

Expected key exploitable results of the project

- Aqueous ECR battery system demonstration result.
- Results of testing Al-ion battery .
- Analysis of irrigation systems as innovative storage systems.
- Functional requirements for AGIs.
- AGI templates and selection tool .
- Validated models of innovative storage behaviour.
- Open source AGI control methods.
- Validated models for industrial grid users providing grid forming capability.

- Operation of coupled electrolyser, storage and renewables.
- Determination of minimum economic grid connection for SHL renewable H2 demo.
- Determination of the impact of batteries on alkaline electrolyser degradation.
- Multi-level control system for irrigation canals to act as storage.
- LCA framework for industrial grid users, storage and renewables.

HORIZON-CL5-2022-D3-01-11: Demonstration of innovative forms of storage and their successful operation and integration into innovative energy systems and grid architectures

Back to projects' list

Electricity Grids | Energy Storage | System Integration

2LIPP

2nd Life for Power Plants

The focus of the project is to develop a hybrid storage system to address rising energy costs and grid instability caused by high levels of renewable energy. The main objectives of the project.

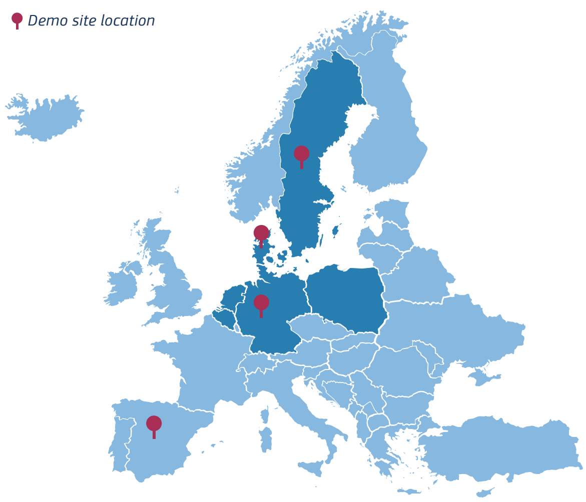
1. To demonstrate an efficient and cost-effective transition for existing utility owners and their power plants based on experiences at the demo site at Bornholm.
2. To develop business models and system designs for the hybrid storage system, both as standalone systems and as the combined hybrid 2LIPP system.
3. To minimize losses and maximize synergy between energy storage and heat and electricity production at power plants.
4. To create roadmaps, in the form of case studies, for the sustainable transition of power plants to a green future, reusing obsolete or underused power plant infrastructure and creating second life renewable energy utilities based on proven European technologies.

FROM	January 2023
TO	December 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
13 511 510,55 €	7 984 492,50 €	https://2lipp.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Investment Decision Tool: Development of a decision support tool to assist utility owners in evaluating the feasibility and economic benefits of retrofitting their facilities with hybrid storage systems.
Large Scale Storage Technologies	Hybrid Storage System Technologies: Integration of multiple state-of-the-art storage technologies, such as flywheel systems, molten salt storage, and battery energy storage systems
Market	Market Transformation Initiatives: Initiation of market transformation initiatives aimed at expanding the customer base for energy storage technologies to include utilities and power plants, creating new opportunities for storage technology providers and accelerating the transition to renewable energy grids
Other Technologies and Services	Energy Management System (EMS): Implementation of an innovative EMS to enable efficient scaling of the system, optimal dispatch strategies, and high-performance operation of the storage technologies. Technical Support and Training: Provision of technical support, training, and capacity-building activities to stakeholders involved in the project, including utility owners, power plant operators, and energy technology providers.

PROJECT PARTNERS' COUNTRIES



COORDINATOR	ENERGY CLUSTER DENMARK (DENMARK)
OTHER PARTNERS	• BORNHOLMS EL PRODUKTION AS (DENMARK) • FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV (GERMANY) • TEKNOLOGISK INSTITUT (DENMARK) • DANMARKS TEKNISKE UNIVERSITET (DENMARK) • PLS-ENERGY SYSTEMS I HESTRA AB (SWEDEN) • QUINTEQ ENERGY B.V.(NEDERLAND) • HYME STORAGE APS (DENMARK) • PINI SVERIGE AB (SWEDEN) • POLITECHNIKA GDANSKA (POLAND) • MIEJSKIE PRZEDSIEBIORSTWO CIEPLOWNICZO-KOMUNALNE KOKSIK - SPOLKA Z OGRANICZONA ODPOWIEDZIALNOSCIA (POLAND) • NETZGESELLSCHAFT EISENBERG MBH (GERMANY) • EUROHEAT & POWER (BELGIUM) • ERNST-ABBE-HOCHSCHULE JENA (GERMANY)

Project Description

Context

The 2LIPP project will develop a HYBRID STORAGE concept to efficiently address the rapidly increasing problems of rising energy cost and grid instability from high levels of renewable energy, that are slowing down the green energy transition in Europe. To develop this concept, a medium scale demonstrator will be built on the Danish Island of Bornholm. It is a meshed island grid with a mainland connection, island mode requirements and a high penetration of renewable energy, making the site an optimal demonstration site to address the project objectives. To maximize the impact, several larger sites around Europe will be used for case studies, including power plants run by partners.

Project presentation, technical description and implementation

The project presentation entails providing an overview of the project's goals, objectives, and significance. It includes detailing the context in which the project operates, the challenges it aims to address, and the potential impact it could have.

The technical description and implementation involve delving into the specifics of how the project will be executed. This includes detailing the chosen technologies, methodologies, and strategies that will be employed to achieve the project's objectives. It may also involve discussing the timeline, milestones, and key deliverables of the project. Additionally, it would cover any technical challenges anticipated and how they will be mitigated.

Overall, the project presentation provides a high-level overview, while the technical description and implementation delve into the specifics of how the project will be carried out.

Project Impacts

The project impacts encompass technical advancements in hybrid storage and energy management systems, economic benefits through cost reductions and new business opportunities, environmental gains via reduced greenhouse gas emissions, social advantages such as job creation and improved energy access, and policy influence on energy-related regulations and frameworks.

Innovative aspects of the project

Hybrid Storage System: The project introduces a novel approach by integrating multiple storage technologies, such as flywheel, molten salt, and battery energy storage systems, to create a hybrid storage solution. This allows for optimized performance and flexibility in addressing grid stability and energy management challenges.

Expected key exploitable results of the project

- Hybrid Storage System Technology: Development of a scalable hybrid storage system integrating multiple state-of-the-art storage technologies, facilitating efficient energy management and grid stability.
- Business Models and System Designs: Creation of innovative business models and system designs for implementing the hybrid storage system, offering cost-effective solutions for utility owners and power plants.
- Investment Decision Tool: Development of an investment decision tool to assist utility owners in evaluating the feasibility and economic benefits of retrofitting their facilities with hybrid storage systems, enabling informed decision-making.
- Feasibility Case Studies: Production of feasibility case studies demonstrating the successful implementation and benefits of the hybrid storage concept in various utility power plants across Europe, providing practical insights and best practices for replication.
- Market Transformation: Transformation of the energy storage market by expanding the customer base to include utilities and power plants, creating new opportunities for storage technology providers and accelerating the transition to renewable energy grids.

Key exploitable results and sub-key exploitable results achieved to date

- Development of Hybrid Storage System Technology.
- Creation of Business Models and System Designs.
- Implementation of Investment Decision Tool.
- Production of Feasibility Case Studies.
- Initiatives for Market Transformation.

Sub-Key Exploitable Results:

- Optimization of System Performance.
- Enhancement of Grid Stability.
- Cost Reductions for Utility Owners.
- Increased Renewable Energy Integration.
- Knowledge Sharing and Capacity Building.

HORIZON-CL5-2022-D3-01-10: Interoperable solutions for flexibility services using distributed energy storage

Back to projects' list

Electricity Grids | Energy Storage | Digitalisation

PARMENIDES

Plug&plAy eneRgy ManagEmeNt for hybrID Energy Storage

PARMENIDES develops, deploys, and validates innovative, interoperable, and secure concepts and solutions for providing flexibility services by the utilization of Hybrid Energy Storage Systems (HESS).

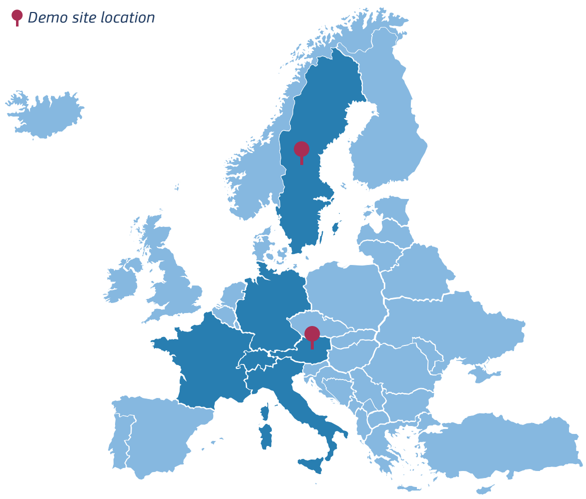
O1: Identify relevant end-users and stakeholders, their needs, define relevant use cases and requirements.
O2: Define an interoperable, reliable, and secure ICT architecture, standards for HESS, and a
generic ontology for energy communities and the flexibility utilization provided by HESS
O3: Develop an ontology-based energy management system
O4: Demonstrate the developed solutions in very diverse pilots and evaluate the technical, economic and social potential

FROM	January 2023
TO	December 2025

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
3 626 814,50 €	2 990 477,00 €	https://parmenides-project.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	Network management, Monitoring and control tools
Distributed Storage Technologies	Batteries, Electric vehicles, Thermal energy production, distribution and storage
Other Technologies and Services	Energy Management Systems for Energy Communities and Building Communities

PROJECT PARTNERS' COUNTRIES



COORDINATOR	AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH (Austria)

OTHER PARTNERS

- KUNGLIGA TEKNISKA HOEGSKOLAN (SWEDEN)
- TRIALOG (FRANCE)
- ENERGIENETZE STEIERMARK GMBH (AUSTRIA)
- MAPS S.P.A. (ITALY)
- R2M SOLUTION SRL (ITALY)
- EUROPEAN DISTRIBUTED ENERGY RESOURCES LABORATORIES (DERLAB) EV (GERMANY)
- EXPERIENTIA GLOBAL SA (SWITZERLAND)

Project Description

Context

The ongoing transition from a centralized to a bi-directional energy system presents challenges. Achieving national, European, and UN Sustainable Development Goals necessitates integrating decentralized renewable energy sources. To manage their volatility, a substantial flexibility potential is vital, achievable through diverse storage technologies at various levels. Ensuring interoperability across domains and existing systems is essential for effective integration and utilization of these technologies.

Project presentation, technical description and implementation

- A new generation of energy management systems implemented to provide the capability of a hybrid energy storage system (HESS) to work as a conventional battery energy storage system with enhanced performance. Hybrid energy storage systems can concern multiple distributed sources of storage, such as EV Batteries, Home Batteries, thermal batteries, or connection with the Heat Pumps.
- Agreeing in wide scope of stakeholders including EV community and other sources of storage on a common protocol that could connect different storage applications
- Validation of user acceptance, and demonstrating concepts that ensure privacy, liability, security, and trust in connected data spaces.
- To encourage European citizens and businesses, especially SMEs to deploy storage, the ease of use and consequently interoperability are a must.

Project Impacts

- Increased flexibility and resilience of the energy system based on improved and/or new technologies to plan and control the energy systems, even multi-carrier systems, maintaining system stability under difficult circumstances.
- Enhance consumer satisfaction and increased system flexibility thanks to enabling consumers to benefit from data-driven energy services and facilitating their investment and engagement in the energy transition, through selfconsumption, demand response or joint investments in renewables (either individually or through energy communities or micro-grids).
- Foster the European market for new energy services and business models as well as tested standardised and open interfaces of energy devices through a higher degree of interoperability, increased data availability and easier data exchange among energy companies as well as companies using energy system data.

Innovative aspects of the project

One of the main innovations of the project is the development of a novel ontology, called the PARMENIDES Energy Community Ontology (PECO). The main aim of this ontology is to facilitate the operation of energy communities. PECO places a strong emphasis on optimizing energy flows and maximizing the use of locally generated energy by using HESS. Additionally, a new generation of EMS is developed, capable of utilizing PECO as a knowledge base.

Expected key exploitable results of the project

- PARMENIDES Energy Management PARMENIDES EMS4HESS.
- PECO PARMENIDES Energy Community Ontology.
- AIT Virtual Verification Laboratory.
- PARMENIDES Ontology constrains management.
- Innovative PARMENIDES business model.
- PARMENIDES flexibility and load management strategy.
- PARMENIDES system architecture.

Key exploitable results and sub-key exploitable results achieved to date

- PARMENIDES Energy Management PARMENIDES EMS4HESS.
- PECO PARMENIDES Energy Community Ontology

AIT Virtual Verification Laboratory.

- PARMENIDES Ontology constrains management .
- Innovative PARMENIDES business model .
- PARMENIDES flexibility and load management strategy.
- PARMENIDES system architecture: Generic and pilot-specific/use-case-specific ICT architecture defined.

HORIZON-CL5-2022-D3-01-10: Interoperable solutions for flexibility services using distributed energy storage

Back to projects' list

System Integration

INTERSTORE

Interoperable opeN-source Tools to Enable hybRidisation, utiliSation, and moneTisation of stORage flExibility

interstore

The overall vision of InterSTORE is to deploy and demonstrate a set of interoperable Open-Source tools to integrate Distributed Energy Storage (DES) and Distributed Energy Resources (DER), to enable the hybridization, utilisationProvide 4 software open-source tools for assuring interoperability, flexibility and data standardization

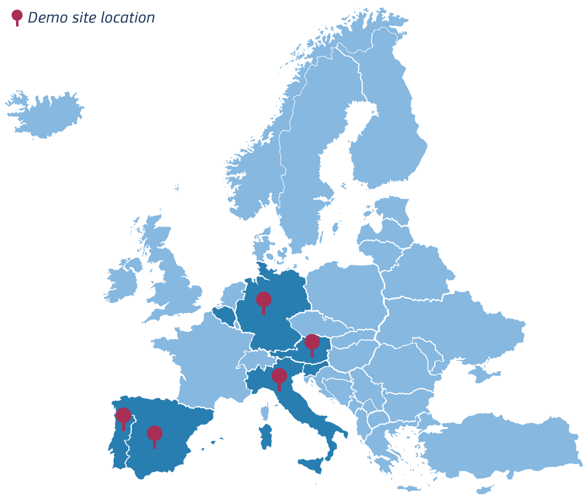
• Consider each relevant aspect of flexible use of HESS in different main application areas (EV, Industrial, Residential, Commercial)
• Demonstrate 7 high impact use cases in 4 real life living labs
• Use beyond the state-of-the-art methods to enable hybridization

FROM	January 2023
TO	December 2025

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
4 355 197,50 €	3 498 630,75 €	https://interstore-project.eu/

TECHNOLOGIES AND SERVICES DEPLOYED		
Distributed Storage Technologies		Batteries; Electric vehicles; Other distributed storage technologies (Supercap & FC)

PROJECT PARTNERS' COUNTRIES



COORDINATOR	RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (Germany)

OTHER PARTNERS

- AACHEN (GERMANY)
- CYBERGRID GMBH & CO (AUSTRIA)
- ENEL X SRL (ITALY)
- FORSCHUNGSZENTRUM JULICH (GERMANY)
- INESC TEC - INSTITUTO DE ENGENHARIA DE SISTEMAS E COMPUTADORES, TECNOLOGIA E CIÊNCIA (PORTUGAL)
- HYBRID ENERGY STORAGE SOLUTIONS (SPAIN)
- EATON INDUSTRIES (GERMANY)
- SUNESIS, INOVATIVNE TEHNOLOGIJE IN STORITVE (SLOVENIA)
- VDE VDE VERBAND DER ELEKTROTECHNIK ELEKTRONIK INFORMATIONSTECHNIK (GERMANY)
- CAPWATT (PORTUGAL)
- ENGINEERING - INGEGNERIA INFORMATICA SPA (ITALY)
- EASE EUROPEAN ASSOCIATION FOR STORAGE OF ENERGY (BELGIUM)

Project Description

Context

Storage is a very diverse universe of solutions and technologies with very different characteristics. InterSTORE plans to address this complexity by developing an innovative middleware that, while virtualising the storage technology, will simplify its use from the point of view of integration platform thanks to a technology agnostic approach. The middleware will facilitate the integration of storage creating an independence from hardware solutions which are critical from customer perspectives to avoid vendor lock-in solutions and assure the compliance to the new IEEE 23.5 standard. It will also facilitate its use from a monetisation perspective making sure that more investments in storage.

Project presentation, technical description and implementation

The new InterSTORE solution will be tested and validated in a 4 real life with the goal to develop testing software to be adopted in the future for interoperability certification.

Technical description and implementation. The overall vision of InterSTORE is to deploy and demonstrate a set of interoperable Open-Source tools to integrate Distributed Energy Storage (DES) and Distributed Energy Resources (DER), to enable the hybridization, utilisation and monetisation of storage flexibility, within a real-life environment. The project outcome will allow various DES, DER and several new generation Energy Management Systems (EMS) to be integrated by different stakeholders, while demonstrating the value added of asset's connection to common data space, reducing uncertainty and hence increasing acceptance by technology takers and final users.

Project Impacts

- Provide 4 software open-source tools for assuring interoperability, flexibility and data standardization.
- Consider each relevant aspect of flexible use of HESS in different main application areas (EV, Industrial, Residential, Commercial).
- Demonstrate 7 high impact use cases in 4 real life living labs.
- Use beyond the state-of-the-art methods to enable hybridization, utilisation and monetisation of storage flexibility, while also ensuring data space standardization.

Socio-economics:

- Increase societal resilience after energy price crisis.
- Reduce skepticism about optimization of HESS

Environment:

- Design and implementation is aligned with EC's Energy Package "Clean Energy for All Europeans.

Market Transformation:

- Significant cost saving economic impact in the all cases scenarios as presented in the project.
- Valorization multiple 9 UCs.
- Policy: Contribute to standardization through the creation of synergies among different domains (IEEE 23,5, and similar) and provision of recommendation to standardizations bodies.
- Involvement of policy makers through recommendations on how to reduce and close gaps in legislation.

Innovative aspects of the project

InterSTORE objective are aligned with the 6 research areas identified by ETIP SNET roadmap 22-23.

Expected key exploitable results of the project

R1 Development of 4 Open-source interoperability toolkit and implementation of 5 EMS and flexibility products in 4 real pilots:

- Interoperable client/server for Distributed Energy Storage.
- Legacy System protocol converter.
- Testing procedures and software tools.

- EMS for HESS across different applications.

Expected key exploitable results of the project

The following SW has been released in open GitHub:

- Interoperable client/server for Distributed Energy Storage https://github.com/Horizont-Europe-Interstore.
- Legacy System protocol converter.
- Testing procedures and software tools.
- Open Data Space framework https://github.com/Horizont-Europe-Interstore/Energy-Data-Space-Connecto.

HORIZON-CL5-2022-D3-01-10: Interoperable solutions for flexibility services using distributed energy storage

Back to projects' list

Energy storage | Digitalisation | System integration

FlexCHESS

Flexibility services based on Connected and interoperable Hybrid Energy Storage System

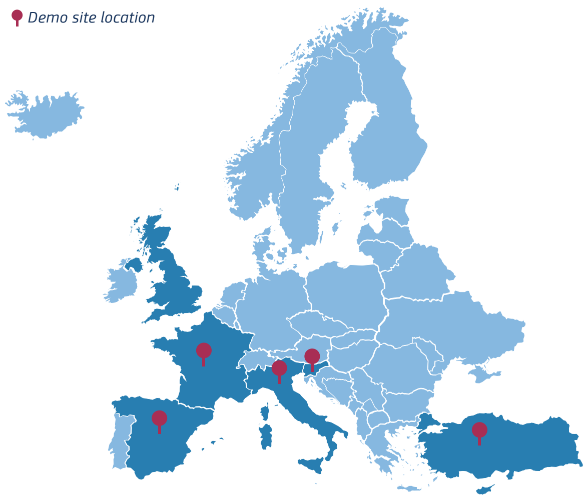
FlexCHESS is dedicated to revolutionizing energy storage practices by leveraging advanced technologies such as digital twins, Virtual Energy Storage Systems (VESS), and Distributed Ledger Technology (DLT). Its primary objectives include enhancing grid stability through Connected Hybrid Energy Storage Systems (CHESS), increasing profitability for energy storage installations, promoting innovation and competitiveness among SMEs and startups in Europe, validating solutions through pilot demonstrations, evaluating performance and flexibility of CHESS, and fostering effective collaboration among consortium partners for project success.

FROM	December 2022
TO	November 2025

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
2 879 681,25 €	2 317 385,63 €	https://flexchess.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Smart appliances
Grid Technologies	Monitoring and control tools
Large Scale Storage Technologies	Power to gas; Compressed air energy storage; Hydro storage; Molten salt storage
Distributed Storage Technologies	Batteries

PROJECT PARTNERS' COUNTRIES



COORDINATOR	UNIVERSITE D'AIX MARSEILLE (France)
OTHER PARTNERS	• ALGOWATT SPA (ITALY) • RDIUP (FRANCE) • ARCELIK A.S. (TÜRKIYE) • ELEKTRO LJUBLJANA PODJETJE ZADISTRIBUCIJO ELEKTRICNE ENERGIJE D.D. (SLOVENIA) • C.I.P. CITIZENS IN POWER (CYPRUS) • LA SOLAR ENERGIA SOCIEDAD COOPERATIVA (SPAIN) • MY ENERGIA ONER SL (SPAIN) • IREN SPA (ITALY) • IREN ENERGIA SPA (ITALY) • UNIVERSITA DEGLI STUDI DI GENOVA (ITALY) • ULUDAG ELEKTRIK DAGITIM ANONIM SIRKKETI (TÜRKIYE) • TOSHIBA EUROPE LIMITED (UNITED KINGDOM) • CARDIFF UNIVERSITY (UNITED KINGDOM)

Project Description

Context

FlexCHESS aligns with the European Commission's priorities by addressing challenges in smart grids, energy storage, and digitalization. It contributes to sustainability by enhancing grid stability and integrating renewable energy sources efficiently. Digitalization enables transparency, traceability, and data-driven decision-making. Inclusion is promoted through consumer empowerment and the development of energy communities. Economic growth is fostered by unlocking new business opportunities and enhancing the competitiveness of SMEs.

Project presentation, technical description and implementation

FlexCHESS aims to tackle the technological challenges in energy storage and grid stability by developing innovative solutions. Its objectives include:

1. Addressing the challenge of integrating renewable energy sources by enhancing grid stability through the deployment of virtual energy storage systems (VESS) and connected hybrid energy storage systems (CHESS).

2. Maximizing flexibility in the energy system to accommodate fluctuations in renewable energy generation and demand.

3. Ensuring transparency and traceability in energy transactions through the implementation of distributed ledger technology (DLT).

FlexCHESS technical approach distinguishes itself by combining CHESS aggregation with digital twin concepts and DLT. This approach enables real-time optimization of energy storage and grid operations, providing unparalleled flexibility and reliability.

Project Impacts

Economic impacts: Increased market share, new market entrance.

Social impacts: New jobs created, increased quality of life.

Environmental impacts: Decreased CO2 emissions, energy savings.

Technological impacts: Development and diffusion of new technologies and innovations.

Other impacts: Enhanced grid resilience, improved energy access for communities.

Innovative aspects of the project

The most innovative aspect of FlexCHESS lies in its integration of virtual energy storage systems (VESS) with connected hybrid energy storage systems (CHESS) and distributed ledger technology (DLT). This combination optimizes grid stability, maximizes flexibility, and ensures transparent energy transactions, revolutionizing the energy storage landscape.

Expected key exploitable results of the project

- Development of virtual energy storage systems (VESS) for enhanced grid flexibility and stability.
- Integration of connected hybrid energy storage systems (CHESS) to optimize energy storage and support renewable energy integration.
- Implementation of distributed ledger technology (DLT) for transparent and traceable energy transactions.
- Creation of innovative business models for energy storage services, unlocking new market opportunities.
- Demonstration of the feasibility and scalability of FlexCHESS solutions through pilot projects across Europe.
- Provision of open-access tools and frameworks for stakeholders to replicate and adapt FlexCHESS solutions.
- Generation of valuable insights and best practices for the energy storage sector, contributing to future research and policy development.

Key exploitable results and sub-key exploitable results achieved to date

- Successful development of virtual energy storage systems (VESS) prototype.
- Integration of connected hybrid energy storage

systems (CHESS) into existing grid infrastructure.

- Implementation of initial phase of distributed ledger technology (DLT) for transparent energy transactions.
- Preliminary establishment of innovative business models for energy storage services.
- Progress made in pilot projects across Europe, demonstrating feasibility and scalability.
- Ongoing refinement of open-access tools and frameworks for stakeholders.
- Initial insights and best practices gathered, contributing to future research and policy development.

Sub-key exploitable results:

- Further optimization of VESS prototype for enhanced performance.
- Continued development of DLT integration for improved transparency and traceability.
- Advancement in business model design to capture additional market opportunities.
- Expansion of pilot projects to include more diverse geographical areas and energy systems.

HORIZON-CL5-2022-D3-01-09: Grid Forming Capability (in support of the offshore strategy)

Back to projects' list

Electricity Grids | Syatem Integration | Market Design

InterOPERA

Enabling Interoperability of multi-vendor HVDC grids

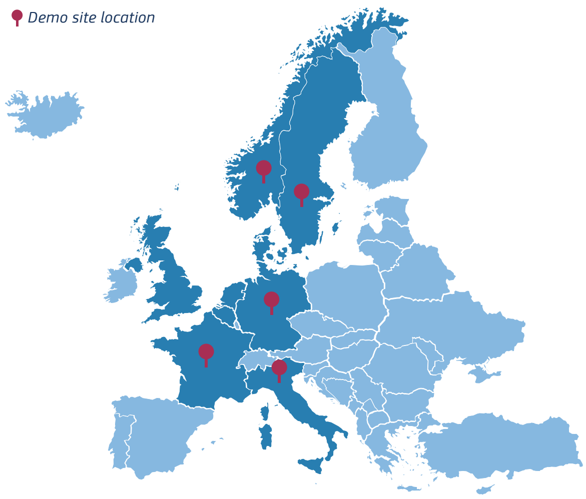
InterOPERA aims to enable interoperability of multi-vendor HVDC grids for offshore wind integration. It focuses on standardizing HVDC systems, facilitating collaboration among industry leaders, and providing policy recommendations. Key objectives include defining demonstrator case studies, de-risking interoperability issues, and establishing modular approaches to HVDC projects. Measurable outcomes include detailed functional specifications, simulation platforms, and cooperation agreements, leading to cost-effective solutions and wider adoption of HVDC technology.

FROM	January 2023
TO	April 2027

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
69 618 021,38 €	50 720 449,35 €	https://interopera.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	High Voltage Alternating Current; High Voltage Direct Current; Network management; Monitoring and control tools
Large Scale Storage Technologies	Power to gas; Compressed air energy storage; Hydro storage; Molten salt storage
Distributed Storage Technologies	Batteries; Electric vehicles; Thermal energy production, distribution and storage
Generation Technologies	Wind turbines; Photovoltaic; Solar thermal; Biogas

PROJECT PARTNERS' COUNTRIES



COORDINATOR	SuperGrid Institute (France)

OTHER PARTNERS

- SIEMENS ENERGY GLOBAL GMBH & CO. KG (Germany)
- HITACHI ENERGY SWEDEN AB (Sweden)
- GE GRID GMBH (Germany)
- RTE RESEAU DE TRANSPORT D'ELECTRICITE (France)
- TENNET TSO GMBH (Germany)
- ASSOCIATION EUROPEENNE DE L'INDUSTRIE DESEQUIPEMENTS ET DES SERVICES DE TRANSMISSION ET DE DISTRIBUTION D'ELECTRICITE AISBL (Belgium)
- ORSTED WIND POWER A/S (Denmark)
- AMPRION GMB (Germany)
- WindEurope (Belgium)
- VESTAS WIND SYSTEMS A/S (Denmark)
- SIEMENS GAMESA RENEWABLE ENERGY AS (Denmark)
- SCIBREAK AB (Sweden)
- STATNETT SF (Norway)
- TECHNISCHE UNIVERSITEIT DELFT (Netherlands)
- ENERGINET (Denmark)
- TENNET TSO BV (Netherlands)
- EQUINOR WIND POWER AS (Norway)
- SOHERTZ TRANSMISSION GMBH (Germany)
- VATTENFALL VINDKRAFT A/S (Sweden)
- ERNA - RETE ELETTRICA NAZIONALE SPA
- TERNA RETE ITALIA SPA (Italy)
- RIJKSUNIVERSITEIT GRONINGEN (Netherlands)
- UK GRID SOLUTIONS LIMITED (UK)

Project Description

Context

The InterOPERA project aligns with European Commission priorities by addressing key challenges in energy infrastructure, specifically multi-vendor multi-terminal HVDC grids. This contributes to sustainability by facilitating offshore wind energy integration, supporting decarbonization goals. The project fosters digitalization through interoperability solutions, promoting efficient grid operations. By enabling cross-border collaboration and market flexibility, it aligns with European objectives for inclusion and economic growth, ensuring a resilient and integrated energy system for the future.

Project presentation, technical description and implementation

InterOPERA aims to tackle challenges in multi-vendor multi-terminal HVDC grids, enabling their interoperability for offshore wind integration. Objectives include de-risking technology to enable real-life projects, enhancing grid-forming capabilities, and standardizing interoperability. Its approach differs by coordinating diverse industry stakeholders, fostering collaboration among HVDC vendors, TSOs, and wind turbine developers. Methodology involves analyzing HVDC projects, developing interoperability frameworks, and executing real-time physical demonstrators. Key components like HVDC systems, protection, and network management tools contribute to achieving seamless integration, scalability, and grid resilience.

Project Impacts

Technological impacts: development of new technologies of TES coupled with power cycle and heat pump.

Economic impacts:

- Increased market share for HVDC grid technology providers.
- New market entrance opportunities for multi-vendor HVDC projects.
- Potential for increased revenues and margins due to standardized interoperability.

Social impacts:

- Creation of new jobs in the renewable energy sector.
- Enhanced quality of jobs in HVDC technology development and deployment.
- Improved quality of life through increased access to clean energy.

Environmental impacts:

- Reduced carbon emissions through efficient offshore wind energy integration.
- Decreased dependency on fossil fuels.
- Conservation of natural resources through optimized grid management.

Technological impacts:

- Development and dissemination of new interoperability standards.
- Advancement of grid-forming capabilities for HVDC systems.
- Integration of distributed energy resources into the grid.

Other impacts:

- Strengthened collaboration among industry stakeholders.
- Enhanced grid resilience and reliability.
- Accelerated transition towards sustainable energy systems.

Innovative aspects of the project

The most impactful aspect of InterOPERA is pioneering the interoperability of multi-vendor HVDC grids, facilitating seamless integration of renewable energy. This innovation addresses a critical challenge in the energy transition, enabling collaboration among diverse stakeholders and accelerating the development of a sustainable European HVDC grid.

Expected key exploitable results of the project

- Standardized functional specifications for multi-vendor HVDC grids

- Standardized models and simulation platforms for interoperable HVDC systems
- Cooperation agreements facilitating multi-vendor collaboration
- Interoperability assessment tools for HVDC grid development
- Guidance for offshore network planning
- Operational and strategic tools for multi-terminal HVDC grid deployment

Key exploitable results and sub-key exploitable results achieved to date

- Development of standardized functional specifications for multi-vendor HVDC grids
- Establishment of standardized models and simulation platforms for interoperable HVDC systems
- Initiation of cooperation agreements facilitating multi-vendor collaboration
- Early-stage progress on interoperability assessment tools for HVDC grid development
- Preliminary guidance for offshore network planning
- Initial development of operational and strategic tools for multi-terminal HVDC grid deployment

HORIZON-CL5-2022-D3-01-08: Supporting the action of consumers in the energy market and guide them to act as prosumers, communities and other active forms of active participation in the energy activities

Back to projects' list

ENPOWER

Energy Activated Citizens and Data-Driven Energy-Secure Communities for a Consumer-Centric Energy System

Rapid developments in the energy sector resulting from the need to fulfil green deal goals have led to increased access for energy-activated citizens and energy-secure cross-sector communities. In turn, this leads to increased access and management as well as improved efficiency. The EU-funded ENPOWER project is supporting this push towards a citizen-centric energy system. The project will combine state-of-the-art ICTs with social-behavioural dimensions, sharing economy and value stacking business models to offer several crucial tools, frameworks and services. These include but are not limited to a social science framework, critical AI algorithms and tools for energy community planning.

FROM	September 2023
TO	August 2026

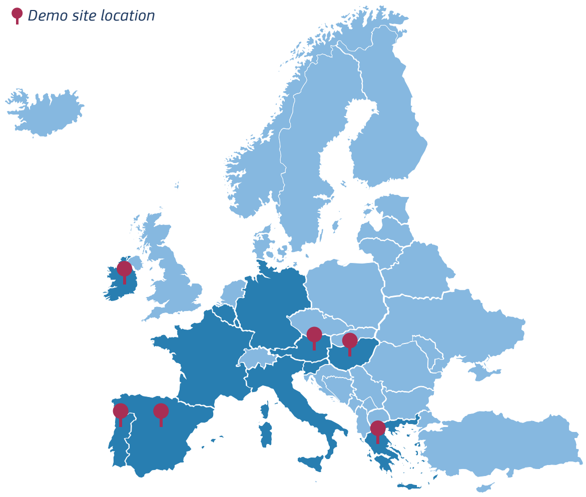
PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
7 094 156,25 €	5 999 718,75 €	https://www.enpower-project.eu/

TECHNOLOGIES AND SERVICES DEPLOYED

Other Technologies and Services

Consumers clustering and segmentation algorithms, and AI-based data-driven tools; Energy Community planning Tool; Cross-sector consumers aware DTs for flexibility modelling and planning; Optimal cross-commodity energy and beyond management services for individual consumers and energy communities, both local and virtual ones; Hybrid top-down/bottom-up Virtual Power Plant for cross-commodity flexibility optimization; Interoperable DR Manager; Closed Loop near real time nudging services

PROJECT PARTNERS' COUNTRIES



COORDINATOR	ETHNICON METSOVION POLYTECHNION (Greece)

OTHER PARTNERS

- HEROON POLYTECHNIOU 9 ZOGRAPHOU CAMPUS (Greece)
- ENGINEERING - INGEGNERIA INFORMATICA SPA (Italy)
- INESC TEC - INSTITUTO DE ENGENHARIADE SISTEMAS E COMPUTADORES, TECNOLOGIA E CIENCIA (Portugal)
- FUNDACION CARTIF (Spain)
- COMSENSUS, KOMUNIKACIJE IN SENZORIKA, DOO (Slovenia)
- EUROPEAN DYNAMICS LUXEMBOURG SA (Luxembourg)
- AUDENCIA (France)
- REGULATORY ASSISTANCE PROJECT (Belgium)
- ICLEI EUROPEAN SECRETARIAT GMBH (ICLEI EUROPASEKRETARIAT GMBH) (Germany)
- BLUEPRINT ENERGY SOLUTIONS GMBH (Austria)
- OURPOWER ENERGIEGENOSSENSCHAFT SCE MIT BESCHRANKTER HAFTUNG (Austria)
- COOPERNICO - COOPERATIVA DE DESENVOLVIMENTO SUSTENTAVEL CRL (Portugal)
- WATT-IS SA (Portugal)
- COOPERATIVE ELECTRICA DO VALE DESTE CRL (Portugal)
- ENERGEIAKI KOINOTITA CHALKIS - ENE.KOI.CHA (Greece)
- ELLINIKI ETAIREIA ENERGEIAKIS OIKONOMIAS (Greece)
- GREEN ENERGY AGGREGATOR SERVICES A.E. (Greece)
- PARITY PLATFORM IDIOTIKI KEFALAIOUXIKI ETAIREIA (Greece)
- EPRI EUROPE DAC (Ireland)
- UNIVERSITY COLLEGE CORK - NATIONAL UNIVERSITY OF IRELAND, CORK (Ireland)
- DCSIX TECHNOLOGIES LIMITED (Ireland)
- MOL TEIC (Ireland)
- ESB INNOVATION ROI LIMITED (Ireland)
- BEKESCSABA ENERGIA ESCO KFT. (Hungary)
- ENASCO CLEANTECH ALLIANCE KORLATOLT FELELOSSEGU TARSASAG (Hungary)
- CUERVA ENERGIA SLU (Spain)
- TURNING TABLES SOCIEDAD LIMITADA (Spain)
- UNIVERSITAT BASEL

Project Description

Context

ENPOWER strives to transform traditional passive energy consumers into active energy citizens enabling them to take full control on their energy usage. The project engages with all the principal actors of the energy value chain, allowing them to achieve energy savings, increase their energy efficiency and self-consumption optimization while transforming energy consumers and communities to digitally enhanced and grid-friendly ones. The project aims to include cross-sector social values in its approach and different value chains (e.g. food along agriculture, blue economy, tourism).

Project presentation, technical description and implementation

ENPOWER, employs a comprehensive methodology integrating social, technological, and business aspects to revolutionize the energy systems and empower communities. At its core, ENPOWER seeks to create a consumer-centric and socially responsible energy landscape.

Social Layer: The Social Layer will unlock consumer preferences and behaviour within energy communities, enhancing citizen engagement, rooted in Design Thinking methodologies, fostering dialogue among stakeholders, facilitating a co-creation and co-implementation process for consumer-centred, data-driven services and incentives.

Technological Layer: The Technological Layer encompasses a suite of services and tools for individual and community-level energy activation including the Energy Community Planning Tool that provides energy activated citizens with an intuitive view of their energy activation effects, promoting informed choices and community-level benefits.

Business Layer: The Business Layer innovates the energy sector dynamics through the design and validation of novel collective aggregation archetypes, like cross-commodity and cross-sector energy communities. This expansion includes the introduction of an Energy Data Community, potentially overseeing a Data Space-driven marketplace.

Project Impacts

Economic:

- 13-15% cost reduction in the energy bill for activated energy consumers.
- 15% increased energy efficiency.

Technological:

- Harmonise and extend existing automation-oriented standards (e.g. Family if IEC standards), business DR standards (OpenADR2.0), ontologies (SAREF), and languages (EFI).
- 45% increased energy data sharing by active consumers after 5 years.
- 10 new data-driven services to facilitate consumer activation and market participation.

Societal:

- 30-35 energy communities created, set up, and/or upscaled/replicated after five years from the project starting date.
- >1500 consumers engaged and >1000 consumers activated.
- 40% average yearly increase of the share of consumers energy market participation via energy communities.
- > 500 active consumers engaged in automated DR.
- 15-20% carbon emission reduction in the areas of the 6 pilots due to increased decentralised management of energy infrastructures.

Expected key exploitable results of the project

- A Social Science Framework complemented by innovative multi-dimensional incentives to encourage energy citizens' participation in a consumer-centric energy and demand response market.

- AI-based consumers clustering and market segmentation algorithms enhancing understanding and engagement.
- An interactive decision support tool and facilitation services, for consumer activation and energy community planning.
- The establishment of an Energy Data Space compliant digital backbone for consumer and community-level data-driven activation, interoperable DR, and privacy-preserving federated learning.
- A peer-to-peer digital marketplace for tokenized energy and non-energy assets evaluation and reciprocal compensation.
- Data-driven services and apps for energy efficiency and activation performance management, optimizing consumer activation at both the local community and aggregated levels.
- Edge monitoring hubs that will automate demand response management, contributing to grid operation and active participation in electricity markets.
- A Business Sandbox to explore novel sharing economy and social innovation-based business models.
- Methodologies and guidelines for the setup, upscaling, and replication of energy communities, ensuring a holistic approach to community-centric energy initiatives.

HORIZON-CL5-2022-D3-01-08: Supporting the action of consumers in the energy market and guide them to act as prosumers, communities and other active forms of active participation in the energy activities	Back to projects' list

Digitalisation | Consumers/Prosumers | Decarbonisation

COMMUNITAS

Bound to accelerate the roll-out and expansion of Energy Communities and empower consumers as fully-fledged energy market players

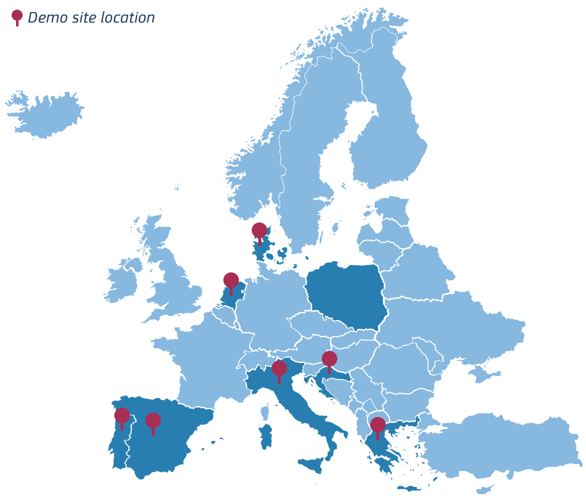
The European Commission's "Clean Energy for all Europeans" package (CEP) has introduced concepts for Renewable Energy Communities (RECs) and Citizen Energy Communities (CECs), aiming to promote energy citizenship and active participation in energy markets. COMMUNITAS aims to overcome barriers and streamline these concepts, delivering a Knowledge Base and innovative tools using technologies like IoT, Blockchain, and Cloud Computing. The project also involves citizens in Social and Policy Labs to incorporate their feedback and needs into core developments, positioning them at the center of energy markets.

FROM	January 2023
TO	June 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
7 002 540,00 €	5 999 602,50 €	https://communitas-project.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response; Smart appliances; Other technologies for consumers (Non intrusive load monitoring)
Grid Technologies	Network management, Monitoring and control tools
Market	Electricity market

PROJECT PARTNERS' COUNTRIES



COORDINATOR	LABELEC ESTUDOS DESENVOLVIMENTO E ACTIVIDADES LABORATORIAIS SA (Portugal)

OTHER PARTNERS

- SMART ENERGY LAB - ASSOCIATION (Portugal)
- UNINOVA-INSTITUTO DE DESENVOLVIMENTO DE NOVAS TECNOLOGIAS-ASSOCIACAO (Portugal)
- UNIVERSIDADE NOVA DE LISBOA (Portugal)
- ETRA INVESTIGACION Y DESARROLLO SA (Spain)
- COOPERATIVA ELECTRICA BENEFICA SAN FRANCISCO DE ASIS SOCIEDAD COOPERATIVA VALENCIANA (Spain)
- RINA CONSULTING SPA (Italy)
- AZIENDA CONSORZIALE SERVIZI MUNICIPALIZZATI SPA (Italy)
- FONDAZIONE BRUNO KESSLER (Italy)
- ENERGY@WORK SOCIETA' COOPERATIVA A R.L. (Italy)
- ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS (Greece)
- WATT AND VOLT ANONIMI ETAIRIA EKMETALLEYSIS ENALLAKTIKON MORFON ENERGEIAS (Greece)
- EUROPEAN GREEN CITIES APS (Denmark)
- ASM - CENTRUM BADAN I ANALIZ RYNKUSPOLKA Z OGRANICZONA ODPOWIEDZIALNOSCIA (Poland)
- SVEUCILISTE U ZAGREBU, FAKULTET STROJARSTVA I BRODOGRADNJE (Croatia)
- NEDERLANDSE ORGANISATIE VOOR TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK TNO (Netherlands)
- COOPERATIEVE VERENIGING GRUNNEGER POWER UA (Netherlands)
- EMAC EMPRESA MUNICIPAL DE AMBIENTEDE CASCAIS EM SA (Portugal)

Project Description

Context

Changes in energy regulation, rising costs, and environmental awareness are driving citizens and civil society towards a greener future. Renewable Energy Certificates (RECs) and Clean Energy Certificates (CECs) can help address this issue by bringing consumers closer to energy markets. Wide adoption of these concepts is crucial, and a new set of digital tools and services should be provided to energy consumers to promote a paradigm shift in the sharing economy principles, making them more inclusive, digital, and fair. This will enable ECs to democratize energy markets.

Project presentation, technical description and implementation

The COMMUNITAS consortium is working to establish Energy Communities (ECs) and encourage consumer participation in the energy market. The project aims to create an open, interoperable, and modular platform called the COMMUNITAS Core Platform (CCP) for various users, including citizens, communities, and energy players. The consortium will develop 12 digital tools to unlock the full potential of citizens as nuclear actors in energy markets. The project will provide regulatory and administrative support to ECs and empower citizens as co-creators through an innovative methodology for citizen and consumer engagement and value-based proposition design. The project will follow a phased, iterative approach, with three development sprints preceded by participatory lab sessions and validation periods. Stakeholder input will be included in the project's methodology for co-creation.

Project Impacts

The COMMUNITAS project aims to facilitate the transition to sustainable energy paradigms by engaging citizens in energy communities (ECs) and developing tools to support their creation and operation. Here's a summary of the project impacts across its various objectives:

Scientific Impacts: The project will advance scientific knowledge by co-creating innovative tools and methodologies through participatory processes, contributing to peer-reviewed publications and disseminating findings in scientific journals.

Economic/Technological Impacts: It will develop a set of tools including a Knowledge Base platform, EC Planning Tool, EC Management Platform, and Investment Advisor to support the implementation, operation, and expansion of ECs. These tools will enhance energy literacy, reduce electricity costs, increase self-consumption, and support sustainable investments.

Societal Impacts: The project will promote inclusive engagement, gender equality, and social cohesion by disseminating knowledge through workshops and e-learning content. It aims to reach a significant number of citizens, increase public acceptance of ECs, mitigate energy poverty, and inspire sustainable energy practices.

Scale/Significance: Across various metrics such as the number of ECs involved, citizen engagement sessions, tool development, users of EC Management Platform, sustainable investments, reduction in electricity costs, and increase in self-consumption, the project aims to have a substantial impact on a broad scale.

Expected key exploitable results of the project

- COMMUNITAS Core Platform (CCP).
- Energy community management platform.
- Investment advisor for household- and community-level sustainable investments.
- Energy Community Planning Tool.
- MultiFASE – near real-time optimisation of ECs' Distributed Energy Resources (DERs).
- Demand Response and optimal market position.
- P2P and local energy markets.
- Fungible & Non-Fungible Token solution for P2P energy market trading.
- Guarantees of Origin platform.

- Telemetry data anomaly detection toolkit.
- VERIFY – A web-based platform enabling LCA/LCC of projects.
- USE – A platform enabling the uniform evaluation of projects.
- Business models for Energy Communities, Local Energy Markets and Flexibility Tools.
- Methodology for citizen and consumer engagement and value-based proposition design in EC.

HORIZON-CL5-2022-D3-01-08: Supporting the action of consumers in the energy market and guide them to act as prosumers, communities and other active forms of active participation in the energy activities

Back to projects' list

Electricity grids | Consumers/Prosumers | System Integration

RESCHOOL

Strategies and tOOls for Incentivization and management of flexibility in Energy Communities with distributed Resources

reschool

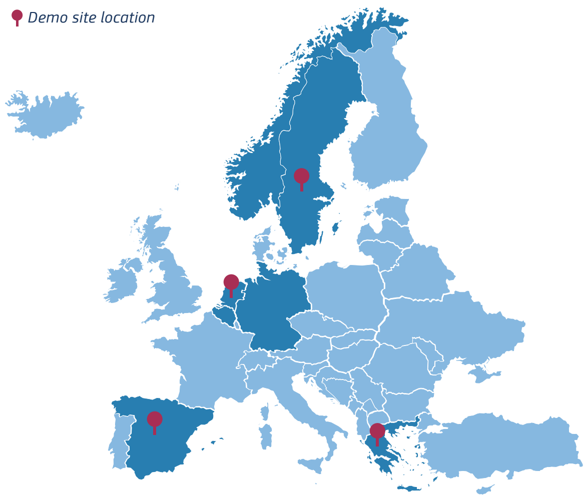
The main objective of RESCHOOL is to catalyse the creation, growth and management of energy communities by leveraging the engagement of participants, facilitating the cooperation in collaborative initiatives within communities, and co-producing tools for the efficient management of energy and trading at individual and aggregated levels.

FROM	January 2023
TO	June 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
6 118 596,26 €	5 593 570,00 €	https://www.reschool-project.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response; Smart appliances; Smart metering
Distributed Storage Technologies	Batteries Electric Vehicles
Generation Technologies	Photovoltaic; Other generation technologies (geothermal)

PROJECT PARTNERS' COUNTRIES



COORDINATOR	UNIVERSITAT DE GIRONA (Spain)

OTHER PARTNERS

- UNIVERSITETET I STAVANGER (Norway)
- UNIVERSITEIT UTRECHT (Netherlands)
- BAMBOO ENERGY PLATFORM SL (Spain)
- RISE RESEARCH INSTITUTES OF SWEDEN AB (Sweden)
- EUROPEAN RENEWABLE ENERGIES FEDERATION- FEDERATION EUROPEENNE DES ENERGIES RENOUVELABLES (Belgium)
- EUROPEAN SCIENCE COMMUNICATION INSTITUTE (ESCI) GGMBH (Germany)
- KMO ENERGY SL (Spain)
- NIESING HUGO (Netherlands)
- ELECTRICITY INNOVATION EKONOMISK FORENING (Sweden)
- ENERGEIAKI KOINOTITA PERIORISMENIS EVTHINIS (Greece)
- ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS (Greece)
- INNOHUB BV (Netherlands)
- GEMEENTE AMSTERDAM (Netherlands)
- DIPUTACION DE GERONA (Spain)
- LOCALLIFE SWEDEN AB (Sweden)

Project Description

Context

The EU's "citizen" and "renewable" energy community frameworks set out a number of requirements provisions, with regards to governance, open and voluntary participation, effectively control by members as well as their primary purpose (i.e. environmental, economic or social benefits). Unfortunately, the legislation is still quite disparate among European countries, and has mostly not been adequately transposed into national laws. RESCHOOL wants to analyse and overcome barriers including the lack of social awareness, role of citizens in energy markets.

Project presentation, technical description and implementation

RESCHOOL propose twofold approach: On the one hand RESCHOOL envisions a series of engagement and empowerment activities (WP2) including gamification and serious games and a series of trainings to foster the intergenerational exchange of knowledge. On the other hand, RESCHOOL supports energy digitalisation through interoperable architecture, enhanced with a suite of energy services (WP3). Requirements and use cases are defined in WP1 and validated and demonstrated in 4 different PILOTS (WP4). Sustainability and replicability of the pilot communities and solutions will be further analysed and exploited (WP5) and promoted in different events, conferences or media, following a tailor-made communication and dissemination strategy (WP6) to maximise the project impact.

Project Impacts

To impulse the creation, growing and management of energy communities by levering the engagement of participants, facilitating the cooperation in collaborative initiatives inside the community and providing tools for an efficient management of energy and trading at individual and aggregated level. Citizen engagement for community building at both local and broad scale through intergenerational training and gamification. Support connectivity between energy data and collaborative tools to facilitate decision making and community level. Enabler of collective participation of citizens in the energy system by facilitating both automated flexibility management and aggregation and digital access to interact with other energy stakeholders in the energy value chain. Energy and visualization services, algorithms and connectivity. Open source energy management platform adapted to energy communities. Integration of enhanced energy services and visualisation interfaces. RESCHOOL aims to demonstrate the capability of energy communities to provide flexibility and get economic return from it.

Innovative aspects of the project

RESCHOOL will elaborate training programmes adapted to the different education. Gamification and collaborative techniques to motivate citizens to optimize energy use and learn about the benefits of shared energy and flexibility schemas. Data services being deployed facilitate investment into the clean energy transition and speed up the figure of prosumers in Europe and addressing the challenge of market participation through flexibility platform for communities.

Expected key exploitable results of the project

- Regulatory framework for communities in EU and policy advisory.
- Social barriers and driving forces for participation or creation of an Energy Community .
- Replicability assessment and guidelines of the PILOTs.
- Intergenerational education and training methodology.
- Proxis for SROI.
- Roadmap for standardization of Energy Communities.
- Data driven energy services/modules/ toolbox including monitoring, forecasting and flexibility scheduling capabilities.
- RESCHOOL Collaborative Community Platform
- 1% Open-source EMS.
- New gamifications methods and tools for engagement and empowerment of members of energy communities
- AI-powered gamification framework
- Visualisation toolbox

HORIZON-CL5-2022-D3-01-08: Supporting the action of consumers in the energy market and guide them to act as prosumers, communities and other active forms of active participation in the energy activities	Back to projects' list

Electricity grids | Market Design | General topics

MASTERPIECE

Multidisciplinary Approaches and Software Technologies for Engagement, Recruitment and Participation in Innovative Energy Communities in Europe

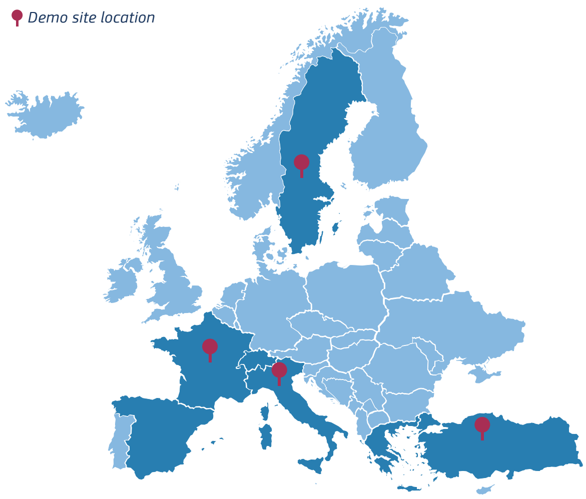
MASTERPIECE focuses on creating a digital arena to facilitate the creation and operation of Energy Communities across Europe. Main objectives: i) Empowering energy consumers and fostering collaboration paving the way towards a new energy market paradigm; ii) Creating user-centric solutions to naturally accelerate citizens' involvement; iii) Proposing innovative business strategies and incentives mechanisms fto activate market participants' reaction; iv) Establishing standardized cybersecurity infrastructure to protect citizens and privacy; v) Demonstrating the feasibility and replicability of projetc's innovations across diverse geographical and frameworks real-life pilots. .

FROM	January 2023
TO	June 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
6 985 509 €	5 996 628 €	https://masterpiece-horizon.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response; Smart metering; Heating/cooling peak load management; Other technologies for consumers (Demand optimisation)
Grid Technologies	Monitoring and control tools
Generation Technologies	Photovoltaic
Market	Infrastructure costs; Electricity market

PROJECT PARTNERS' COUNTRIES



COORDINATOR	UNIVERSIDAD DE MURCIA (Spain)

OTHER PARTNERS

- ALGOWATT SPA (Italy)
- UNIVERSIDAD DE MURCIA (Spain)
- ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS (Greece)
- R2M SOLUTION S.R.L. (Italy)
- ODIN SOLUTIONS S.L. (Spain)
- EXPERIENTIA GLOBAL SA (Switzerland)
- TROYA CEVRE DERNEGI (Turkey)
- ULUDAG ELEKTRIK DAGITIM A.S. (Turkey)
- UNIVERSITA' COMMERCIALE LUIGI BOCCONI (Italy)
- SUSTAINABLEINNOVATION I SVERIGE AB (Sweden)
- UNIVERSITE D'AIX MARSEILLE (France)
- RDIUP (France)
- ACEA PRODUZIONE SPA (Italy)
- GRID ABILITY SCARL (Italy)
- NGENIC AB (Sweden)
- UPPSALA KOMMUN (Sweden)
- AGENCE LOCALE DE L'ENERGIE ET DU CLIMAT - MÉTROPOLE BORDELAISE ET GIRONDE – ALEC (France)
- COMUNE DI BERCHIDDA (Italy)
- PLATE-FORME EFFICACITÉ ÉNERGÉTIQUE SEINE AVAL SEINERGY LAB (France)

Project Description

Context

Energy communities hinge on the open participation of members and the local community. There are thousands of energy communities in Europe. Providing support for the creation and development of energy communities on a local scale is top priority in the EU. In this context, the EU-funded MASTERPIECE project will create a digital coordination and cooperation arena that will facilitate the creation and operation of energy communities throughout Europe. It will be demonstrated its applicability of methodological, technical and business innovations in several real-life pilots.

Project presentation, technical description and implementation

The project aims at creating a digital coordination and cooperation modular platform of services that will facilitate the creation and operation of ECs. The methodology focuses on social innovations and participatory processes to engage stakeholders. ICT tools will support creating, managing, and replicating ECs. A digital platform ecosystem will assist organizational, legislative, and operational activities. This includes creating ECs, incentivizing active participation, financial planning, energy literacy training, sustainable business models, and showcasing best practices. A decision-making toolkit will be tailored to the goals, behavior, financial, and regulatory conditions. MASTERPIECE aims to address fuel poverty and identify vulnerable individuals as a barrier to overcome.

Project Impacts

Economic:

- Increase efficiency and economic sustainability of ECs.
- Enhance economic appeal and impact for all ecosystem players.
- Expand market opportunities for energy market players.
- Utilize existing incentives effectively.
- Improve ESCO market viability and robustness.
- Stimulate local investments and job creation.

Environmental:

- Achieve energy cost savings through demand response (DR) and flexibility.
- Reduce CO_2 emissions by consuming RES-generated energy.
- Increase renewable energy production and decrease energy dependency.
- Promote informed behaviors to reduce energy consumption.

Social:

- Empower and engage energy users in the energy chain.
- Raise awareness about the connection between climate change and energy consumption.
- Support the creation of ECs tailored to local contexts and peculiarities.
- Develop sustainable business models for ECs.
- Innovate regulatory frameworks and provide insights to policymakers.

Technical:

- Develop innovative, modular, and integrated platforms for managing ECs, DR, and flexibility.
- Ensure interoperability with existing data collection solutions and among modules.
- Enhance capacity for managing data-driven solutions.
- Ensure acceptance of IT solutions through co-design and usability principles application.

Scientific:

- Collaborate with other EU initiatives and projects.
- Combine SSH with energy domain knowledge, business expertise, and advanced IT solutions for behavior analysis.
- Identify motivational levers and create inter-

vention programs.

- Share scientific progress adopting Open Access principles.

Innovative aspects of the project

Creating a digital coordination and cooperation modular platform of services that will facilitate the creation and operation of energy communities, along the facilities given to members of the community to contribute to services and other developments will represent the distinction of MASTERPIECE's solution, making it participative by design. The modular platform will cover the energy community's journey.

Expected key exploitable results of the project

- KER#1 MASTERPIECE service platform.
- KER#2 Intervention Program.
- KER#2a Recommendations for Policy makers.
- KER#2b Replicability study.
- KER#3 Model of incentives.
- KER#4 EC participation toolkit.
- KER#5 MEET app.
- KER#6 Energy Community DSS.
- KER#7 Energy Community Management Platform.
- KER#8 Community DR mechanisms.
- KER#9 Micro-grid load control.
- KER#10 EC Business models.
- KER#11 MASTERPIECE Pilots.

HORIZON-CL5-2022-D3-01-07 - Demonstration of innovative rotor, blades and control systems for tidal energy devices

Back to projects' list

Electricity grids | System integration | Decarbonisation

MAXBlade

Maximising tidal energy generation through Blade Scaling & Advanced Digital Engineering

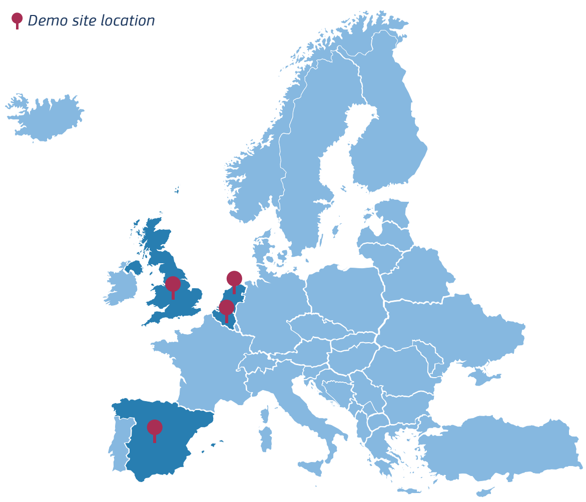
The MAXBlade project aims to revolutionize tidal energy generation by increasing rotor swept area by 70%. It focuses on delivering reliable, cost-optimized 13m tidal turbine blades, implementing advanced structural condition monitoring, optimizing blade/controller designs, enabling circularity in blade manufacturing, and advancing digital maintenance management. Key objectives include achieving a €30/MWh cost reduction, ensuring a 20% generation cost reduction, and supporting European supply chain solutions for tidal stream energy. The project targets significant socio-economic benefits, environmental impact through increased renewable energy utilization, market transformation in the renewab.

FROM	January 2023
TO	June 2028

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
1 755 645,00 €	1 373 889,00 €	https://maxblade.tech/

TECHNOLOGIES AND SERVICES DEPLOYED	
Distributed Storage Technologies	Batteries
Generation Technologies	Wind turbines

PROJECT PARTNERS' COUNTRIES



COORDINATOR	FMC TECHNOLOGIES SPOLKA Z OGRANICZONA ODPOWIEDZIALNOSCIA (Poland)
OTHER PARTNERS	• MARASOFT B.V. (THE NETHERLANDS) • FUNDACION TECNALIA RESEARCH & INNOVATION (SPAIN) • BELGISCH LABORATORIUM VANELEKTRICITEITSINDUSTRIE (BELGIUM) • ASSOCIATIONEUROPEENNE DE LINDUSTRIE DESCOMPOSITES (BELGIUM) • THE EUROPEAN MARINE ENERGY CENTRE LIMITED (UNITED KINGDOM) • THE UNIVERSITY OF EDINBURGH (UNITED KINGDOM) • ORBITAL MARINE POWER LIMITED (UNITED KINGDOM)

Project Description

Context

The MAXBlade project aligns with the European Commission's priorities by addressing sustainability, innovation, and economic growth. Tidal energy development contributes to the EU's renewable energy goals, enhancing energy security and reducing carbon emissions. By focusing on blade scaling and digital engineering, the project fosters technological advancements and supports the transition towards a low-carbon economy. Moreover, it promotes inclusion by creating job opportunities and strengthening the European supply chain in the renewable energy sector.

Project presentation, technical description and implementation

The MAXBlade project addresses key technological challenges in tidal energy generation by focusing on blade scaling and advanced digital engineering. Objectives include delivering a 70% increase in rotor swept area, improving blade design, reliability, and maintenance, and achieving a €30/MWh cost reduction in tidal stream energy. Unlike existing solutions, MAXBlade approach combines innovative blade design with advanced digital monitoring and control systems. We'll employ a multi-disciplinary methodology encompassing computational modeling, material science, and field testing to optimize blade performance and durability. Key components such as recyclable thermoplastic resins and advanced structural condition monitoring systems will be pivotal in achieving project goals.

Project Impacts

Economic impacts:

- Increased market competitiveness for tidal energy technology.
- Cost reduction in tidal stream energy production.
- Expansion of European supply chain for tidal turbine blades.

Social impacts:

- Creation of new job opportunities in the renewable energy sector.
- Enhancement of skills and expertise in tidal energy technology.
- Increased access to sustainable and affordable energy solutions.

Environmental impacts:

- Reduction in carbon emissions through increased utilization of renewable energy.
- Conservation of marine ecosystems by promoting clean energy alternatives.
- Contribution to achieving European sustainability goals.

Technological impacts:

- Advancement of blade engineering and monitoring technologies.
- Development of recyclable materials for tidal turbine blades.
- Facilitation of innovation in tidal energy generation methods.

Innovative aspects of the project

The most innovative aspect of the MAXBlade project lies in its holistic approach to revolutionizing tidal energy generation. By focusing on blade scaling, advanced digital engineering, and circular economy principles, MAXBlade aims to significantly increase rotor swept area, enhance blade reliability, and promote recyclability. This comprehensive strategy promises to unlock new efficiencies, reduce costs, and propel tidal energy technology towards widespread adoption.

Expected key exploitable results of the project

- Enhanced tidal turbine blade design optimized for increased rotor swept area.
- Advanced structural condition monitoring systems for improved turbine reliability.
- Tailored blade/controller designs for maximizing array-level power performance.

- Circular economy approach for tidal turbine blades, including recyclable thermoplastic manufacturing.
- European leadership in tidal turbine composite blade manufacturing with increased production capacity.
- Integrated digital maintenance management system for efficient tidal array operations.

Key exploitable results and sub-key exploitable results achieved to date

- Advanced tidal turbine blade design finalized, achieving a 70% increase in rotor swept area.
- Structural condition monitoring systems successfully implemented, enhancing turbine reliability and performance.
- Tailored blade/controller designs developed and tested for optimized array-level power generation.
- Initial steps taken towards circular economy approach for tidal turbine blades, including feasibility studies for recyclable thermoplastic manufacturing.
- Collaboration established with European partners to lead in tidal turbine composite blade manufacturing, with plans for increased production capacity.
- Early-stage development underway for integrated digital maintenance management system for tidal array operations.

HORIZON-CL5-2022-D3-01-12 - Replicable solutions for a cross sector compliant energy ecosystem	Back to projects' list

Electricity grids	Digitalisation	Consumers/prosumers

REEFLEX

REplicable, interoperable, cross-sector solutions and Energy services for demand side FLEXibility markets

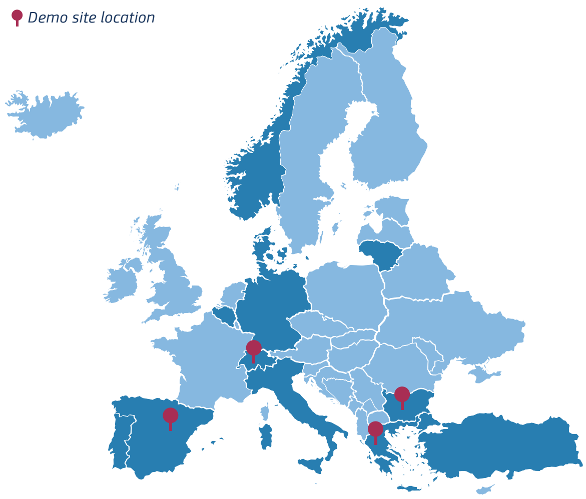
REEFLEX is focused on delivering higher participation of energy consumers in demand side flexibility markets and demonstrating niches of opportunities for new services provided by SMEs and start-ups, seeing a growing number of distributed energy resources (DERs) connected to the network.
DERs come from an ample variety of energy carriers and sectors, accompanied by the introduction of new digitalized assets. This decentralization poses significant challenges for the resilience of the system, and uncertainty in traditional control routines.
To ensure replicability of REEFLEX solutions, they will be demonstrated and tested in 4 main demonstrator, and replicated in 3 additional countries

FROM	January 2023
TO	December 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
9 980 283,56 €	8 002 111,00 €	www.reeflexh2020.eu

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response; Smart appliances; Smart metering; Heating/cooling peak load management
Grid Technologies	Network management; Monitoring and control tools
Market	Electricity market

PROJECT PARTNERS' COUNTRIES



COORDINATOR	FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS (Spain)

OTHER PARTNERS

- Sistemas Urbanos de Energías Renovables SL (Spain)
- Sociedad Municipal Zaragoza Vivienda (Spain)
- Omi-Polo Español SA (Spain)
- Ethniko Kentro Erevnas Kai Technologikis Anaptyxis (Greece)
- Watt and Volt Anonimi Etairia Ekmetalleysis Enallaktikon Morfon Energeias (Greece)
- Kainotomia Idiotiki Kefalaiouchiki Etaireia (Greece)
- Que Technologies Kefalaiouchiki Etaireia (Greece)
- Ubitech Limited (Belgium)
- Yugoiztochnoevropyska Tehnologichna Kompania Ood (Bulgaria)
- Abilix Soft Ltd (Bulgaria)
- University of Piraeus Research Center (Greece)
- Suite5 Data Intelligence Solutions Limited (Belgium)
- Enerbrain Srl (Italy)
- Betteries Amps Gmbh (Germany)
- Arcelik A. S. (Turkey)
- Lietuvos Energetikos Institutas (Lithuania)
- Rina Consulting Spa (Italy)
- Fundación Cartif (Spain)
- Smart Innovation Norway (Norway)
- Temsa Skoda Sabanci Ulasim Araclarianonim Sirketi (Turkey)
- Holbæk Kommune (Denmark)
- Smart Energy Lab - Association (Portugal)
- Edp Centre for New energy Technologies (Portugal)
- Azienda Elettrica di Massagno SA (Switzerland)
- Hive Power Sagl (Switzerland)
- Scuola Universitaria Professionale Della Svizzera Italiana (Switzerland)

Project Description

Context

Current energy ecosystem is seeing a growing number of distributed energy resources (DERs) connected to the network, which continuously expands the energy system "edge" in terms of controllability and operational complexity. This progressive decentralization, accompanied by the introduction of new digitalized assets (e.g., EVs, IoT, storage solutions), poses significant challenges for the resilience of the system, while introducing increased uncertainty in traditional control routines given the stochastic and intermittent character of renewable generation and the new control variables (not currently addressed in existing tools for the system management) introduced by new assets.

Project presentation, technical description and implementation

REEFLEX will develop a central interoperability platformand a catalogue of services with the capability of maximising DER flexibility, while respecting the different end user profiles and needs along with the physical limitations of existing infrastructures. Additionally, the generation of a common operation market model together with AI-driven intelligence services and automation systems, enabled through the utilization of DLT technologies (blockchain) for enhancing transparency and trust, will reduce market entry barriers and costs and achieve a higher participation from energy consumers. They will benefit from new revenues obtained through data and flexibility transactions (prosumer empowerment and entrance in energy markets), while enjoying innovative, personalized, data (intelligence)-driven services for smart, human-centric control of their assets in the frame of demand-response.

Project Impacts

Replicability: REEFLEX will be replicated in 3 different countries and demonstrated up to TRL 7 in 4 main demonstration sites with cross-replication covering different energy vectors, covering 7 countries overall to ensure replicability and scalability of the project results.

Socio-economics: The generation of a common operation market model together with AI-driven intelligence services and automation systems, enabled through the utilization of DLT technologies (blockchain) will reduce market entry barriers and costs and achieve a higher participation from energy consumers. They will benefit from new revenues obtained through data and flexibility transactions.

Environment: By accounting real time and synthetic data derived from power flow analysis, REEFLEX will provide both environmental and economic benefits by grouping together prosumers with same needs and characteristics, directly targeting platform users to increase economic profits, minimize emissions, decarbonize environment and decrease CO2 footprint

Market Transformation: REEFLEX will allow to determine end-user's potential flexibility and aggregation by calculating their capacities to offer flexibility and their cost, their capacity to increase or decrease their consumption or even provide energy to the grid in different time horizons, which will led to a better RES and storage facilities better and extended use.

This will result in an optimal market selection tool, which will provide the platform with an array of expected scenarios of the flexibility markets, arranged by probability, and the forecasted price trends, making it possible to apply the most convenient decisions in terms of energy use and optimal flexibility market bidding.

Policy: Through the proper tasks, REEFLEX will deliver policy recommendations to align the main outputs with upcoming legislation on sustainable smart grids and recommendations on standards and certifications to ensure the flexible integration and interoperability of DERs.

Innovative aspects of the project

New energy services, demand side flexibility market, central platform and a catalogue of new services maximising DER flexibility.

Expected key exploitable results of the project

REEFLEX platform; ERIFY and USE modules/add-onsERIFY and USE modules/add-ons; Flexibility catalogue; Smart flexible appliances; IoT with management capabilities; Flexible V2G/batteries inverters; Universal Battery Management; NILM disaggregation techniques; Flexibility calculation and aggregation tools; Market selection tool; P2P system; Common market module

HORIZON-CL5-2022-D3-01-02: Demonstration of innovative materials, supply cycles, recycling technologies to increase the overall circularity of wind energy technology and to reduce the primary use of critical raw materials

Back to projects' list

REFRESH

Smart dismantling, sorting and REcycling of glass Fibre Reinforced composite from wind power Sector through Holistic approach

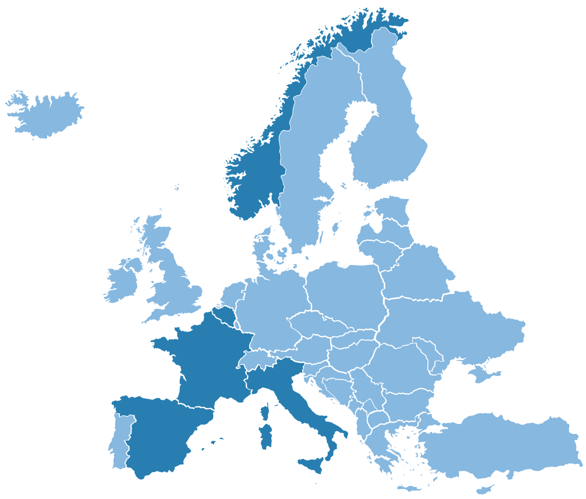
REFRESH aims to develop and demonstrate a novel circular, smart system for an improved recycling (>90%) of glass fiber-reinforced composites derived from wind turbine dismantling or reblading, with high purity level. The project will focus on the mechanical and thermal treatment of waste, but it will strongly involve the entire reverse circular value chain: from end-of-life blades to a wide range of re-manufactured products. REFRESH proposes a flexible re-manufacturing line: when a wind-blade is decommissioned, it will be performed a selection of optimal recycling process according to the technical condition of the blade and current market demand; this will be achieved by using a dedicated tracking tool for collecting, protecting and sharing information and an embedded decision-making tool software for selecting time by time the most sustainable approach to recycling.

FROM	January 2023
TO	December 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
15 520 627,85 €	11 462 602,00 €	https://refresh-project.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Smart metering, Application CES-as-a-service
Grid Technologies	Feed low grade waste heat to the district heating networks
Large Scale Storage Technologies	Industrial battery
Distributed Storage Technologies	Storage for self- consumption, Hydrogen battery, V2G
Generation Technologies	Solar PV, hydropower, V2G
Market	Electricity price Reduction, flexibility services

PROJECT PARTNERS' COUNTRIES



COORDINATOR	Rina Consulting S.p.A (Italy)
OTHER PARTNERS	• ACCIONA (Spain) • CETMA (Italy) • CIRCE (Spain) • Gees Recycling (Italy) • TECNALIA (Spain) • MTB MANUFACTURING (France) • ENECOLAB S.R.L. (Italy) • GJENKRAFT (Norway) • STD FRANCE (France) • EUCIA (Belgium)

Project Description

Context

REFRESH aims to develop and demonstrate a novel circular, smart system for an improved recycling (>90%) of glass fiber-reinforced composites derived from wind turbine dismantling or reblading, with high purity level. The project will focus on the mechanical and thermal treatment of waste, but it will strongly involve the entire reverse circular value chain: from end-of-life blades to a wide range of re-manufactured products.

Project presentation, technical description and implementation

- Development of large-scale industrial demonstration of composite material recycling technologies to increase the circularity of wind technology.
- To develop a flexible production line, able to deal with a large amount of materials and applicable to several manufacturers and possibly to other sectors.

REFRESH will mainly focus on technology solution development, prototyping and demonstration activities aiming to overcome the current technological gaps and uncertainties found at the End of Lise stage for wind blades:

- New advanced dismantling and sorting technologies.
- New recycling technologies and production processes for secondary raw materials.
- Deployment of REFRESH Technologies.
- Develop an advanced smart tool for traceability.

Project Impacts

Replicability: The REFRESH project targets the recovery of composites from wind blades, opening the door to a huge resource and replicability potential.

Socio-economics: Contribution to key social European Policies and Initiatives, new job creation, creation of novel Business models, impact on other sectors beside wind energy.

Environment: sustainable economic activity with resources savings or uses, which works towards circular economy and eco-design strategy.

HORIZON-CL5-2022-D3-01-02: Demonstration of innovative materials, supply cycles, recycling technologies to increase the overall circularity of wind energy technology and to reduce the primary use of critical raw materials

Back to projects' list

Energy storage | Digitalisation | Consumers/prosumers

EoLo-HUBs

Wind turbine blades End of Life through Open HUBs for circular materials in sustainable business models

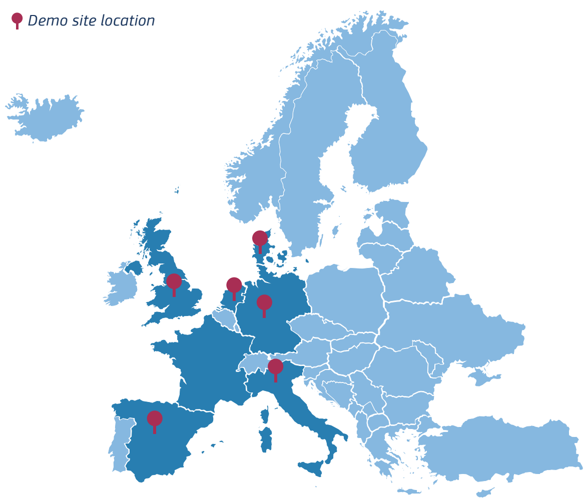
The project aims to address the End of Life (EoL) challenges of wind turbine blades through open hubs for circular materials and sustainable business models. It focuses on developing technologies, organizational structures, and legal recommendations to implement Circular Economy (CE) practices in the wind energy sector. Key objectives include demonstrating novel recycling technologies, creating resilient value chains, promoting circularity in wind technology, reducing carbon footprint, and fostering EU leadership in renewable energy..

FROM	January 2023
TO	December 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
12 093 768,99 €	9 994 682,38 €	https://www.eolo-hubs.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	High Voltage Alternating Current; High Voltage Direct Current; Multi-terminal; Micro-grid; Semiconductor devices and power converters; Grid inertia
Large Scale Storage Technologies	Power to gas; Compressed air energy storage; Hydro storage
Distributed Storage Technologies	Batteries; Thermal energy production, distribution and storage
Generation Technologies	Wind turbines; Photovoltaic

PROJECT PARTNERS' COUNTRIES



COORDINATOR	FUNDACION AITIIP (Spain)

OTHER PARTNERS

- ECHT regie in transitie B.V (Netherlands)
- NORDEX ENERGY GMBH (Germany)
- MOSES PRODUCTOS SL (Spain)
- MITSUBISHI CHEMICAL ADVANCED MATERIALS GMBH (Germany)
- CONSORCIO AERODROMO AEROPUERTO DE TERUEL (Spain)
- ADVANTIS APS (Denmark)
- FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV (Germany)
- JANSEN RECYCLING GROUP B.V (Netherlands)
- MONDRAGON GOI ESKOLA POLITEKNIKOA JOSE MARIA ARIZMENDIARRIETA S COOP (Spain)
- SAINT-GOBAIN PLACO IBERICA SA (Spain)
- GLOBAL EQUITY & CORPORATE CONSULTING SL (Spain)
- NEDERLANDSE ORGANISATIE VOOR TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK TNO (Netherlands)
- CENTRO RICERCHE FIAT SCPA (Italy)
- OLYMERIS (France)
- NCC OPERATIONS LIMITED (UK)
- UNIVERSITY OF LEEDS (UK)
- THE MANUFACTURING TECHNOLOGY CENTRE LIMITED (UK)

Project Description

Context

The project addresses the pressing need for sustainable management of wind turbine blade waste in the wind energy sector, aligning with EU priorities on circular economy and renewable energy. By tackling the end-of-life challenge, it contributes to sustainability goals, promoting circularity and reducing waste. Moreover, the project embraces digitalization to optimize recycling processes, fostering innovation and efficiency. Its outcomes align with EU objectives of economic growth, environmental protection, and social inclusion, ensuring a greener and more sustainable future for Europe.

Project presentation, technical description and implementation

The project aims to address the technological challenge of sustainable management of wind turbine blade waste by developing innovative recycling technologies. Objectives include decommissioning and pretreatment of blades, sustainable fiber reclamation, and upgrading processes for recovered fibers. EoLo-HUBs approach differs by demonstrating a cluster-based model for implementing sustainable business models around blade recycling. Methodology involves large-scale demonstration of recycling technologies and setting up a knowledge hub for replication. Key components like decommissioning processes and fiber reclamation contribute to achieving circularity in wind turbine blade management.

Project Impacts

Economic impacts: Increased revenue from recycled materials, reduced dependency on raw materials, new business opportunities in circular economy.

Social impacts: Creation of new jobs in recycling sector, improved quality of life in regions with wind farms, empowerment of local communities through sustainable practices.

Environmental impacts: Decreased waste and pollution from landfilling or incineration of wind turbine blades, reduced carbon footprint of wind energy sector, conservation of natural resources.

Technological impacts: Development and diffusion of innovative recycling technologies for composite materials, advancement in circular economy practices for wind turbine blades.

Innovative aspects of the project

The most innovative aspect of the project is the development of novel composite material recycling technologies specifically tailored for wind turbine blades. These technologies address the challenges of decommissioning, pretreatment, and sustainable fiber reclamation, contributing to a circular economy in the wind energy sector.

Expected key exploitable results of the project

- Development of innovative composite material recycling technologies for wind turbine blades.
- Decommissioning and pretreatment processes for effective handling, inspection, cutting, shredding, and sorting of blades.
- Sustainable fiber reclamation methods including low carbon pyrolysis and green chemistry solvolysis.
- Upgrading processes for recovered fibers, focusing on glass fibers and carbon fibers.
- Establishment of three open hubs for co-designing and co-creating circular economy solutions.
- Creation of a digital knowledge hub facilitating the replication of project approaches for wind turbine blade recycling, including decision support tools and material passports.

Key exploitable results and sub-key exploitable results achieved to date

- Development of novel composite material recycling technologies for wind turbine blades.
- Successful demonstration of decommissioning and pretreatment processes for effective handling, inspection, cutting, shredding, and sorting of blades.
- Advancement in sustainable fiber reclamation

methods including low carbon pyrolysis and green chemistry solvolysis.

- Progress in upgrading processes for recovered fibers, focusing on glass fibers and carbon fibers
- Establishment of open hubs for co-designing and co-creating circular economy solutions.
- Initiation of a digital knowledge hub facilitating the replication of project approaches for wind turbine blade recycling, including decision support tools and material passports.

HORIZON-CL5-2022-D3-01-02: Demonstration of innovative materials, supply cycles, recycling technologies to increase the overall circularity of wind energy technology and to reduce the primary use of critical raw materials

Back to projects' list

Other keywords

Blades2Build

Recycle, repurpose and reuse end-of-life wind blade composites – a coupled pre- and co-processing demonstration plant

The general scope of the proposed project is to evaluate and demonstrate in large scale the possibility of recycling or resource recovery from blades and similar waste materials in a large consortium with some of

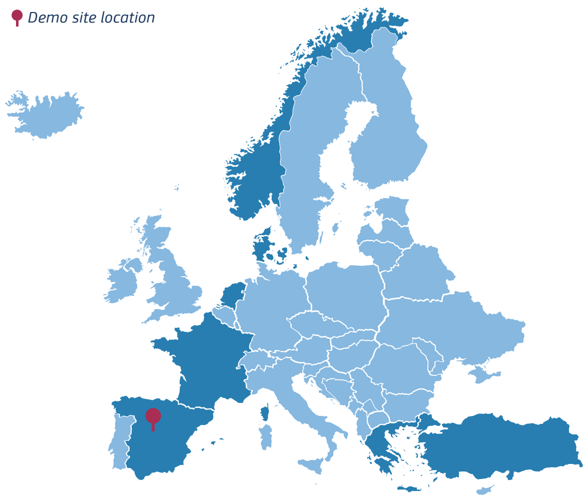
Europe's key players in areas of importance for the project.

FROM	January 2023
TO	December 2025

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
15 490 034,00 €	12 362 239,68 €	https://blades2build.com/

TECHNOLOGIES AND SERVICES DEPLOYED	
Other technologies and services	Recycling demonstration plant for EoL windmill blades

PROJECT PARTNERS' COUNTRIES



COORDINATOR	DANMARKS TEKNISKE UNIVERSITET (Denmark)
OTHER PARTNERS	• ACCIONA CONSTRUCCION SA (Spain) • HOLCIM INNOVATION CENTER SAS (France) • LM WIND POWER AS (Denmark) • ETHNICON METSOVION POLYTECHNION (Greece) • TECHNISCHE UNIVERSITEIT EINDHOVEN (Netherlands) • RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (Germany) • RENAO DANISMANLIK LIMITED SIRKETI (Türkiye) • PREZERO GESTION DE RESIDUOS SA (Spain) • ENDESA GENERACION SA (Spain) • PREZERO ESPANA SA (Spain) • GE WIND ENERGY GMBH (Germany) • GLOBAL CONSULTING SUSTAINABILITY (Norway) • ELDAN RECYCLING AS (Denmark)

Project Description

Context

Blades2Build contributes to two main priorities identified by the European Commission: Building a climate-neutral, green, fair and social Europe, and Developing a strong and vibrant economic base. This project investigates - at the high TRL of 7 - how to deal with windmill blades, one of the main waste streams caused by wind power, presenting recycling alternatives for the produced waste within the construction industry. At TRL 7, the project will generate a demonstration plant at the end of the project able to deal with 6 tons of blade waste per year. This plant will be located in Castilla y Leon, a county of northern Spain. This will generate enconomic growth of the region.

Project presentation, technical description and implementation

Blades2Build aims to create circular solutions for end-of-life windmill blades generated by the wind industry. This is done by creating different solutions with windmill waste, mainly targeting the construction industry. While the majority of circular solutions investigated up to now target recycling, Blades2Build investigates higher levels of circularity like repurpose and reuse. This implies less use of energy as a waste management solution. The project at low TRL will explore innovative solutions for the blade waste. At higher TRL a demonstration plant to will be developed to generate blade shredded material that can be used in the generation of low strength concrete. As the project develops, the plant will adhere to the new circular solutions generated at low TRL.

Project Impacts

Environmental impacts: reduce EoL waste of windmill blades.

Expected key exploitable results of the project

- Recycling of end of life windmill blades

HORIZON-CL5-2021-D5-01-04: LCA and design for sustainable circularity - holistic approach for zero-emission mobility solutions and related battery value chain (2ZERO & Batteries Partnership)

Back to projects' list

Energy Storage | Digitalisation | Consumers/prosumers

TRANSENSUS LCA

Towards a European-wide harmonised transport-specific LCA Approach

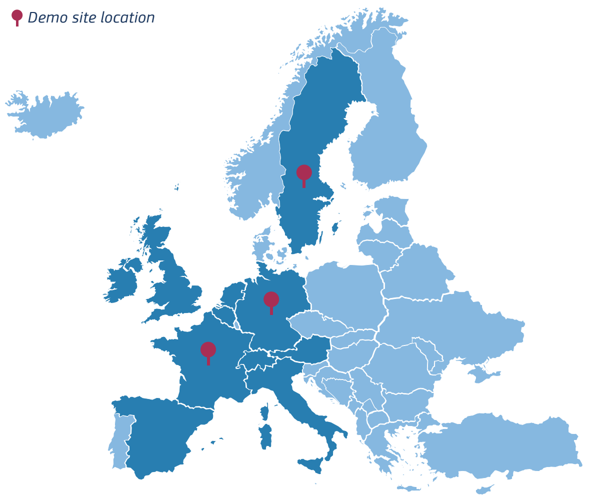
TranSensus LCA aims to harmonize a single LCA approach for zero-emission road transport in Europe. Objectives include developing a real-data LCA approach, harmonizing methodologies, and managing LCI data. Implementation involves conceptualizing a consensus LCA, conducting tests, and seeking stakeholder consensus. Expected impacts include transparency, informed consumer choices, contribution to SDGs, market transformation, and informing policies for reduced environmental impact.

FROM	January 2023
TO	June 2025

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
3 675 176,25 €	3 675 176,25 €	https://lca4transport.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response; Smart appliances; Smart metering; Heating/cooling peak load management
Grid Technologies	High Voltage Alternating Current; High Voltage Direct Current; Micro-grid; Network management
Large Scale Storage Technologies	Power to gas; Compressed air energy storage; Hydro storage
Distributed Storage Technologies	Batteries; Electric vehicle

PROJECT PARTNERS' COUNTRIES



COORDINATOR	Fraunhofer LBF & IST (Germany)

OTHER PARTNERS

- BMW (Germany)
- BRGM (France)
- CEA (France)
- EDF (France)
- University Ghent (Belgium)
- University Leiden (Netherlands)
- Northvolt (Sweden)
- Renault (France)
- Ricardo (Germany)
- RWTH-Aachen – INAB (Germany)
- Scania (Sweden)
- Sphera (Germany)
- IVL (Sweden)
- TU Braunschweig (Germany)
- University Bordeaux (Germany)
- Volkswagen (Germany)
- Umicore (Belgium)
- Valeo (France)
- ST Microelectronics (France)
- Ricardo (UK)
- Ecoinvent (Switzerland)
- University College Dublin (Ireland)
- CLEPA (Belgium)
- ECTRI (Belgium)

OTHER PARTNERS	
	• University Firenze (Italy) • PSA (France) • AVL (Austria) • Ford (Germany) • Smart Freight Center (Netherlands) • EURIC (Belgium) • RECHARGE (Belgium) • Toyota Motor Europe (Belgium) • Öko-Institut (Germany) • IFPEN (France) • European Lithium Institute (Belgium) • IVECO (Italy) • Fiat (Italy) • Siemens (Germany) • Volvo Technology (Sweden)Siemens (Germany) • Everledger (UK) • ERTICO (Belgium) • Tecnalia (Spain)

Project Description

Context

Digital tools and technologies for smart grids (energy management systems, Supervisory control and data acquisition - SCADA, digital twins, grid modelling, forecasting, etc.)

Project presentation, technical description and implementation

The TranSensus LCA project aims to establish a harmonized life cycle assessment (LCA) approach for zero-emission road transport systems across Europe. Key challenges include the lack of standardized methodology and data. Its approach differs by focusing on consensus-building and broad stakeholder engagement. Methodologically, we'll develop a comprehensive LCA framework considering retrospective and prospective assessments, circular economy principles, and social aspects. Key components include real-life data collection, harmonization of methodologies, and stakeholder engagement, supported by technologies such as data modeling tools and collaborative platforms

Project Impacts

Economic impacts: Increased market share for zero-emission mobility solutions, enhanced competitiveness for industry partners, new business opportunities in the sustainable transport sector.

Social impacts: Creation of new jobs in the green economy, improved quality of life through reduced air pollution and noise levels, fostering a culture of sustainability.

Environmental impacts: Significant reduction in CO2 emissions, decreased pollution levels, conservation of natural resources, and promotion of sustainable practices.

Technological impacts: Advancement in LCA methodologies, development of innovative data modeling tools, fostering technological innovation in the transport sector.

Other impacts: Promotion of EU's Green Deal targets, alignment with Sustainable Development Goals, and contribution to the transition towards a circular, climate-neutral economy.

Innovative aspects of the project

The project introduces a pioneering approach to harmonize and standardize life cycle assessment (LCA) methodologies for zero-emission road transport, fostering transparency and comparability across the European Union. By integrating real-life data and stakeholder consensus, it facilitates informed decision-making and drives sustainable innovation in the mobility sector.

Expected key exploitable results of the project

- Development of a harmonized European-wide LCA approach for zero-emission road transport.
- Establishment of methodologies, tools, and datasets for standardized LCA assessments.
- Creation of an ontology and framework for a European-wide LCI database.
- Implementation of LCI data management systems for lifecycle and supply chain analysis.
- Facilitation of LCA-based product and business development for sustainable mobility solutions.

Key exploitable results and sub-key exploitable results achieved to date

- Establishment of a baseline for a harmonized European-wide LCA approach.
- Development of methodologies, tools, and data-sets for standardized LCA assessments.
- Creation of an ontology and framework for a European-wide LCI database.
- Implementation of preliminary LCI data management systems for lifecycle and supply chain analysis.
- Initial progress towards LCA-based product and business development for sustainable mobility solutions.

HORIZON-CL5-2021-D5-01-03: System approach to achieve optimised Smart EV Charging and V2G flexibility in mass-deployment conditions (2ZERO)

Back to projects' list

Electricity grids | Energy storage | Digitalisation

XL-Connect

Large scale system approach for advanced charging solutions

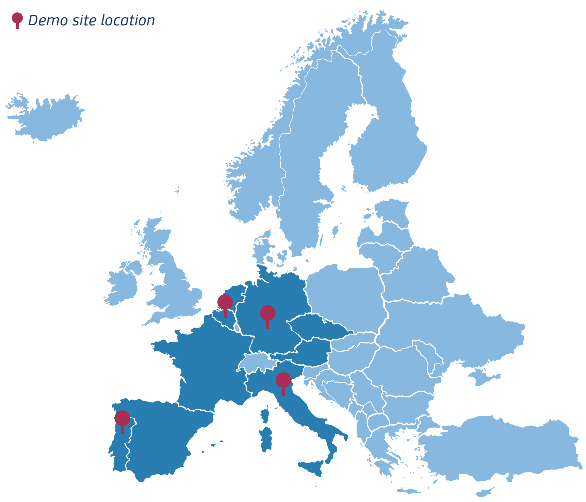
The overall project objective is to optimize the entire charging chain - from energy provision to the end user - to create a clear benefit for all stakeholders. Therefore, a ubiquitous on-demand charging solution based on an optimized charging network considering human, technical and economic factors along the entire charging chain shall be developed. The project will study how people use electric vehicles and analyze the energy system and power grid to understand how they will behave in the future. This research will help predict the actions of electric vehicle owners and companies that use electric vehicle fleets, and will identify any problems in the electric grid and energy system.

FROM	January 2023
TO	June 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
8 387 622,25 €	8 387 620,00 €	https://xlconnect.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response; Smart appliances
Grid Technologies	High Voltage Alternating Current; High Voltage Direct Current; Micro-grid; Monitoring and control tools
Distributed Storage Technologies	Electric Vehicles Batteries

PROJECT PARTNERS' COUNTRIES



COORDINATOR	VIRTUAL VEHICLE RESEARCH GMBH (Austria)

OTHER PARTNERS

- UNIVERSITA DEGLI STUDI DI FIRENZE (Italy)
- IFP Energies nouvelles (France)
- AVESTA BATTERY & ENERGY ENGINEERING (Belgium)
- IDIADA AUTOMOTIVE TECHNOLOGY SA (Spain)
- RICARDO PRAGUE S.R.O. (Czechia)
- RICARDO GMBH (Germany)
- UNIRESEARCH BV (Netherlands)
- FEV EUROPE GMBH (Germany)
- FEV SOFTWARE AND TESTING SOLUTIONS (France)
- FEV SOFTWARE AND TESTING SOLUTIONS GMBH (Germany)
- FUNDACIO EURECAT (Spain)
- RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (Germany)
- AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH (Austria)
- MYCROFT MIND, A.S (Czechia)
- REGIONETZ GMBH (Germany)
- ABB E-MOBILITY S.P.A. (Italy)
- ZAPADOCESKA UNIVERZITA V PLZNI (Czechia)
- E-REDES - DISTRIBUICAO DE ELETRICIDADE SA (Portugal)
- DCCS GMBH (Austria)
- CIRCONTROL SA (Spain)
- FRIED V NEUMAN GESELLSCHAFT MBH (Austria)
- NEUMAN ALUMINIUM FLIESSPRESSWERK GMBH (Austria)
- BAYERISCHE MOTOREN WERKE AKTIENGESELLSCHAFT (Germany)
- ESTRA SPA ENERGIA SERVIZI TERRITORIO AMBIENTE (Italy)
- RICARDO CONSULTING ENGINEERS LIMITED (United Kingdom)

Project Description

Context

The number of battery-powered electric vehicles in the EU is expected to grow to 3-4 million by 23. This strong increase in the amount of electric vehicles is a big challenge for the energy system in Europe from a charging infrastructure point of view, but at the same time a chance to use promising V2G/V2X-technologies. Vehicle-to-grid (V2G) technology enables the charged battery power to also be pushed back to the grid to balance variations in energy production and consumption, as well as to mitigate power quality issues, and can therefore play an important role in increasing grid stability.

Project presentation, technical description and implementation

At the center of the overall system of the electricity grid and charging chain is the end user, who has a contract either with an e-mobility service provider (eMSP) or the grid provider, depending on where they charge their electric vehicle. The eMSP has information about the availability and performance requirements of the charging stations. Ideally, it should also receive information about the battery's charge level, which is exchanged with the vehicle manufacturer's system. This helps in planning trips and calculating charging options and duration based on available charging power, along with route planning. The end user can also exchange data with a navigation service provider (NSP) for these purposes. Additionally, the smart charging service provider (SCSP) has knowledge of the local network requirements.

Project Impacts

- Accelerated uptake of zero tailpipe emission, affordable, user centric solutions (technologies and services) for road-based mobility all across Europe.
- Increased user acceptance, improved air quality, a more circular economy and reduction of environmental impacts.
- Innovative use cases for the integration of zero tailpipe emission vehicles, and infrastructure concepts for the road mobility of people and goods.
- Effective design, assessment and deployment of innovative concepts in road vehicles and mobility services thanks to life-cycle analysis tools and skills in a circular economy context.
- Affordable, user-friendly charging infrastructure concepts and technologies that include vehicle-grid-interactions.

HORIZON-CL5-2021-D5-01-03: System approach to achieve optimised Smart EV Charging and V2G flexibility in mass-deployment conditions (2ZERO)		Back to projects' list
Electricity grids	Energy storage	Digitalisation

FLOW

Flexible energy systems Leveraging the Optimal integration of EVs deployment Wave

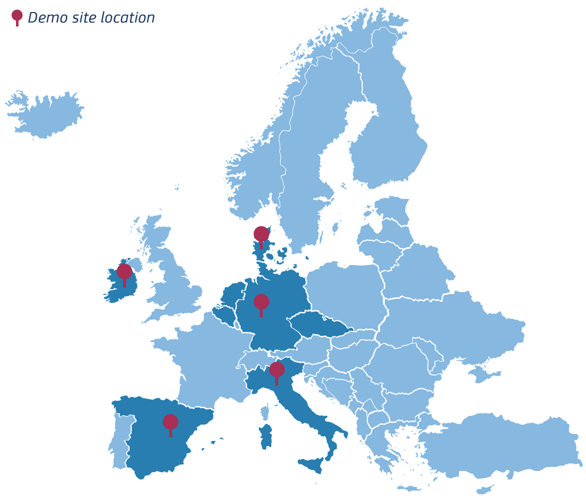
The "FLOW" project focuses on integrating electric vehicles (EVs) into energy systems to alleviate grid challenges and foster mobility and energy decarbonization. It aims to achieve this through multifaceted smart charging and V2X integration solutions, harmonizing and standardizing communication protocols, and developing user-centric technologies. Key objectives include technological innovation, interoperability, user empowerment, and socio-economic and environmental impact. Measurable outcomes include increased user acceptance, economic benefits for EV users, reduced emissions, and enhanced grid stability. The project's main focus areas include smart charging/V2X concepts, interoperability.

FROM	July 2022
TO	June 2025

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
9 873 630,00 €	9 873 628,00 €	https://www.theflowproject.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	High Voltage Alternating Current; High Voltage Direct Current; Micro-grid; Grid inertia; Network management; Monitoring and control tools
Distributed Storage Technologies	VBatteries
Generation Technologies	PV

PROJECT PARTNERS' COUNTRIES



COORDINATOR	FUNDACIO INSTITUT DE RECERCA DE L'ENERGIA DE CATALUNYA (Spain)

OTHER PARTNERS

- DANMARKS TEKNISKE UNIVERSITET (Denmark)
- TECHNISCHE UNIVERSITEIT DELFT (Netherlands)
- HELIOX BV (Netherlands)
- RICERCA SUL SISTEMA ENERGETICO - RSE SPA (Italy)
- ENEL GRIDS S.R.L. (Italy)
- E-DISTRIBUZIONE SPA (Italy)
- ARETI S.P.A. (Italy)
- ACEA ENERGIA SPA (Italy)
- EDISTRIBUCION REDES DIGITALES SL (Spain)
- ENEL X SRL (Italy)
- ENDESA X SERVICIOS SL (Spain)
- RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (Germany)
- UNIVERSITY COLLEGE DUBLIN, NATIONAL UNIVERSITY OF IRELAND, DUBLIN (Ireland)
- R2M SOLUTION SPAIN SL (Spain)
- EATON ELEKTROTECHNIKA SRO (Czechia)
- EATON INTELLIGENT POWER LIMITED (Ireland)
- NATIONAL UNIVERSITY OF IRELAND MAYNOOTH (Ireland)
- TERNA - RETE ELETTRICA NAZIONALE SPA (Italy)
- EUROPEAN DISTRIBUTION SYSTEM OPERATORS FOR SMART GRIDS (Belgium)
- Spirii ApS (Denmark)
- ENGINEERING - INGEGNERIA INFORMATICA SPA (Italy)
- TECHNISCHE UNIVERSITAET CHEMNITZ (Germany)
- L'ASSOCIATION EUROPEENNEDE LA MOBILITE ELECTRIQUE (Belgium)
- BAYERISCHE MOTOREN WERKE AKTIENGESELLSCHAFT (Germany)

Project Description

Context

The project addresses the pressing need for integrating electric vehicles (EVs) into the energy system, aligning with EU objectives for sustainable mobility and energy transition. It supports sustainability by reducing carbon emissions through EV deployment and grid optimization. Emphasizing digitalization, it leverages smart charging solutions and grid technologies to enhance system resilience and flexibility. By promoting EV mass deployment and grid integration, it contributes to inclusive and sustainable economic growth in line with EU policies.

Project presentation, technical description and implementation

The project aims to address the challenges of integrating electric vehicles (EVs) into the energy system, focusing on smart charging and vehicle-to-grid (V2G) flexibility. Objectives include optimizing EV operation, alleviating grid congestion, and fostering renewable energy integration. Its approach differs by offering comprehensive solutions for EV integration, including user-centric products and harmonization of cross-sector standards. Methodology involves leveraging the Smart Grid Architecture Model (SGAM) to integrate EV flexibility into energy systems and developing advanced communication and information systems. Key components such as EV chargers, power converters, and controllers contribute to optimizing grid operation and enhancing system resilience.

Project Impacts

Economic impacts:

- Increased revenues for EV users up to €400 annually through V2X.
- Development of innovative EV flexibility markets.
- Grid investment reduction potential of €1.3 billion annually per country.

Social impacts:

- Increased user acceptance of EVs.
- Improved air quality through reduced emissions.
- Reduced noise pollution.

Environmental impacts:

- Reduction of greenhouse gas emissions by over 600,000 tons of CO_2 annually.
- Reduction of sulfur dioxide (SO_2), nitrogen oxides (NO_x), and particulate matter.
- Reduction of RES curtailment by 3 TWh by 2040.

Market transformation:

- Testing of local flexibility market and coordination schemes.

Policy impacts:

- Potential for revised regulations and tariffs favoring EV deployment.

Innovative aspects of the project

FLOW's innovation lies in its multi-faceted approach to EV integration. It goes beyond just smart charging, utilizing V2X technology to create a user-centric system. By harmonizing various layers (communication, data, function) and actors (utilities, users, manufacturers), FLOW aims to unlock the full potential of EVs for grid flexibility and user benefit. This comprehensive strategy could be a blueprint for successful mass EV deployment.

Key exploitable results and sub-key exploitable results achieved to date

- Based on the information provided, it's unlikely the FLOW project has achieved the final result of quantified benefits for EV flexibility. This typically involves real-world deployments and data collection over time.
- However, they might have sub-key exploitable results that lay the groundwork for this final achievement.
- Technical achievements (in progress):Harmonized and standardized solutions for smart charging and V2X integration (initial standards and specifications developed).
- Open-source software tools for user-centric EV flexibility management (prototype tools under development).
- Demonstration results (early stages):Replicable use cases for EV flexibility services in different grid scenarios.

HORIZON-CL5-2021-D5-01-03: System approach to achieve optimised Smart EV Charging and V2G flexibility in mass-deployment conditions (2ZERO)

Back to projects' list

Electricity grids | Energy storage | Other keywords

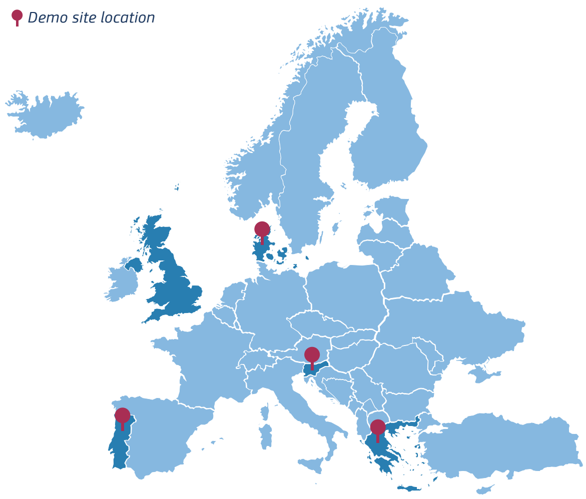
EV4EU

Electric Vehicles Management for carbon neutrality in Europe

The EV4EU project aims to accelerate the mass deployment of EVs in Europe by developing user-centric V2X management strategies. These strategies focus on minimizing the impact on batteries, meeting user needs, enhancing power systems, integrating with energy markets, and facilitating urban transformation. Key objectives include testing V2X approaches across four demo sites, evaluating technology and system impacts, developing tools and apps for EV users, and creating an open platform for data exchange. The project seeks to propose new services, demand response programs, and regulatory frameworks to encourage EV adoption.

FROM	June 2022
TO	November 2025

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
8 989 682,00 €	8 989 682,00 €	https://ev4eu.eu/

TECHNOLOGIES AND SERVICES DEPLOYED		PROJECT PARTNERS' COUNTRIES
Technologies for consumer	Other technologies for consumers (Charging stations)	

COORDINATOR	Instituto de Engenharia de Sistemas e Computadores, Investigação e Desenvolvimento em Lisboa - INESC-ID (Portugal)

OTHER PARTNERS

- UNIVERZA V LJUBLJANI (SLOVENIA)
- DANMARKS TEKNISKE UNIVERSITET (DENMARK)
- SMART ENERGY LAB- ASSOCIATION (PORTUGAL)
- ELEKTRO CELJE D.D. (SLOVENIA)
- BORNHOLMS ENERGI OG FORSYNING AS (DENMARK)
- DIACHEIRISTIS ELLINIKOU DIKTYOU DIANOMIS ELEKTRIKIS ENERGEIAS AE (GREECE)
- CAMPUS BORNHOLM (DENMARK)
- AIGLON ANONYMI VIOMICHANIKI KAI EMPORIKI ETAIREIA AYTOKINITON (GREECE)
- ABB INZENIRING DOO (SLOVENIA)
- SECRETARIA REGIONAL DOS TRANSPORTES TURISM E ENERGIA (PORTUGAL)
- CNET CENTRE FOR NEW ENERGY TECHNOLOGIES SA (PORTUGAL)
- GEN-I, TRGOVANJE IN PRODAJA ELEKTRICNE ENERGIJE, D.O.O. (SLOVENIA)
- DIMOSIA EPICHEIRISI ILEKTRISMOU ANONYMI ETAIREIA (GREECE)
- CIRCLE CONSULT APS (DENMARK)
- EDA – ELECTRICIDADE DOS ACORES SA (PORTUGAL)
- OBCINA KRSKO (SLOVENIA)
- OBMOCNA OBRTNO-PODJETNISKA ZBORNICAKRSKO (SLOVENIA)
- REGIONALNA RAZVOJNA AGENCIJA POSAVJE (SLOVENIA)
- NISSAN MOTOR MANUFACTURING (UK)
- ASSOCIAÇÃO NACIONAL DE TRANSPORTES PÚBLICOS RODOVIÁRIOS MERCADÓRIAS (PT)
- VESTAS WIND SYSTEMS A/S (DENMARK)

Project Description

Context

Europe's transport, a big emitter and reliant on oil, shifts to EVs driven by eco-regulations and consumer green preferences, essential for the EU's 25 neutrality. Challenges like costs and infrastructure persist. EV4EU leads by integrating EVs with V2X for sustainable, digital, and economic growth, targeting smart cities and carbon neutrality. Despite hurdles, the surge in EV investments and usage signals a move towards eco-friendly mobility, emphasizing the urgency to address gaps to maximize EV benefits for Europe's sustainable future.

Project presentation, technical description and implementation

The EV4EU is set to catalyze the shift towards electric vehicles in alignment with the EU's 25 carbon neutrality goals. Spanning from June 222 to November 225, the initiative focuses on deploying user centric V2X management strategies to ensure the seamless integration of EVs into energy systems, urban settings, and the broader market. It aims to tackle key challenges such as battery impact, user adoption, and infrastructure readiness, while promoting sustainable urban mobility. Through a series of 9 technical work packages, EV4EU will develop and test innovative solutions across multiple demonstration sites, targeting the enhancement of EV functionality and the energy grid's efficiency. The project endeavors to create a symbiotic relationship between EVs and renewable energy sources, fostering the development of smart cities.

Project Impacts

- Reduction of charging stations costs.
- Development of V2X compatible charging stations.
- Improve of flexibility in local and national markets.
- Reduction of wind curtailment.
- Reduction of reverse power flows in low voltage grids.

Innovative aspects of the project.

The EV4EU project drives Europe towards sustainable transport by:

- Implementing V2X strategies for widespread EV adoption.
- Improving energy systems with V2X, supporting EU's carbon goals.
- Shaping innovative business models for economic growth.
- Customizing control strategies for EVs in homes, businesses, and communities.
- Creating tools to encourage EV and V2X use.
- Establishing a co-simulation platform for city-level V2X.

Expected key exploitable results of the project

- Integration of bottom-up, user-centric V2X strategies for mass EV deployment.
- Evaluation of V2X impact on batteries, user needs, and power systems.
- Testing of diverse V2X management approaches in real city conditions.
- Development of tools and apps for EV users, promoting accessibility and usability.
- Creation of an open platform ensuring interoperability and privacy protection.
- Co-simulation tool assessing V2X impact on power grids and urban infrastructure.
- Design of new services and regulatory frameworks to incentivize EV adoption.
- Focus on scalability, resilience, and interoperability in platform development.
- Implementation and evaluation of smart charging and V2X solutions in real-world settings.
- Demonstration of VPP participation in national markets and ancillary services.
- Interoperability testing of O-V2X-MP for public charging infrastructure management.

Key exploitable results and sub-key exploitable results achieved to date

- Integration of bottom-up, user-centric V2X strategies for mass EV deployment.
- Evaluation of V2X impact on batteries, user needs, and power systems.
- Development of tools and apps for EV users, promoting accessibility and usability.
- Creation of an open platform ensuring interoperability and privacy protection.
- Design of new services and regulatory frameworks to incentivize EV adoption.
- Focus on scalability, resilience, and interoperability in platform development.
- Implementation and evaluation of smart charging and V2X solutions in real-world settings.
- Demonstration of VPP participation in national markets and ancillary services.
- Interoperability testing of O-V2X-MP for public charging infrastructure management.

HORIZON-CL5-2021-D5-01-03: System approach to achieve optimised Smart EV Charging and V2G flexibility in mass-deployment conditions (2ZERO)

Back to projects' list

Electricity grids | Energy storage | Digitalisation

DriVe2X

Delivering Renewal and Innovation to Mass Vehicle Electrification Enabled by V2X Technologies

The six main objectives of DriVe2X are:
- To improve and consolidate the understanding of V2X concepts and technologies.
- To identify user experience and behavioural challenges of different V2X charging approaches.
- To design and demonstrate a localized and user centric V2X marketplace.
- To develop and demonstrate novel, affordable, user-friendly V2X solutions and charging technologies.
- To assess impacts from mass deployment of V2X technologies on the distribution grids and on the energy markets and energy systems as a whole.
- To support the furthering of V2X open research activities and market scale-up.

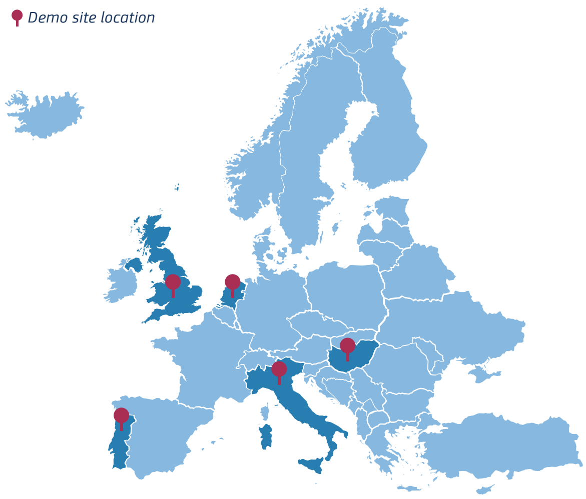
FROM	January 2023
TO	December 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
9 204 544,93 €	9 204 541,00 €	https://drive2x.eu/

TECHNOLOGIES AND SERVICES DEPLOYED

Technologies for consumer	Demand response; Smart metering; Heating/cooling peak load management
Grid Technologies	Micro-grid; Network management; Monitoring and control tools
Distributed Storage Technologies	Electric vehicles; Thermal Energy Storage
Generation Technologies	PV
Market	Electricity market

PROJECT PARTNERS' COUNTRIES



COORDINATOR	LAPPEENRANNAN-LAHDEN TEKNILLINEN YLIOPISTO LUT (Finland)

OTHER PARTNERS

- CNET CENTRE FOR NEW ENERGY TECHNOLOGIES SA (Portugal)
- LABELEC ESTUDOS DESENVOLVIMENTO E ACTIVIDADES LABORATORIAIS SA (Portugal)
- ENGINEERING - INGEGNERIA INFORMATICA SPA (Italy)
- NEDERLANDSE ORGANISATIE VOOR TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK TNO (Netherlands)
- DEUTSCHES ZENTRUM FUR LUFT - UND RAUMFAHRT EV (Germany)
- TECHNISCHE UNIVERSITAT DORTMUND (Germany)
- FUNDACION TECNALIA RESEARCH & INNOVATION (Spain)
- POWER RESEARCH ELECTRONICS B.V. (Netherlands)
- TECHNISCHE UNIVERSITEIT DELFT (Netherlands)
- FONDAZIONE ICONS (Italy)
- EMOTION SRL (Italy)
- ASM TERNI SPA (Italy)
- SZEKELY FAMILY & CO. NONPROFIT KORLATOLT FELELOSSEGU TARSASAG (Hungary)
- GEMEENTE AMSTERDAM (Netherlands)
- ANA - AEROPORTOS DE PORTUGAL, SA (Portugal)
- FUTURE ISLE OF WIGHT CIC (United Kingdom)
- THE NOTTINGHAM TRENT UNIVERSITY (United Kingdom)

Project Description

Context

The shift to electromobility is strongly gaining momentum. On one hand, the mass deployment of EVs carries a hidden game-changing decarbonization potential. On the other hand, if scaled up to mass-market levels, the currently mainstream technical approaches to EV charging control, either pricing-driven or on/off-based, will create dangerous disruptions in power system peak demand. Thus, an effective shift to mass electromobility needs to be accompanied by robust technical advancements in digitally controlled smart charging techniques and by technological improvements in bidirectional EV charging solutions.

Project presentation, technical description and implementation

This multidisciplinary four-year long project will develop new knowledge, tools, models, and technologies to help cope with a V2X-based mass EV deployment future. DriVe2X will implement novel artificial intelligence techniques that efficiently capture the flexible energy potential from advanced smart charging in building parking lots, homes, and charging stations, and match it with the distribution networks' localized needs in order to research dynamic marketplaces for exchanging and trading EV charging flexibility locally. It will develop next-generation lower-cost bidirectional charger units and test it in eight complementary European demonstrators. Lastly, it will study and consolidate the understanding of user behaviour uncertainties linked to smart charging and develop policy tools to support EV roll-out in smart cities.

Project Impacts

Replicability: To ensure maximum representativeness of results, several V2X UCs are developed and represented using the E-mobility Systems Architecture (EMSA). This framework provides a well-structured methodology to developing and understanding the business and functional requirements of V2X operations. Most importantly, it makes it possible to analyze V2X use cases in a common, standardized language that facilitates interactions and understanding among diverse stakeholders. It also has the needed versatility to accommodate systems that are both scalable and flexible to operate in a variety of operational contexts. In addition, DriVe2X advancements are tested and validated in a very diverse range of environments. Each demo is framed at different geographic and urban contexts and face disparate green transition challenges. The demos are located in the Isle of Wight (UK), the City of Maia (PT), the City of Terni (IT), the City of Amsterdam (NL), and the City of Budapest (HU).

Socio-economics: DriVe2X untaps new value creation opportunities for EV owners, prosumers, and other actors (e.g., building managers), facilitating and supporting their further engagement in the EU's energy transition. In addition, the project has a user-centric development approach, embracing EV user's perceptions and expectations as success factors in V2X uptake and upscaling. It then inquires and elicits these social determinants, including it in the development of novel V2X technologies, tools and solutions.

Environment: Due to supporting the accelerated uptake of electric mobility and bidirectional charging, DriVe2X contributes to increasing the flexibility of the EU power system, in this way helping expand the host capacity for intermittent renewable energies (e.g., solar and wind).

Market Transformation: By designing new types of flexibility markets and establishing new services, products, and business models around V2X flexibility as a tradable commodity, the project strongly supports the EU electricity market reform and transformation.

Policy: One of DriVe2X's main outputs is a reference policy framework for supporting the roll-out and market structuration of V2X in European smart cities. This policy tool will be tested in the cities of Amsterdam and Terni. As an outcome of these activities, DriVe2X will also produce policy recommendations.

Innovative aspects of the project

DriVe2X innovates in four specific fronts:

- EMOBILITY MARKETPLACE, by designing new markets for V2X flexibility, including infrastructure such as local flexibility platforms to engage with DSOs.
- V2X CHARGING, by developing and integrating novel bidirectional chargers in real-world operational environments.
- USER ASPECTS, by incorporating V2X adoption factors linked to user experience and perceptions.
- POLICY & UPSCALING, by providing V2X technology diffusion frameworks for smart cities.

Expected key exploitable results of the project

- Survey-based analysis of V2X market gaps.
- Human dimension framework for V2X upscaling.
- Smart charging strategies and control mechanisms to optimize EV markets.
- Innovative flexibility business models to leverage V2X products and services.
- Local V2X flexibility exchange marketplace facilitating V2X integration.
- Predictive methods for V2G flexibility estimation in charging station environments.
- Operational and economic V2X trade-offs to optimize revenues and battery aging.
- Low-power solar-integrated direct DC V2X charger prototype (V2H).
- High-power and high efficiency DC to AC V2X charger prototype (V2G/V2B).
- Connectivity and interoperability between vehicle and other actors.
- Standardization recommendations.
- Assessment of the impacts of V2X on grids and markets.
- Results from demonstrations in the projects' use cases.
- V2X charging mass deployment strategies.

Key exploitable results and sub-key exploitable results achieved to date

Key exploitable results achieved:

- Knowledge of past and current V2X projects and V2X scientific state-of-the-art: An understanding of the growing portfolio of V2X projects and it's key features, including main barriers faced, relevant shortcomings, and lessons learned. Knowledge of the main scientific issues addressed in V2X literature, gaps that have been bridged, and those yet to address. This is strongly supported by dynamic outputs of DriVe2X, such as the DriVe2X map of V2X innovation barriers, the DriVe2X functional framework for comparative analysis of V2X projects, and the DriVe2X Catalogue of worldwide V2X projects.
- Portfolio of fully characterized V2X use cases: Detailed technical characterizations of each of the V2X use cases developed in the DriVe2X project using the SGAM/EMSA architecture.
- Measurement of accurate charging/discharging curves of commercial EVs: Charging and discharging curves of different sized EVs will be measured in the TUDO laboratory in order to build a comprehensive data base. The collected data will enable to draw conclusion about the dynamic behaviour of the EVs and ensure a realistic behaviour of charging and discharging processes in the subsequent simulation taks.

Key exploitable results in progress:

- Design and Development of ML Architecture and Methods: Development of innovative predictive models using Machine Learning methods.
- Smart charging (V1G, V2G, V2H/B) strategies and control mechanisms: Procurement of equipment required for the installation and commissioning of the V2G charger and the integration with the DriVe2X platforms.
- Energy flexibility provision via electric mobility: V2G services for the locals and efficient management of a microgrid in a district with high-RES penetration.

- Drive2X Marketplace: Marketplace platform, based on blockchain, relying on tokenization mechanisms for consumer/stakeholder engagement. In particular will be based on the interaction among DSOs, fleets managers and Energy Retailers for multy-dimensional flexibility management (geographic, temporal and dimensional).
- Game-theoretic modelling of the techno-economic trade-off for battery operation: A mathematicla model that systematically capturs the trade-off between the EV battery technical needs and the economic and practical EV user preferences in terms of EV use and charging.
- Simulation of DSO/TSO interactions: The developed model/methods will allow to simulate and to evaluate the impacts of V2X applications on the overall system. This also includes the consideration of the underlying distribution grids and the usage of flexibility in the overall system.

HORIZON-CL5-2021-D3-03-12: Innovation on floating wind energy deployment optimized for deep waters and different sea basins (Mediterranean Sea, Black Sea, Baltic Sea, North-east Atlantic Ocean)

Back to projects' list

Decarbonisation

WHEEL

Wind Hybrid Evolution for Low-Carbon Solutions

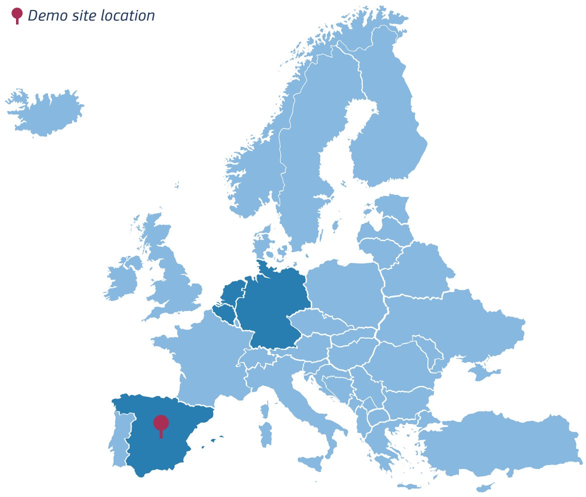
WHEEL project goes beyond the state-of-the-art in multiple topics related to floating wind in its pathway towards large scale commercial projects.
WHEEL will break ground in multiple related but independent aspects: test an advantageous wind turbine configuration unprecedented in floating wind, innovating and testing new-generation synthetic materials for the mooring system, developing and testing new patented floating control strategies or designing patented solutions for on-site large corrective maintenance of floating wind turbines. These solutions have been conceived to address the requirements and opportunities of floating energy industrial production, installation and operation.

FROM	January 2023
TO	December 2027

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
25 289 722,19 €	16 663 950,50 €	

TECHNOLOGIES AND SERVICES DEPLOYED		
Generation Technologies	Floating offshore wind	

PROJECT PARTNERS' COUNTRIES



COORDINATOR	ESTEYCO (Spain)

OTHER PARTNERS

- 2-B ENERGY SL (Netherlands)
- CONSORCIO PARA EL DISENO, CONSTRUCCION, EQUIPAMIENTO Y EXPLOTACION DE LA PLATAFORMA OCEANICA DE CANARIAS (PLOCAN) (Spain)
- ROVER MARITIME SOCIEDAD LIMITADA (Spain)
- FUNDACION INSTITUTO DE HIDRAULICA AMBIENTAL DE CANTABRIA (Spain)
- ENBW ENERGIE BADEN-WURTTEMBERG AG (Germany)
- BEKAERT WIRE ROPE INDUSTRY NV (Belgium)
- BOSKALIS OFFSHORE MARINE SERVICES BV (Netherlands)
- VICINAY SESTAO SOCIEDAD LIMITADA (Spain)
- REPARACIONES NAVALES CANARIAS SOCIEDAD ANONIMA (Spain)

Project Description

Context

Floating offshore wind has the potential to unleash a new European industrial sector able to deliver clean and sustainable energy. Building from European technological and industrial know-how and harnessing the natural resources of the different sea basins around the European Union, namely the Mediterranean Sea, the Black Sea, the Baltic Sea and the North-east Atlantic Ocean, there is an opportunity to leverage these conditions into technological leadership, while supporting the goal of climate neutrality

Project presentation, technical description and implementation

The WHEEL technology is an evolved spar concept using a lowerable weight suspended from an upper structure with tendons. In deeper waters, the weight is lowered, and the tensioned cables behave as triangularised rigid bars making the ballast weight solidary with the whole system.

The floater comprises two tanks, an upper one which provides the buoyancy, and a lower one which houses the ballast weight. The upper buoyancy tank is conveniently submerged in operation, keeping it away from the concentrated wave energy on the surface. A steel tripod structure will act as transition piece between the upper tank and the wind tower.

The WHEEL concept is disruptive with regards to the construction and installation process. The upper and lower tanks can be positioned together, one inside the other, acting as one barge-type platform which provides adequate stability during these temporary stages.

Project Impacts

Replicability: The WHEEL solution has been conceived so that it may rely on a wide and capable local supply chain and facilitate overcoming supply chain bottlenecks that the industry is anticipating, such as those related to the need for large and specialized shipyards prepared to handle the manufacturing, stocking and load-out of very large steel hulls with the high production rates that commercial projects shall demand.

Socio-economics: WHEEL offers outstanding opportunities for local content generation. The fact that it is mainly made of concrete increases its possibilities to maximize economic benefits linked to both local workforce and material sourcing.

Environment: The WHEEL floater solution aims to deliver a radical reduction in emissions and carbon footprint based on: a) Using concrete instead of steel; b) Largely reducing material usage; c) Enabling local construction strategies.

Circularity is also incorporated from the earliest design stages, using materials that are recyclable and/or reusable.

Market Transformation: Based on the advantages of the WHEEL, the Consortium is confident that it will be well received in the European market where a strong effort is being made to reduce carbon emissions and cement its leadership in renewables globally.

Policy: Esteyco, the coordinator of the project, is the only company that has obtained authorisation to energy production in territorial sea in Spain. Therefore, the project is well aware of the legislation and the procedures to obtain the approval for this new offshore wind energy project located in PLOCAN, Spain.

Expected key exploitable results of the project

- Full onshore assembly of the floater&WTG unit to allow highly industrialized construction processes.
- Harbour requirments: water plane area <70 m2, assembly draft < 5m.
- Compacity.
- Reduced Material Usage and low-carbon compared to equivalent semisubmersible solutions.
- Fast mass industrialized production (no less than 1 unit/week).
- Full independence from scarce and costly heavy-lift or special purpose vessels.

- Reduce accelerations in the WTG, improving performance, increasing lifetime and lowering maintenance need.
- Development of an intelligent, advanced, reliable and cost-efficient wind turbine control, enhancing production and reducing O&M needs.
- Large corrective operations with no need to disconnect mooring and power cables.
- Lightweight mooring lines which enhance load management.
- Scalable.
- LCoE reduction.
- Effective anchor system for rocky seabed conditions.

Key exploitable results and sub-key exploitable results achieved to date

- Harbour requirments: Water plane area: target below 70 m2, 30 m2 achieved.
- Wave influence: target over 35 s, 60 s achieved.
- Floater compacity: target diameter ~40 m, 41 m achieved.
- Reduced material usage and low-carbon emissions: target ~ 5000 t, 5014 t achieved.
- Fast manufacturing, avoiding the need of heavy lifting operations.
- Reduced accelerations: slow motions achieved: reference ~ 40 s for inclinations, 31 s achieved, still far from wave influence, which lies within periods up to 20s.
- The mooring design has been conceived to test hybrid mooring lines: it combines 65 m of polyester rope with 97mm R3 chain.

HORIZON-CL5-2021-D3-03-12: Innovation on floating wind energy deployment optimized for deep waters and different sea basins (Mediterranean Sea, Black Sea, Baltic Sea, North-east Atlantic Ocean)

Back to projects' list

System integration | Decarbonisation

NEXTFLOAT

Next Generation Integrated Floating Wind Optimized for Deep Waters

Goal: Cost-effective FOW for deep waters (<€54/MWh LCOE by 2030).

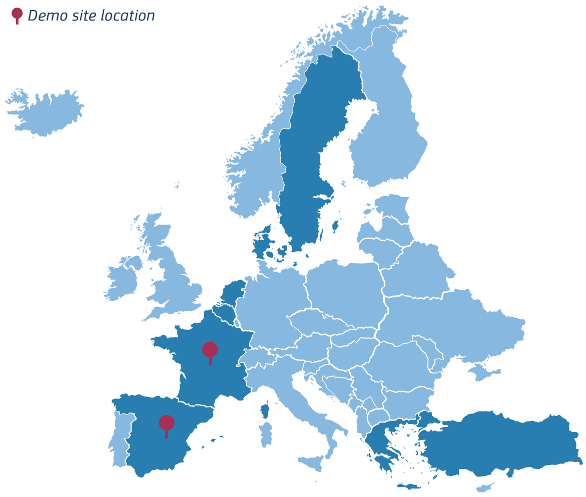
Activities: Design & test TLP mooring for deepwater stability & larger turbines; develop lightweight platform to reduce costs & simplify construction; standardize FOW social & environmental impact assessment.

FROM	November 2022
TO	April 2027

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
22 143 713,00 €	15 995 130,36 €	https://cordis.europa.eu/project/id/101084300/fr

TECHNOLOGIES AND SERVICES DEPLOYED		
	Generation Technologies	Floating offshore wind

PROJECT PARTNERS' COUNTRIES



COORDINATOR	TECHNIP ENERGIES (Netherlands)

OTHER PARTNERS

- TECHNIP ENERGIES (FRANCE)
- CYBERNETIX (FRANCE)
- X1WIND (SPAIN)
- NATURGY (SPAIN)
- 2-B ENERGY HOLDING BV (NETHERLANDS)
- HELLENIC CABLES (GREECE)
- DTU (DENMARK)
- HYDRO (SWEDEN)
- OCAS (BELGIUM)
- ECOLE CENTRALE DE NANTES (FRANCE)
- SCHWARTZ HAUTMONT (SPAIN)
- TERSAN (TURKEY)
- OCEAN ECOSTRUCTURES (SPAIN)

Project Description

Context

The EU prioritizes renewable energy to achieve climate neutrality by 2050. Deep offshore wind holds vast potential, but current floating wind technology is expensive. NEXTFLOAT addresses this by developing a cost-competitive, sustainable solution to unlock this potential and accelerate the transition to clean energy.

Project presentation, technical description and implementation

- Targets cost-effective floating wind for deep waters.
- Develops TLP mooring for superior stability & scalability (20MW+ turbines).
- Designs lightweight platform to reduce costs and simplify construction.
- Validates design through scaled prototype testing.
- Aims for LCOE < €54/MWh by 2030 for sustainable energy.

Project Impacts

Economic: Reduces cost of floating offshore wind energy, making it more competitive.

Environmental: Minimizes environmental footprint of offshore wind farms (reduced seabed impact, materials, improved marine biodiversity).

Technological: Advances deepwater floating wind technology and design (TLP mooring, scalable platform).

Energy: Increases production of clean renewable energy from wind.

Innovative aspects of the project

- Superior TLP mooring for deepwater stability with large turbines.
- Lightweight platform design slashing costs and simplifying construction.

Expected key exploitable results of the project

Validated design: A detailed technical design for a cost-competitive FOW system with TLP mooring, achieving LCOE below €54/MWh by 2030.

Demonstrated performance: A scaled prototype successfully tested in a controlled environment, validating key design aspects of the FOW system.

Upscaling feasibility: A study on the technical and economic feasibility of upscaling the FOW system design to accommodate 14MW and 20MW wind turbines.

Standardized methodology: A new standard methodology for assessing the social and environmental impacts of floating offshore wind farms throughout their lifecycle.

Key exploitable results and sub-key exploitable results achieved to date

- The NEXTFLOAT project is still in its early stages (as of April 2024), starting in November 2022. Therefore, there aren't any key exploitable results achieved to date.
- However, based on the project plan, some sub-key exploitable results are expected in the early stages of development:
- Initial literature review and analysis of existing deepwater FOW technologies.
- Identification of key technical challenges and opportunities for cost reduction.
- Conceptual design of the FOW system with TLP mooring and lightweight platform.
- Development of a simulation model for performance assessment of the FOW system.
- These initial results will lay the foundation for the project's core objectives of achieving a validated design, demonstrating performance through a prototype, and conducting upscaling feasibility studies.

HORIZON-CL5-2021-D3-03-12: Innovation on floating wind energy deployment optimized for deep waters and different sea basins (Mediterranean Sea, Black Sea, Baltic Sea, North-east Atlantic Ocean)

Back to projects' list

Decarbonisation

INFINITE

Innovative Offshore Wind Technologies In Deep Waters

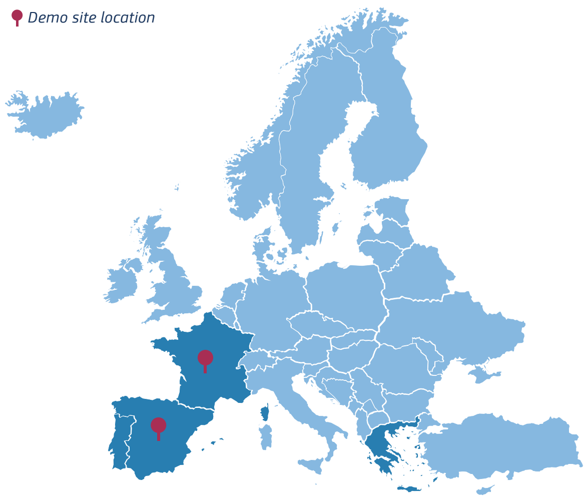
The INFINITE project demonstrates floating offshore wind system at 100m water depth with two key technology innovations. The first is a disruptive and environment environment-friendly concrete tension leg platform anchored with an innovative tendon-based mooring system. The platform is designed to work with commercially available WTGs and is scalable, modular and self-installing, showing a vast potential for industrialisation. The second is an innovative aluminium dynamic cable design that is safer, lighter, cheaper and allows for more standardisation in O&M. The demonstrator makes use of a cost optimised O&M strategy that increases accessibility and turbine availability. Moreover, best practices for value co-creation with local stakeholders are applied leading to increased public acceptance of offshore wind developments and an improved Maritime Spatial Planning. The innovations result in an LCOE of 85.3 EUR/MWh at project end and set the path to achieve
43.3 EUR/MWh by 2030. An LCA of the technology innovations developed and an industrial roadmap bringing together innovation needs, supply chain readiness and policy frameworks to allow mass production and
deployment complement the project activities.

FROM	November 2022
TO	October 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
22 398 250,00 €	15 455 944,89 €	https://www.infiniteproject.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	Innovative materials
Generation Technologies	Floating offshore wind

PROJECT PARTNERS' COUNTRIES



COORDINATOR	BLUENEWABLES SL (Spain)
OTHER PARTNERS	• ACCIONA CONSTRUCCION SA (Spain) • ACCIONA GENERACION RENOVABLE, S.A. (Spain) • FULGOR MONOPROSOPI ANONYMI ETERIA ELLINIKI VIOMIXANIA KALODIO (Greece) • ACSM SHIPPING CO SOCIEDAD LIMITADA (Spain) • FUNDACION CENER (Spain) • LONDON OFFSHORE CONSULTANTS (France) • WAVEC/OFFSHORE RENEWABLES – • CENTRO DE ENERGIA OFFSHORE ASSOCIACAO (Portugal)

Project Description

Context

The INFINITE project aligns with the European Commission's priorities by addressing key thematic areas such as sustainability, energy transition, and innovation. By deploying innovative offshore wind technologies, the project contributes to reducing carbon emissions and advancing renewable energy targets. Furthermore, its focus on digitalization enhances energy efficiency and grid integration, supporting Europe's transition towards a greener and more resilient energy system. Additionally, the project promotes economic growth by fostering technological innovation, creating job opportunities, and driving market transformation in the renewable energy sector.

Project presentation, technical description and implementation

INFINITE aims to overcome challenges in deep-water offshore wind deployment with two key innovations: a concrete tension leg platform and an aluminium dynamic cable. These solutions offer cost-effectiveness and scalability. Through rigorous testing and collaboration, the project aims to achieve TRL 7 and an LCOE of 85.3 EUR/MWh, contributing to environmental sustainability, market transformation, and policy recommendations.

Project Impacts

Economic impacts:

- Increased market share for offshore wind energy.
- Creation of new job opportunities in the renewable energy sector.
- Boost to local economies through project investments.

Social impacts:

- Improved quality of life through access to cleaner energy.
- Enhanced community engagement and participation in sustainable energy initiatives.
- Promotion of cultural awareness and acceptance of offshore wind projects.

Environmental impacts:

- Reduction in carbon emissions and other pollutants.
- Conservation of natural resources through sustainable energy production.
- Contribution to combating climate change and preserving ecosystems.

Technological impacts:

- Advancement of innovative technologies for deep-water offshore wind systems.
- Development of cost-effective solutions for renewable energy generation.
- Dissemination of knowledge and best practices in offshore wind technology.

Innovative aspects of the project

The most innovative aspect of the project is the development of a disruptive concrete tension leg platform anchored with an innovative tendon-based mooring system for deep-water offshore wind. This novel approach ensures both environmental sustainability and cost-effectiveness, paving the way for scalable and modular wind energy solutions.

Expected key exploitable results of the project

- Development of a disruptive concrete tension leg platform (TLP) anchored with an innovative tendon-based mooring system for deep-water offshore wind.
- Deployment and validation of an environment-friendly TLP design suitable for water depths of 100m.
- Advancement of the Technology Readiness Level (TRL) of the TLP to level 7.
- Connection of the platform to the grid through an innovative aluminium dynamic cable design.
- Achieving a competitive levelized cost of energy (LCOE) of 85.3 EUR/MWh.
- Creation of a social integration plan and stake-

holder engagement strategy.

- Environmental sustainability assessment and development of an Environmental Management Plan.
- Introduction of disruptive TLP and dynamic cable technologies to the market, transforming the subsea dynamic cable market.
- Development of a roadmap with policy recommendations for the Maritime Spatial Planning.

Key exploitable results and sub-key exploitable results achieved to date

- Successful development and validation of the disruptive concrete tension leg platform (TLP) anchored with an innovative tendon-based mooring system.
- Advancement of the Technology Readiness Level (TRL) of the TLP to level 7, demonstrating its readiness for commercial deployment.
- Deployment and validation of the environment-friendly TLP design suitable for water depths of 100m.
- Successful connection of the platform to the grid through the innovative aluminium dynamic cable design.
- Achievement of a competitive levelized cost of energy (LCOE) of 85.3 EUR/MWh, meeting project objectives.
- Initial implementation of the social integration plan and stakeholder engagement strategy.
- Environmental sustainability assessment conducted, laying the groundwork for the Environmental Management Plan.
- Introduction of disruptive TLP and dynamic cable technologies to the market, with ongoing efforts to transform the subsea dynamic cable market.
- Progress made in developing a roadmap with policy recommendations for the Maritime Spatial Planning.

HORIZON-CL5-2021-D3-03-12: Innovation on floating wind energy deployment optimized for deep waters and different sea basins (Mediterranean Sea, Black Sea, Baltic Sea, North-east Atlantic Ocean)

Back to projects' list

Digitalisation | Consumers/prosumers | Decarbonisation

BLOW

Black sea fLoating Offshore Wind

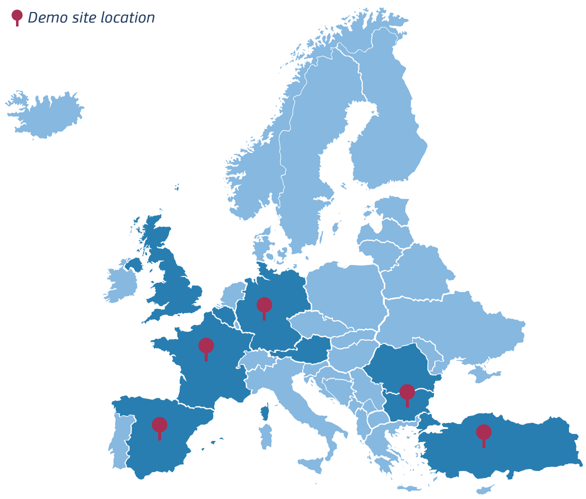
The BLOW project aims to achieve significant impacts in various areas:
- Economic impacts: Developing a cost-efficient floating unit design to reduce the Levelized Cost of Energy (LCOE) to 87€/MWh by 2028.
- Environmental impacts: Targeting a 40% reduction in greenhouse gas (GHG) emissions compared to other floating offshore wind technologies.
- Technological impacts: Advancing digitalization for operation, control, and maintenance of offshore wind farms.
- Market transformation: Facilitating industrial mass production and deployment of floating offshore wind farms in deep-sea areas.

FROM	January 2023
TO	December 2027

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
21 242 887,50 €	15 483 361,26 €	https://blow-project.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	High Voltage Alternating Current, High Voltage Direct Current, Multi-terminal, Micro-grid, Semiconductor devices and power converters, Protections, High Voltage Direct Current breaker, Network management, Monitoring and control tools
Large Scale Storage Technologies	Power to gas, Compressed air energy storage
Distributed Storage Technologies	Batteries, Electric vehicles, Thermal energy production, distribution and storage, Flywheels
Generation Technologies	Wind turbines, Photovoltaic, Biogas, Tidal energy, Micro-generation

PROJECT PARTNERS' COUNTRIES



COORDINATOR: FUNDACIO INSTITUT DE RECERCA DE L'ENERGIA DE CATALUNYA (Spain)

OTHER PARTNERS

- EOLINK (FRANCE)
- Petroceltic (Bulgaria)
- GSP Offshore (Romania)
- CMU (Romania)
- BEIA (Romania)
- CEPS (Belgium)
- BEXCO NV (Belgium)
- MCE (Austria)
- SCU (Turkey)
- DURED (Turkey)
- Fraunhofer (Germany)
- ACCIONA (Spain)
- MGU (Bulgaria)
- EMEC (United Kingdom)
- BUL (United Kingdom)

Project Description

Context

Offshore wind energy is a rapidly growing sector due to its cost-efficiency, cleanliness, and scalability. However, current offshore wind farms are mainly deployed in shallow water areas, limiting their potential. To tap into the vast potential of deep-sea areas, floating offshore wind technologies (FOWT) are crucial. The BLOW project aims to unlock the Black Sea's floating offshore wind potential by developing a disruptive, cost-efficient floating unit design optimized for low and medium wind speed areas. By demonstrating a 5 MW demonstrator in the Black Sea, the project seeks to pave the way for industrial mass production and the deployment of floating offshore wind farms. Additionally, synergies with the Oil & Gas sector will be explored, along with efforts to foster societal acceptance and cross-border policy development.

Project presentation, technical description and implementation

The BLOW project aims to unlock the potential of floating offshore wind energy in the Black Sea through the development of a disruptive, cost-efficient floating unit design optimized for low and medium wind speed areas. This project will demonstrate a 5 MW floating offshore wind turbine in the Black Sea, paving the way for industrial mass production and deployment of floating offshore wind farms. The project will also explore synergies with the Oil & Gas sector and foster societal acceptance and cross-border policy development. Technical aspects of the project include the development of innovative architecture and turbine adaptation, implementation of single point mooring with anchor piles and power cable layout, utilization of nylon permanent mooring lines, subsea part monitoring combined with digital tools for predictive maintenance, and innovative control techniques for grid forming and wind farm optimization.

Project Impacts

Unlocking Floating Offshore Wind Potential: By demonstrating a disruptive, cost-efficient floating unit design optimized for low and medium wind speed areas in the Black Sea, the project will unlock the potential of floating offshore wind energy in the region.

Industrial Mass Production: The project will pave the way for industrial mass production and deployment of floating offshore wind farms, accelerating the energy transition in the region.

Cost Reduction and Competitiveness: BLOW targets an expected levelized cost of energy (LCOE) of €87/MWh by 228 and €5/MWh beyond 23, contributing to the competitiveness of offshore wind energy.

Environmental Impact Reduction: The project aims to reduce the environmental impact of floating offshore wind technology by 4% compared to other solutions, particularly in terms of greenhouse gas emissions.

Cross-Border Policy Development and Societal Acceptance: BLOW will support cross-border policy development and foster societal acceptance of floating offshore wind technology, facilitating future mass industrialization and replication of projects in the Black Sea region.

Innovative aspects of the project.

Disruptive Floating Unit Design: BLOW develops a disruptive, cost-efficient floating unit design optimized for low and medium wind speed areas, enabling the deployment of floating offshore wind farms in previously untapped regions.

Large Rotor Optimization: The project incorporates large rotor optimization to maximize power generation in areas with lower wind speeds, enhancing the efficiency and performance of floating offshore wind turbines.

Single Point Mooring System: BLOW utilizes an innovative single point mooring system with anchor piles and power cable layout, improving stability and reliability in deep-sea environments.

Digitalization for Operation and Maintenance: BLOW integrates digitalization techniques for advanced operation, control, and maintenance, enhancing system reliability and enabling predictive maintenance strategies.

Grid-Forming Control Techniques: The project implements innovative control techniques for grid-forming and wind farm optimization, ensuring stable and efficient operation of floating offshore wind systems.

Expected key exploitable results of the project

Disruptive Floating Unit Design: The innovative floating unit design optimized for low and medium wind speed areas can be commercialized for deployment in various offshore wind farm projects globally.

Advanced Operation and Maintenance Techniques: The digitalization techniques and predictive maintenance strategies developed in the project can be commercialized as software solutions for optimizing the operation and maintenance of offshore wind turbines.

Grid-Forming Control Techniques: The innovative control techniques for grid-forming and wind farm optimization can be integrated into grid management systems to enhance stability and efficiency in renewable energy integration.

Single Point Mooring System: The single point mooring system with anchor piles and power cable layout can be further developed and commercialized for use in other offshore energy projects, such as oil and gas platforms.

Environmental Impact Reduction: The methodologies and technologies developed to reduce the environmental impact of floating offshore wind farms can be implemented in future projects to mitigate the ecological footprint of renewable energy installations.

Key exploitable results and sub-key exploitable results achieved to date

Key Exploitable Results Achieved to Date:

Disruptive Floating Unit Design:

- Conceptual design of the innovative floating unit optimized for low and medium wind speed areas has been completed.
- Preliminary simulations and feasibility studies have demonstrated the potential cost-efficiency and scalability of the design.

Advanced Operation and Maintenance Techniques:

- Development of digitalization tools and predictive maintenance algorithms is underway, with initial prototypes showing promising results in enhancing turbine performance and reliability.

Grid-Forming Control Techniques:

- Research on grid-forming control techniques has led to the identification of promising methodologies for enhancing grid stability and renewable energy integration.
- Initial testing and validation of control algorithms have shown improvements in grid performance and energy system reliability.

Single Point Mooring System:

- Design and engineering work for the single point mooring system, including anchor piles and power cable layout, has commenced.
- Preliminary simulations and modeling have demonstrated the effectiveness and reliability of the proposed mooring system configuration.

Environmental Impact Reduction:

- Initial assessments and studies have been conducted to evaluate the potential environmental benefits and impacts of the floating offshore wind project.
- Strategies for reducing environmental footprint, such as habitat protection measures and emissions mitigation techniques, are being developed and refined.

Sub-Key Exploitable Results:

- Detailed technical specifications and design documentation for the floating unit, mooring system, and control algorithms.
- Prototypes and proof-of-concept demonstrations of digitalization tools and predictive maintenance solutions.
- Research reports and publications outlining the findings and advancements in grid-forming control techniques.
- Environmental impact assessment reports and mitigation plans for ensuring sustainable project development.
- Collaboration agreements and partnerships with industry stakeholders for future commercialization and deployment efforts.

HORIZON-CL5-2021-D3-03-10 - Innovative foundations, floating substructures and connection systems for floating PV and ocean energy devices

Back to projects' list

Decarbonisation

SUREWAVE

Structural reliable offshore floating PV solution integrating circular concrete floating breakwater

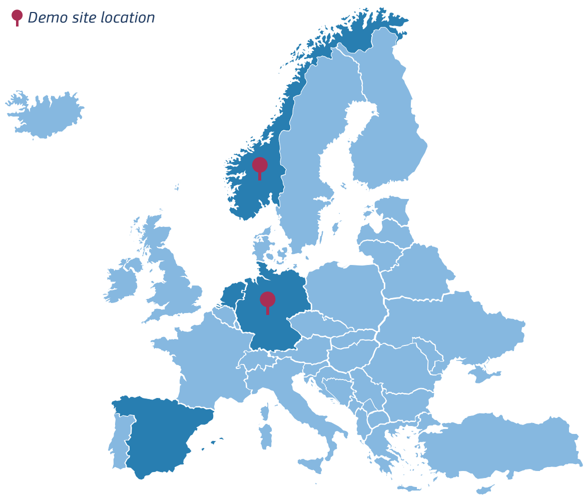
SUREWAVE will develop and test an innovative concept of Floating Photo-Voltaic (FPV) system consisting of an external floating breakwater structure acting as a protection against severe wave-wind-current loads on the FPV modules, allowing increased operational availability and energy output, thus unlocking the massive deployment of Offshore FPV.

FROM	October 2022
TO	September 2025

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
3 515 097,50 €	3 515 097,50 €	https://surewave.eu/

TECHNOLOGIES AND SERVICES DEPLOYED		
	Generation Technologies	Photovoltaic; Floating offshore PV

PROJECT PARTNERS' COUNTRIES



COORDINATOR	SINTEF (Norway)
OTHER PARTNERS	• SUNLIT SEA AS (Norway) • ASOCIACION CENTRO TECNOLOGICO CEIT (Spain) • STICHTING MARITIEM RESEARCH INSTITUUT NEDERLAND (Netharlands) • ACCIONA CONSTRUCCION SA (Spain) • CLEMENT GERMANY GMBH (Germany) • INSTITUT FUR ENERGIE- UND UMWELTFORSCHUIDELBERG GGMBH (Germany)

Project Description

Context

The SUREWAVE project aims to revolutionize renewable energy with its innovative Floating Photo-Voltaic (FPV) system. By utilizing a unique circular material-based floating breakwater structure, it shields the FPV from severe wave loads, ensuring enhanced operational efficiency and energy production. This groundbreaking concept enables FPV deployment across European sea basins, even in harsh conditions with high wind, current, and wave intensity. By harnessing solar power in offshore environments, SUREWAVE contributes significantly to the expansion of renewable energy sources. Its implementation not only advances sustainability but also accelerates the global transition toward decarbonization

Project presentation, technical description and implementation

SUREWAVE aims to research, develop, and test an advanced offshore FPV solution taking advantage of the existing expertise in offshore energy structures, materials, etc. SUREWAVE, a 36-month project, is divided into eight Work Packages (WPs). WP1 manages the project, while WP8 handles dissemination. The project is split into three blocks. WP2, the first block, defines a preliminary framework for a floating PV solution based on the breakwater concept. WP3, WP4, and WP5, the second block, focus on the research and development of the floating PV solution, including system integration, breakwater design, and new material solutions. WP6 and WP7, the third block, involve testing and validation of the solution, aiming to achieve TRL5 for the SUREWAVE floating PV solution. This project aims to revolutionize the field of solar energy by developing a novel floating PV solution.

Project Impacts

Economic impacts: SUREWAVE will develop an advanced FPV solution for harsh marine environments in the offshore energy sector and will address, solve and test the real problems structural integrity, lifetime, durability, reliability, LCoE reduction, thus favouring the awareness of the end-users and the future adoption of the solution.

Societal impacts: thanks to consider the needs of key social actors by design and an adequate spatial planning for the future exploitation strategy, SUREWAVE will facilitate the coastal local use of energy thus maximizing wellbeing of the coastal populations (less contamination), reducing coastal citizens´ electricity bills and boosting coastal local industry growth for the offshore FPV multi-disciplinary necessary skills and facilities.

Sustainable Development Goals (SDG): SUREWAVE aims to unlock massive deployment of offshore FPV. It is not only contributing to the scientific impact, but also to the economic and societal impact, addressing the 9 Key Impact Pathways (KIPs) defined by HORIZON EUROPE and contributing to the following Sustainable Development Goals: SDG-7. Affordable and Clean Energy, SDG-8. Decent Work and Economic Growth, SDG-9. Industry, Innovation & Infrastructure, SDG-12. Responsible Consumption and Production and SDG-13. Climate Action

Expected key exploitable results of the project

Floating PV Solution: The development of a novel floating PV solution based on the breakwater concept is a significant outcome. This solution can be applied in various water bodies, expanding the potential for solar energy generation.

System Integration and Breakwater Design: The research and development phase results in an integrated system with an optimized breakwater design. This design can be exploited in similar renewable energy projects.

New Material Solutions: The project develops new circular concrete material solutions, which can be used in other construction and energy projects.

Computational Modelling and Simulation Tools: The tools developed for quick and accurate determination of material properties can be utilized in various engineering and design applications.

HORIZON-CL5-2021-D3-03-10 - Innovative foundations, floating substructures and connection systems for floating PV and ocean energy devices	Back to projects' list

Decarbonisation

PLOTEC

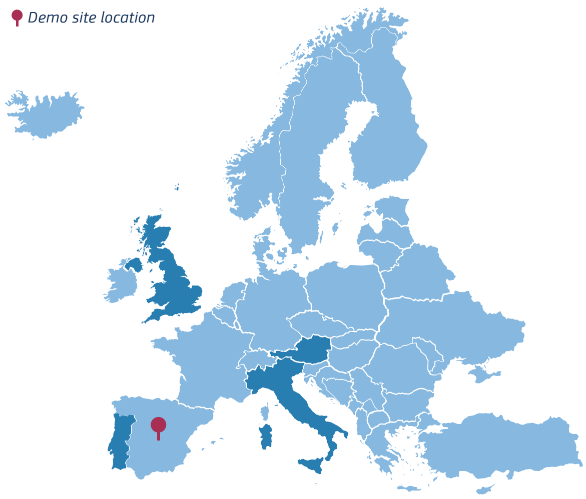
PLOCAN Tested Optimised Floating Ocean Thermal Energy Conversion Platform

PLOTEC

PLOTEC aims to achieve a successful demonstration of the novel designs and materials for an ocean thermal energy conversion (OTEC) platform capable of converting solar heat energy stored in the oceans surrounding the Overseas Countries and Territories of the EU, Small Islands and Developing States, and the Asian and African continent into reliable, baseload power with an economical cost model.

FROM	November 2022
TO	April 2025

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
1 322 523,08 €	1 322 523,08 €	https://plotec.eu/

TECHNOLOGIES AND SERVICES DEPLOYED		PROJECT PARTNERS' COUNTRIES
Generation Technologies	Ocean thermal energy conversion	

COORDINATOR	CONSORCIO PARA EL DISENO, CONSTRUCCION, EQUIPAMIENTO Y EXPLOTACION DE LA PLATAFORMA OCEANICA DE CANARIAS (Spain)
OTHER PARTNERS	• WAVEC/OFFSHORE RENEWABLES - CENTRO DE ENERGIA OFFSHORE ASSOCIACAO (Portugal) • QUALITY CULTURE (Italy) • AGRU KUNSTSTOFFTECHNIK GMBH (Austria) • GLOBAL OTEC RESOURCES LTD (United Kingdom) • CLEANTECH ENGINEERING LIMITED (United Kingdom) • UNIVERSITY OF PLYMOUTH (United Kingdom)

Project Description

Context

OTEC plants generate renewable energy using the temperature difference between warmer surface water (heated directly by the sun) and cooler water at seabed level (8 –1 m). It requires a temperature difference of 2°C or more, meaning it is more efficient in warmer ocean climates. Mass adoption of OTEC technology has been hampered by the high equipment and set up costs. This project seeks to overcome this key economic barrier by providing novel design and materials in OTEC, enabling better designs, less expensive materials and installations. The developments in offshore design, improved materials and computational modelling are transferrable to other offshore industries.

Project presentation, technical description and implementation

The challenge of this project is in designing the ocean thermal energy conversion (OTEC) system and materials to survive extreme environmental conditions due to its intrinsic characteristics (e.g., long pipe to sea depths), the high tension forces that the riser pipe, and joints must support, as well as the corrosion and sea movement needed. The knowledge created by this project in marine engineering design and novel materials, as well as the computational modelling will not only improve the accessibility of OTEC solutions but improve the design and materials available to other offshore floating energy and marine devices, reinforcing the transfer of knowledge acquired in the project to other ambitious renewable energy and low carbon activities.

Project Impacts

Test and validate novel materials in offshore floating energy structures including new designs and replacement of materials that release high levels of CO2.

- Short term impact: develop new modelling using HDPE instead of concrete.
- Mid-term impact: Reduction of the LCOE and CAPEX expense for construction.
- Long term impact: Reduction of LCOE in line with SET Plan targets for floating offshore ocean energy systems.

Test and validate new components and design in a marine environment, including circular floating platform and robust cold water pipe.

- Short term impact: Demonstrator deployed and validated through LCOE, LCA and EIA.
- Mid-term impact: Market uptake of new cheaper more efficient OTEC solutions.
- Long-term impact: Reduction of fossil fuels and increase in offshore energy with a focus on OTEC.

Research material properties in combination with improved computational modelling tools developed in ORCAFlex ensuring replicability through industry standard usage in marine engineering.

- Short term impact: validation of lower carbon emitting materials (concrete) in favour of more recyclable materials (HDPE).
- Mid-term impact: Improved install ability and maintenance of marine substructures.
- Long term impact: De-risking ocean energy systems in the renewables sector.

Validate Computational Modelling for material properties through a demonstrator robustly monitored and evaluated in PLOCAN (Canary Islands)

- Short term impact: reduce LCOE and establish norms for LCA's for Offshore energy platforms using similar materials.
- Mid-term impact: increase understanding of the real life performance of materials performance, and design needs.
- Long term impact: Improved life time, reliability and operability of floating offshore platforms for renewable energy.

In the Long term all the above activities will contribute to enabling mass deployment of offshore renewables at low cost enabling the Green Energy Transition and creating new markets for the EU in key areas (Caribbean, Pacific, Asia, Africa, Indian Ocean) enabling large scale energy transition with

EU leadership and technologies).

Expected key exploitable results of the project

- Cylindrical Floating Structure (design).
- Cold Water Riser Pipe and Gimbal (design).
- Recyclable materials for the offshore construction.
- Computational model development (using ORCAFlex) of new program and simulation runs based on complex models using project designs and materials.

HORIZON-CL5-2021-D3-03-10 - Innovative foundations, floating substructures and connection systems for floating PV and ocean energy devices

Back to projects' list

Electricity grids | System integration | Decarbonisation

NATURSEA-PV

NOVEL ECO-CEMENTITIOUS MATERIALS AND COMPONENTS FOR DURABLE, COMPETITIVE, AND BIO-INSPIRED OFFSHORE FLOATING PV SUBSTRUCTURES

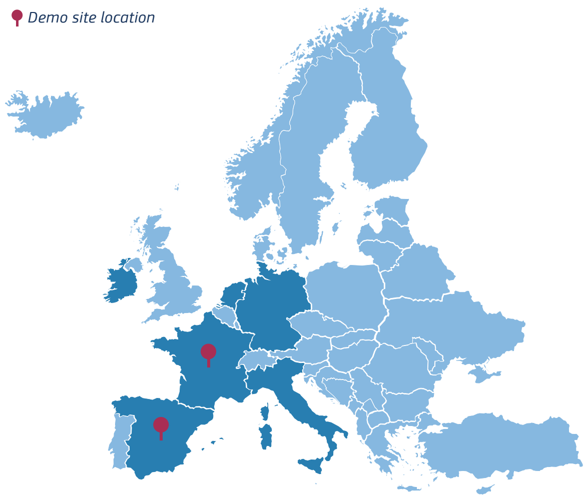
The NaturSea-PV project aims to enhance the durability, reliability, and cost-effectiveness of offshore floating photovoltaic (PV) substructures. It focuses on developing innovative structural designs and eco-friendly materials to withstand harsh marine conditions while reducing installation costs. Key objectives include conceptual substructure design inspired by nature, circular materials development, predictive computational tools for durability assessment, and testing in realistic offshore conditions. Measurable outcomes include improved substructure lifespan, reduced degradation rates, and decreased Levelized Cost of Electricity (LCOE).

FROM	November 2022
TO	October 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
3 621 694,10 €	3 621 694,10 €	https://www.natursea-pv.eu/

TECHNOLOGIES AND SERVICES DEPLOYED		
Generation Technologies	Floating offshore PV	

PROJECT PARTNERS' COUNTRIES



COORDINATOR	FUNDACION TECNALIA RESEARCH & INNOVATION (Spain)

OTHER PARTNERS

- STICHTING MARITIEM RESEARCH INSTITUUT NEDERLAND (Netherlands)
- UNIVERSITE DE BORDEAUX (France)
- UNIVERSITY COLLEGE CORK - NATIONAL UNIVERSITY OF IRELAND, CORK (Ireland)
- TECHNISCHE UNIVERSITAT DARMSTADT (Germany)
- UNIVERSIDAD DEL PAIS VASCO/ EUSKAL HERRIKO UNIBERTSITATEA (Spain)
- BASQUE CENTER FOR MACROMOLECULAR DESIGN AND ENGINEERING POLYMAT FUNDAZIOA (Spain)
- AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS (Spain)
- WARRANT HUB SPA (Italy)
- PREFABRICADOS FORMEX SOCIEDAD LIMITADA (Spain)
- RESEARCH & DEVELOPMENT CONCRETES SOCIEDAD LIMITADA (Spain)

Project Description

Context

NaturSea-PV aligns with the EU's green goals by developing cost-effective, eco-friendly offshore solar technology. This supports decarbonisation, sustainability, and economic growth through renewable energy.

Project presentation, technical description and implementation

NaturSea-PV tackles challenges of harsh marine environments for offshore solar substructures. The project aims to create durable, eco-friendly designs using novel concrete and coatings. We'll achieve this through bio-inspired design, life-cycle prediction tools, and real-world testing to validate performance and ensure regulatory compliance.

Project Impacts

Environmental: Reduced CO2 emissions through renewable energy generation.

Economic: Cost-effective offshore solar with potential for new jobs.

Technological: Development of eco-friendly concrete and life-cycle prediction tools.

Replicability: Easily adaptable designs for various offshore solar projects.

Innovative aspects of the project

The combination of bio-inspired design, eco-friendly concrete, and life-cycle prediction tools to be the most innovative aspect of NaturSea-PV. This combination allows for cost-effective, sustainable offshore solar substructures that are optimized for harsh marine environments.

Expected key exploitable results of the project

NaturSea-PV is expected to deliver a range of key exploitable results that will significantly advance the field of offshore solar energy:

Novel bio-inspired designs: for durable and cost-effective offshore solar substructures, optimized to withstand harsh marine environments.

Key exploitable results and sub-key exploitable results achieved to date

The NaturSea-PV project is currently in its early stages (as of April 2024). While no key exploitable results have been fully achieved yet, some sub-key results are under development:

Progress on bio-inspired designs: Initial studies exploring potential substructure configurations inspired by nature are underway.

UHPC formulation development: Research into eco-friendly UHPC formulations with improved durability and corrosion resistance for marine applications is ongoing.

Life-cycle prediction tool development: The initial stages of creating computational tools to predict the long-term performance of substructures are in progress.

HORIZON-CL5-2021-D3-02-11: Reinforcing digitalisation related know how of local energy ecosystems

Back to projects' list

Digitalisation | Consumers/prosumers | Market Design

EVERY1

Enable eVeryone's Engagement in the eneRgY transitiON

The Every1 consortium brings together leading experts in energy, education, and ecosystems combined with

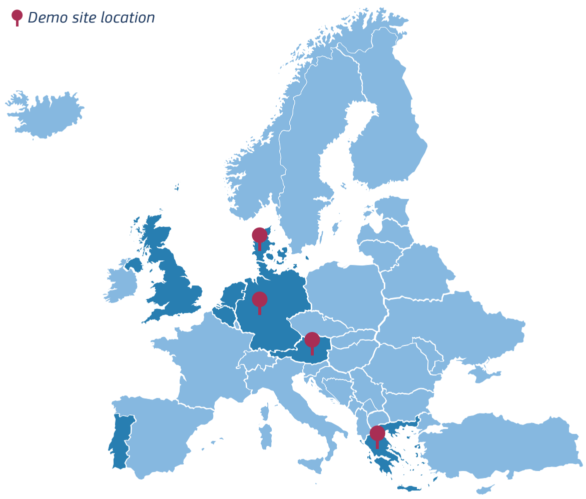
social sciences to deliver an impactful concept that includes all elements needed to enable the effective participation of all European stakeholders in the digital energy market.

FROM	November 2022
TO	April 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
3 281 788,50 €	3 281 788,50 €	https://every1.energy/

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	High Voltage Alternating Current; Micro-grid; Grid inertia; Network management
Large Scale Storage Technologies	Power to gas; Compressed air energy storage; Hydro storage; Molten salt storage
Distributed Storage Technologies	Batteries; Flywheels
Generation Technologies	Wind turbines; Photovoltaic

PROJECT PARTNERS' COUNTRIES



COORDINATOR	FLUX50 (Belgium)
OTHER PARTNERS	• EWORX YPIRESIES ILEKTRONIKOU EPICHEIREIN ANONYMOS ETAIREIA (Greece) • TH!NK E (Belgium) • JOANNEUM RESEARCH FORSCHUNGSGESELLSCHAFT MBH (Austria) • STEINBEIS 2i GMBH (Germany) • INTERNATIONAL CLEANTECH NETWORK F.M.B.A. (Denmark) • TECHNISCHE UNIVERSITEIT EINDHOVEN (Netherlands) • INESC TEC - INSTITUTO DE ENGENHARIADE SISTEMAS E COMPUTADORES, TECNOLOGIA E CIENCIA (Portugal) • RDA - CLIMATE SOLUTIONS UNIPESSOAL LDA (Portugal) • INSTITUTE OF COMMUNICATION AND COMPUTER SYSTEMS (Greece) • THE OPEN UNIVERSITY (United Kingdom)

Project Description

Context

The project aligns with EU priorities by addressing sustainability, digitalization, and inclusion in the energy sector. It contributes to achieving the EU's energy and climate goals by fostering the participation of all stakeholders in the digital energy market. By enhancing consumer engagement, promoting energy communities, and advancing digital technologies, the project supports the transition to a sustainable, low-carbon energy system while promoting economic growth and social inclusion across Europe.

Project presentation, technical description and implementation

The project addresses the challenge of enabling the effective participation of all European stakeholders in the digital energy market. Its objectives include:

- Overcoming barriers to participation by providing tailored learning paths and capacity building material in all European languages.
- Developing a deep understanding of stakeholders and ecosystems through data analysis.
- Implementing an outreach campaign focused on local engagement, including social media campaigns and multi-language materials.
- Creating competence clusters for digital energy concepts and delivering a multi-language capacity-building program.
- Fostering market creation by exchanging best practices with policymakers and energy regulators.

Project Impacts

Economic impacts: Increased market participation, enhanced revenue streams for stakeholders, improved market efficiency.

Social impacts: Creation of new jobs in the energy sector, improved quality of life through access to digital energy services, strengthened community engagement.

Environmental impacts: Reduced carbon emissions, increased use of renewable energy sources, energy efficiency improvements.

Technological impacts: Development and adoption of digital tools and technologies for smart energy grids, advancement of energy storage solutions, promotion of data exchange and interoperability.

Other impacts: Enhanced energy security, increased resilience to disruptions, empowerment of consumers and prosumers in the energy market.

Expected key exploitable results of the project

- Tailored learning paths and capacity-building materials for all European stakeholders in the digital energy market.
- Comprehensive understanding of stakeholder needs and ecosystems.
- Increased participation and engagement in the digital energy market.
- Sustainable energy transition facilitated through inclusivity and empowerment.

Key exploitable results and sub-key exploitable results achieved to date

- Development of tailored learning paths and capacity-building materials for stakeholders.
- Comprehensive mapping of stakeholder needs and ecosystems.
- Increased awareness and engagement of stakeholders in the digital energy market.
- Initial stages of development for sustainable energy transition strategies and solutions.

HORIZON-CL5-2021-D3-02-10 - Demonstration of advanced Power Electronics for application in the energy sector

Back to projects' list

Electricity grids | Digitalisation | System integration

SiC4GRID

Next Generation Modular SiC-Based Advanced Power Electronics Converters for Enhanced Renewables Integration into the Grid

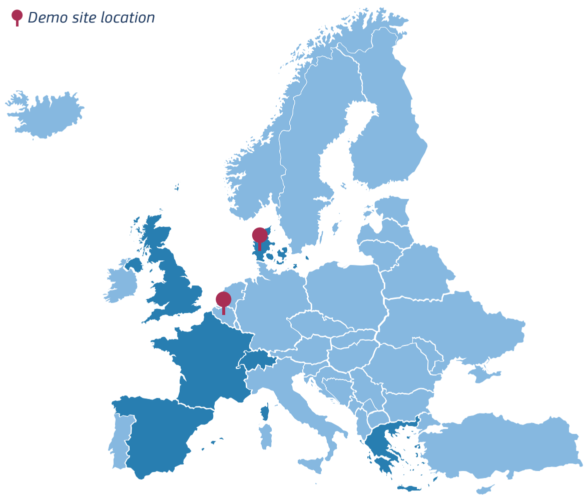
SiC4GRID is a 42-months project gathering partners from the complete value chain of SiC -based converters collaborating to tackle current obstacles to the technologies' market uptake.

FROM	October 2022
TO	March 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
4 665 917,50 €	3 787 065,50 €	https://sic4grid.eu/

TECHNOLOGIES AND SERVICES DEPLOYED		
Grid Technologies		High Voltage Direct Current; Multi-terminal; Semiconductor devices and power converters; Monitoring and control tools

PROJECT PARTNERS' COUNTRIES



COORDINATOR	VRIJE UNIVERSITEIT BRUSSEL (Belgium)
OTHER PARTNERS	• AALBORG UNIVERSITET (Denmark) • ELECTRICITE DE FRANCE (France) • SOITEC SA (France) • POWERCON AS (Denmark) • KK WIND SOLUTIONS AS (Denmark) • INFORMATION TECHNOLOGY FOR MARKET LEADERSHIP (Greece) • MONDRAGON GOI ESKOLA POLITEKNIKOA JOSE MARIA ARIZMENDIARRIETA S COOP (Spain) • EUROQUALITY SARL (France) • Hitachi ABB Power Grids Ltd (Switzerland) • CSEM CENTRE SUISSE D'ELECTRONIQUE ET DE MICROTECHNIQUE SA - RECHERCHE ET DEVELOPPEMENT (Switzerland) • AMANTYS POWER ELECTRONICS LTD (United-Kingdom)

Project Description

Context

SiC4GRID is an ambitious 42-month project aiming to optimize silicon carbide (SiC) based technology for the integration of renewable energies into the energy grid by focusing on cost and size reduction and low environmental impact of MVDC/HVDC converters. The project is driven by innovations in hardware, software, and IoT, and its ultimate goal is to bring European leadership to the forefront of converter technology providers for the integration of renewable energies into the energy grid.

Project presentation, technical description and implementation

SiC4GRID addresses the challenges of cost, efficiency and environmental impact linked to the introduction of the promising SiC technology in MVDC/HVDC renewable converter applications (onshore and offshore). Innovative SiC-based power switches and modules with reduced cost and increased efficiency are developed, including optimized SiC epi wafers and smart gate drivers. This is supported by digital tools with the development of a co-design optimization framework that optimizes the cost, efficiency and lifetime of the SiC-based modules and converter, a full Digital Twin modelling and predictive maintenance algorithms. A real demonstrator consisting of a Modular Multilevel Converter (MMC) will integrate the developed SiC power modules with a an IoT architecture for optimal system operation. Finally, 3 virtual use cases will be investigated in parallel.

Project Impacts

Technological impacts: development of new technologies of TES coupled with power cycle and heat pump.

Technological impacts:

- Production, test and validation of WBG-based switching semiconductors such as Silicon Carbide (SiC) for HVDC– MVDC converter applications in converter stations.
- Reduced size of components and equipment for offshore / onshore applications.
- Reduced cost of WBG-based semiconductors such as Silicon Carbide (SiC).

Economic impact: competitive market uptake of a technology largely hindered by its cost, reduction of the use of materials and size of the overall converter thus reducing the cost of technology making it most cost effective.

Societal impact: Co2 emissions reduction and better use of resources, circularity by design systematised throughout the industry, enhanced grid integration of renewable energy technologies, longer lifetime of components, better acceptance of wind energy.

Innovative aspects of the project

The main innovations in SiC4GRID are the following:

- Innovative SiC switches with novel epi wafers structure for 3.3kV applications.
- Low-cost 3.3kV SiC-based modules with smart gate drivers.
- Co-design optimization tool with design for high replicability and reliability (D4HR).
- Digital Twin modelling for use case applications.
- Smart IoT architecture enabling self-healing EMS.
- Comprehensive circularity and environmental sustainability design and assessment of technologies.

Expected key exploitable results of the project

- Optimised technology: competitive SiC-based power module at 3% cost reduction and allowing for a 2% size reduction of the converter.
- Optimised hardware/software integrated architecture: predictive health monitoring system ensuring failure and 3+ years of lifetime for the SiC-based converter.
- Methodologies for eco-design and circularity in the industry: 3% less resources used and 5% less CO2 emission for the power module manufacturing process.

- Commercialisation strategies for SiC-based power module and converter applications in particular.
- Recommendations for data standardisation aligned with the Green Powered Future Mission's goal to enhance industry digitalisation through standardised data transfers, recommendations will be published.

HORIZON-CL5-2021-D3-02-10 - Demonstration of advanced Power Electronics for application in the energy sector

Back to projects' list

Electricity grids | Energy storage | System integration

FOR2ENSICS

Future Oriented Renewable and Reliable Energy SIC Solutions

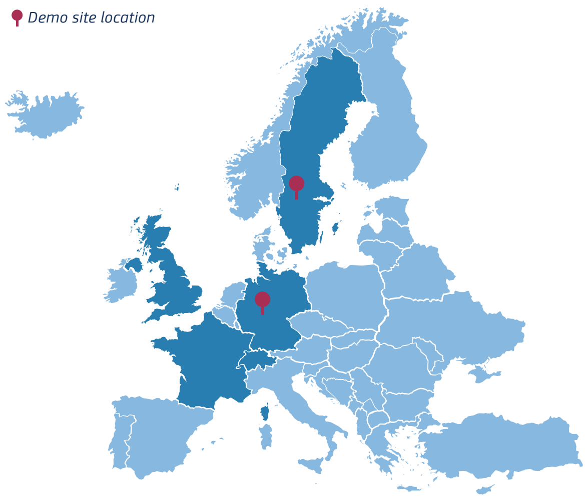
Project FOR²ENSICS aims to develop efficient, low-cost DC/DC converters for LV to MV using ultra-high voltage SiC-based switching devices. Objectives include developing a commercial prototype, integrating SiC materials into power electronics, and investigating reliability. Outcomes: commercialization, environmental impact reduction, increased adoption of renewables and EV infrastructure.

FROM	January 2023
TO	December 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
5 533 91,00 €	4 393 517,00 €	https://for2ensics.imb-cnm.csic.es/

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	High Voltage Alternating Current; High Voltage Direct Current; Multi-terminal; Micro-grid; Semiconductor devices and power converters
Large Scale Storage Technologies	Hydro storage; Molten salt storage
Generation Technologies	Wind turbines; Photovoltaic

PROJECT PARTNERS' COUNTRIES



COORDINATOR	AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS (Spain)

OTHER PARTNERS

- II-VI KISTA AB(Sweden)
- UNIVERSITAET BREMEN (Germany)
- DEEP CONCEPT (France)
- SUPERGRID INSTITUTE (France)
- Hitachi ABB Power Grids Ltd.(Switzerland)
- ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE (Switzerland)
- THE CHANCELLOR MASTERS AND SCHOLARS OF THE UNIVERSITY OF CAMBRIDGE (United Kingdom)

Project Description

Context

The project addresses the pressing need for sustainable energy solutions in line with European Commission priorities towards a low-carbon economy, decarbonisation, digitalisation, and sustainability. To meet these objectives the project will develop innovative energy storage solutions, integrating renewable energy sources, and enhancing grid flexibility. By fostering collaboration between stakeholders and leveraging advanced technologies, the project contributes to inclusive growth, promotes energy security, and accelerates the transition towards a sustainable and resilient energy system.

Project presentation, technical description and implementation

The project of will integrate renewable energy sources into the grid by developing efficient DC/DC converters for low to medium voltage. Key objectives include designing converters using silicon carbide (SiC) based ultra-high voltage switching devices and implementing low-cost production processes. Methodology involves theoretical design, SiC device fabrication, and converter testing. SiC devices offer higher efficiency and reliability compared to traditional silicon-based converters. The project's uniqueness relies on developing innovative SiC-based converters that enable seamless integration of renewable energy sources into the grid.

Project Impacts

Economic impacts:

- Increased market share for SiC-based converters.
- New market for efficient DC/DC converters.

Social impacts:

- Creation of new high-quality jobs in the renewable energy sector.
- Improved quality of life through enhanced energy efficiency.

Environmental impacts:

- Decreased carbon emissions through the integration of renewable energy sources.
- Energy savings due to the higher efficiency of SiC-based converters.

Technological impacts:

- Development and diffusion of innovative SiC-based converter technology.
- Advancement in renewable energy integration methods.

Innovative aspects of the project

The development of ultra-high voltage SiC-based switching devices for efficient DC/DC converters offers a compact design, higher efficiency, and reduced environmental impact, revolutionizing renewable energy integration.

Key exploitable results and sub-key exploitable results achieved to date

- Development of ultra-high voltage SiC-based switching devices for MVDC and DC/DC applications.
- Progress made in the production processes for efficient, low-cost, compact DC/DC converters for LV to MV.
- Preliminary testing and validation of commercial DC/DC converter prototype underway.
- Exploration of cost reduction strategies and environmental impact mitigation in fabrication processes.
- Ongoing research on increased efficiency, lower volume, reduced weight, longer product lifetime of power electronics systems ongoing.
- Investigation into novel system topologies and applications leveraging UHV SiC devices in progress.
- Initial studies on higher reliability due to reduced number of components and easier cooling for power cycling conditions underway.

HORIZON-CL5-2021-D3-02-10 - Demonstration of advanced Power Electronics for application in the energy sector

Back to projects' list

Electricity grids | System integration | Decarbonisation

AdvanSiC

Advances in Cost-Effective HV SiC Power Devices for Europe's Medium Voltage Grids

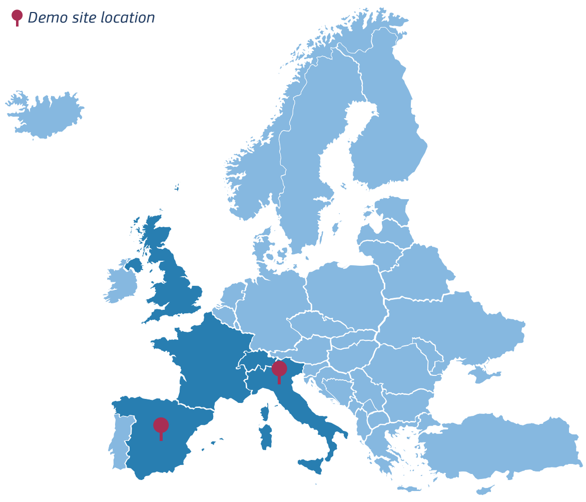
The AdvanSiC project aims to develop cost-effective High-Voltage Silicon Carbide (SiC) MOSFETs for Medium Voltage DC (MVDC) grid applications. It focuses on reducing epitaxy costs, designing efficient 3.3 kV SiC MOSFET chips, and optimizing HV power module development. The project aims to demonstrate cost savings, reliability improvements, and system-level benefits of HV SiC devices in wind and solar power converters, and DC circuit breakers. Overall, AdvanSiC seeks to advance HV SiC technology to enhance grid efficiency and facilitate renewable energy integration.

FROM	January 2023
TO	December 2025

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
4 001 415,00 €	3 242 373,00 €	https://advansic-euproject.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	High Voltage Direct Current, Protections, High Voltage Direct Current breaker, Network management, Monitoring and control tools
Large Scale Storage Technologies	Other large-scale storage technologies (Storage Technologies Pumped hydro storage, Lithium-ion battery systems, Flow battery systems, Thermal energy storage, Flywheel energy storage)
Distributed Storage Technologies	Batteries
Generation Technologies	Wind turbines, Photovoltaic

PROJECT PARTNERS' COUNTRIES



COORDINATOR	IKERLAN (SPAIN)
OTHER PARTNERS	• MERSEN FRANCE ANGERS SAS (France) • CONSIGLIO NAZIONALE DELLE RICERCHE (Italy) • L.P.E. SPA (Italy) • GAMESA ELECTRIC SOCIEDAD ANONIMA (Spain) • UNIVERSITA DEGLI STUDI DI NAPOLI FEDERICO II (Italy) • DEEP CONCEPT (France) • ABB SPA (Italy) • mqSemi AG (Switzerland) • THE UNIVERSITY OF WARWICK (United Kingdom) • THE UNIVERSITY OF NOTTINGHAM (United Kingdom)

Project Description

Context

The AdvanSiC project focuses on developing cost-effective High-Voltage (HV) Silicon Carbide (SiC) MOSFET semiconductors for Medium Voltage (MV) grids. By optimizing design structures and processes, the project aims to reduce the overall cost of HV SiC devices while enhancing their performance and reliability. Through the production of full-scale wind converters, solar inverters, and solid-state circuit breakers, AdvanSiC aims to demonstrate the practical applications and benefits of HV SiC technology in real-world grid scenarios. By improving system efficiency and reliability, the project contributes to the advancement of cleaner and more sustainable energy grids in Europe.

Project presentation, technical description and implementation

The AdvanSiC project is focused on the development of cost-effective High-Voltage (HV) Silicon Carbide (SiC) MOSFET semiconductors for Medium Voltage (MV) grids. These semiconductors are crucial components in converter stations, which play a vital role in integrating renewable energy sources and interconnecting grids.

To achieve its objectives, the project will tackle various stages of the supply chain, from epitaxy to the design of planar MOSFETs and high-voltage power modules. Specifically, the project aims to:

- Reduce the overall cost of epitaxy.
- Design a 3.3 kV SiC MOSFET chip with high performance and reduced costs.
- Optimize the development process of HV power modules.
- Ensure a reduced size, immune, and reliable HV SiC-based power stack.
- Demonstrate the benefits of HV SiC MOSFETs in full-scale laboratory prototypes.
- Quantify the techno-economic benefits of HV SiC MOSFETs in grid applications.

By focusing on these objectives, AdvanSiC aims to develop cost-effective HV SiC semiconductors with outstanding technical characteristics. These advancements will be achieved through collaboration with EU SMEs and startups, ensuring that advances, know-how, and intellectual property remain within the EU.

Project Impacts

- Develop cost-effective HV SiC MOSFET semiconductors for MV grids.
- Reduce overall device costs and improve grid reliability.
- Enhance grid performance and promote renewable energy integration.
- Stimulate market growth in the SiC semiconductor industry.
- Contribute to environmental sustainability and reduce greenhouse gas emissions.

Innovative aspects of the project

Cost-effective HV SiC Semiconductors: Development of High-Voltage (HV) Silicon Carbide (SiC) MOSFET semiconductors for Medium Voltage (MV) grids, aiming to minimize costs through novel design structures and process optimization.

System Reliability: Ensuring an immune and reliable environment to handle SiC fast transients, improving system reliability and minimizing downtime.

Optimized Passives and Cooling Systems: Optimization of passive components and cooling systems to provide cost reduction at both device and system levels, enhancing overall system efficiency and performance.

Techno-Economic Benefits: Quantifying the techno-economic benefits of HV SiC MOSFETs in grid applications, demonstrating potential cost savings and performance advantages compared to conventional silicon-based devices.

Market Growth: Stimulating market growth in the SiC semiconductor industry by demonstrating the benefits of HV SiC MOSFETs in real-world grid applications, fostering innovation and investment in the field.

Expected key exploitable results of the project

- Cost-effective HV SiC MOSFET semiconductors optimized for MV grids.
- Improved system reliability for handling SiC fast transients.
- Enhanced passive components and cooling systems for increased efficiency and performance.
- Techno-economic benefits demonstrating cost savings and performance advantages.
- Market growth opportunities in the SiC semiconductor industry.

Key exploitable results and sub-key exploitable results achieved to date

1. Development of cost-effective HV SiC MOSFET semiconductors for MV grids.

- Optimized design structures and process optimization to minimize costs.

2. Improved system reliability for handling SiC fast transients.

- Enhanced immune and reliable environment for grid applications.

3. Enhanced passive components and cooling systems for increased efficiency and performance.

- Optimization of passive components and cooling systems.

4. Techno-economic benefits demonstrating cost savings and performance advantages.

- Quantification of cost savings and performance benefits in real-world grid applications.

5. Market growth opportunities in the SiC semiconductor industry.

- Promotion of HV SiC MOSFETs to stimulate market growth and innovation.

HORIZON-CL5-2021-D3-02-09: Demonstration of superconducting systems and elpipes

Back to projects' list

Electricity grids | System integration | Decarbonisation

SCARLET

Superconducting cables for sustainable energy transition

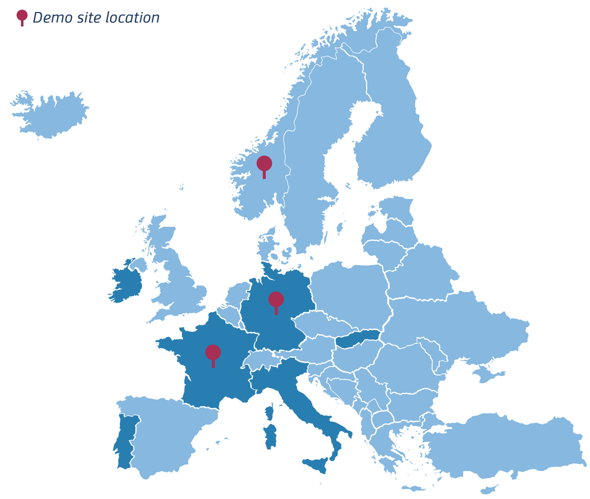
Superconducting medium-voltage cables, utilizing HTS and MgB2 materials, offer a promising solution for transmitting renewable energy to the grid. Onshore HTS cables offer a compact design, preserving the environment and minimizing land use. Offshore HTS cables reduce costs and eliminate the need for large converter stations. MgB2 cables, paired with liquid hydrogen transport, introduce a dual-energy approach. Both HTS and MgB2 MVDC cables will be developed and tested, along with fault current limiters, aiming to reduce LCOE for offshore windfarms by 30%, lower total costs by 15%, enable simultaneous transfer of 0.5 GW H2 and 1 GW electric energy with cables of 90 GW transmission capacity.

FROM	September 2022
TO	February 2027

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
19 602 668,75 €	14 999 959,75 €	https://scarlet-project.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	Protections; Other grid technologies (Medium Voltage DC current)
Other Technologies and Services	Liquid hydrogen transport

PROJECT PARTNERS' COUNTRIES



COORDINATOR	SINTEF ENERGI AS (Norway)

OTHER PARTNERS

- INSTITUTE FOR ADVANCED SUSTAINABILITY STUDIES EV (Germany)
- WAVEC/OFFSHORE RENEWABLES - CENTRO DE ENERGIA OFFSHORE ASSOCIACAO (Portugal)
- INSTITUTE OF ELECTRICAL ENGINEERING, SLOVAK ACADEMY OF SCIENCES (Slovakia)
- ALMA MATER STUDIORUM - UNIVERSITA DI BOLOGNA (Italy)
- ABSOLUT SYSTEM SAS (France)
- ECOLE SUPERIEURE DE PHYSIQUE ET DECHIMIE INDUSTRIELLES DE LA VILLE DE PARIS (France)
- SUPERGRID INSTITUTE (France)
- RICERCA SUL SISTEMA ENERGETICO - RSE SPA (Italy)
- RINA CONSULTING SPA (Italy)
- SUPERNODE LIMITED (Ireland)
- VISION ELECTRIC SUPER CONDUCTORS GMBH (Germany)
- ASG SUPERCONDUCTORS SPA (Italy)
- NEXANS FRANCE (France)
- NEXANS DEUTSCHLAND GMBH (Germany)

Project Description

Context

Superconducting wires have reached suitable performance levels for high-current cables, with ongoing research validating technology for final development steps. SCARLET focuses on developing superconducting cables for high-power transmission from remote renewable energy sites to existing grids at low cost. Operating under DC conditions at medium voltages, these cables eliminate the need for costly converter stations, leading to significant cost reductions. They also boast lower energy losses, smaller footprints, and reduced environmental impact compared to conventional cables. SCARLET aims to industrialize these cables for multi-kilometer lengths and demonstrate their effectiveness.

Project presentation, technical description and implementation

Project ImpactAt the project outset, specific use cases define superconductor cable specifications for power transmission, operating parameters, cooling methods, and link lengths. This is separately done for HTS onshore, HTS offshore, and MgB2 with LH2 cooling. Cable design starts with the conductor and insulation, informed by data from grid operators on expected performance and transient conditions. Simulations validate behavior under grid transients. Cable designs are tested, optimized, and prepared for large-scale production. Attention is given to safe LH2 operation, with thorough testing of the MgB2/LH2 cable system. The development of the FCL supporting SCTLs utilizes a mix of experimental and theoretical approaches. A final test protocol demonstrates FCL module performance under various conditions. Economic studies guide technical developments, focusing on exploiting results for cost savings.

Innovative aspects of the project

SCARLET introduces medium-voltage DC superconducting cables, employing both HTS and MgB2 technologies, with high currents of 5 to 2 kA, constituting the best compromise to increase the transmitted power and to reduce OPEX and CAPEX. It innovates cable design for high-power transmission, ensuring reliability and efficiency while integrating LH2 cooling. This advancement enables cost-effective integration of renewable energy, revolutionizing grid infrastructure for sustainable power distribution.

Expected key exploitable results of the project

- Onshore MV HTS cable connection of renewable production and interconnection.
- Export MV HTS cable for offshore wind farms.
- MV HTS cable for offshore applications (offshore generation export, interconnector, hybrid solutions).
- Cryogenic systems for MgB2 cables.
- Cryogenic cooler for reliquefication of LH2 storage.
- Cryogenic cooler systems for MV HTS cables and SFCL.
- MgB2 cables for combined electricity transmission and LH2 transport systems.
- Flexible cryogenic transfer line for LH2.
- Electromagnetic transient (EMT) simulation models Electrical system methodology and techno-economic models.
- FCL module demonstrator.
- Current leads from ambient to 2 K on high voltage.
- Health and safety analysis for operation of a superconducting cable system in LH2.

HORIZON-CL5-2021-D3-02-08: Electricity system reliability and resilience by design: High-Voltage, Direct Current (HVDC)-based systems and solutions

Back to projects' list

Electricity grids | Energy storage | System integration

HVDC-WISE

HVDC-based grid architectures for reliable and resilient WIdeSprEad hybrid AC/DC transmission systems

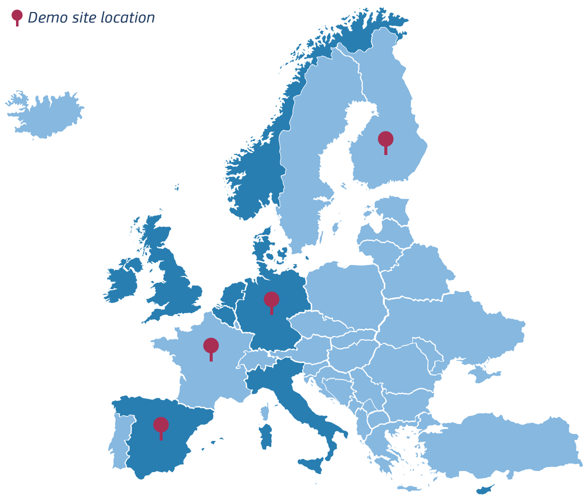
The HVDC-WISE project aims to enhance transmission system resilience and reliability through HVDC-based grid architectures. It will develop planning tools, propose HVDC grid concepts, identify emerging technologies, and validate solutions across diverse European power system contexts. Measurable outcomes include the development of planning tools, proposal and assessment of HVDC grid concepts, identification of emerging technologies, validation of solutions, and guidelines for policy frameworks. The project focuses on reliability- and resilience-oriented planning, HVDC grid architecture, emerging technologies, and policy guidelines.

FROM	October 2022
TO	March 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
6 868 313,75 €	6 565 970,75 €	https://hvdc-wise.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	High Voltage Alternating Current; Multi-terminal; Grid inertia; Network management
Large Scale Storage Technologies	Power to gas; Compressed air energy storage; Hydro storage; Molten salt storage
Distributed Storage Technologies	Batteries; Electric vehicles
Generation Technologies	Wind turbines; Photovoltaic; Biogas; Micro-generation

PROJECT PARTNERS' COUNTRIES



COORDINATOR	SuperGrid Institute (France)

OTHER PARTNERS

- TENNET TSO GMBH (GERMANY)
- UNIVERSIDAD PONTIFICIA COMILLAS (SPAIN)
- RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (GERMANY)
- EPRI EUROPE DAC (IRELAND)
- TECHNISCHE UNIVERSITEIT DELFT (NETHERLANDS)
- ENGIE IMPACT BELGIUM (BELGIUM)
- UNIVERSITY OF CYPRUS (CYPRUS)
- RICERCA SUL SISTEMA ENERGETICO - RSE SPA (ITALY)
- ENERGINET (DENMARK)
- AMPRION GMBH (GERMANY)
- STATNETT SF (NORWAY)
- UNIVERSITY OF STRATHCLYDE (UNITED KINGDOM)
- SCOTTISH HYDRO ELECTRIC TRANSMISSION PLC (UNITED KINGDOM)

Project Description

Context

The HVDC-WISE project aligns with the priorities identified by the European Commission for energy transition and grid resilience. It addresses the need to modernize electrical grids by integrating advanced technologies like HVDC to enhance reliability and resilience. Aligned with European objectives of sustainability, digitalization, inclusion, and economic growth, HVDC-WISE aims to optimize energy resource utilization, promote the transition to renewable sources, improve system efficiency, and ensure equitable and inclusive access to energy.

Project presentation, technical description and implementation

HVDC-WISE addresses the challenge of modernizing electrical grids by leveraging HVDC technology for enhanced resilience and reliability. Objectives include proposing HVDC-based grid architectures and developing planning tools for their effective deployment. Unlike existing solutions, the project integrates emerging technologies and innovative control functionalities to mitigate risks and optimize grid performance. Methodology involves developing reliability-oriented planning tools, proposing HVDC grid architectures, assessing emerging technologies, and validating solutions through realistic use cases. Key components like HVDC systems and advanced control algorithms contribute to achieving project goals by enhancing grid resilience and reliability.

Project Impacts

Economic impacts:

- Increased market share for HVDC technology providers.
- New opportunities for revenue generation in the clean energy market.

Social impacts:

- Creation of new high-quality jobs in the renewable energy sector.
- Improved quality of life through enhanced grid reliability and resilience.

Environmental impacts:

- Decreased CO2 emissions through integration of renewable energy sources.
- Energy savings from efficient grid operation.

Technological impacts:

- Development and validation of innovative HVDC-based grid architectures.
- Diffusion of new planning tools and methodologies for resilient grid design.

Innovative aspects of the project

The most innovative aspect of HVDC-WISE lies in its approach to leveraging HVDC technology for enhancing grid resilience and reliability. By proposing novel HVDC-based grid architectures and control strategies, the project aims to address the evolving challenges of integrating renewable energy sources while ensuring grid stability and performance, thus paving the way for a sustainable energy future.

Expected key exploitable results of the project

- Development of reliability-&-resilience-oriented planning toolset: Methodologies and tools for expansion planning considering challenges faced by networks with HVDC technologies.
- Library of standardized models of HVDC technologies.
- Proposition and assessment of HVDC-based grid architecture concepts: Innovative control and protection functionalities for HVDC architectures.
- Identification, modeling, and assessment of emerging technologies for HVDC-based grid architectures.
- Validation of resilience-oriented planning toolset and HVDC-based grid architecture concepts in industrially relevant environment: Realistic use cases representing different regions of Europe, each with specific challenges.

Key exploitable results and sub-key exploitable results achieved to date

Key Exploitable Results Achieved:

- Development of a reliability-&-resilience-oriented planning toolset, including methodologies and tools for expansion planning considering challenges faced by networks with HVDC technologies.
- Proposition and assessment of HVDC-based grid architecture concepts, including innovative control and protection functionalities for HVDC architectures.
- Identification, modeling, and assessment of emerging technologies for HVDC-based grid architectures.

Sub-Key Exploitable Results in Progress:

- Validation of resilience-oriented planning toolset and HVDC-based grid architecture concepts in an industrially relevant environment through realistic use cases representing different regions of Europe, each with specific challenges.

HORIZON-CL5-2021-D3-02-08: Electricity system reliability and resilience by design: High-Voltage, Direct Current (HVDC)-based systems and solutions

Back to projects' list

Electricity grids | Other keywords

NEWGEN

New generation of HVDC insulation materials, cables and systems

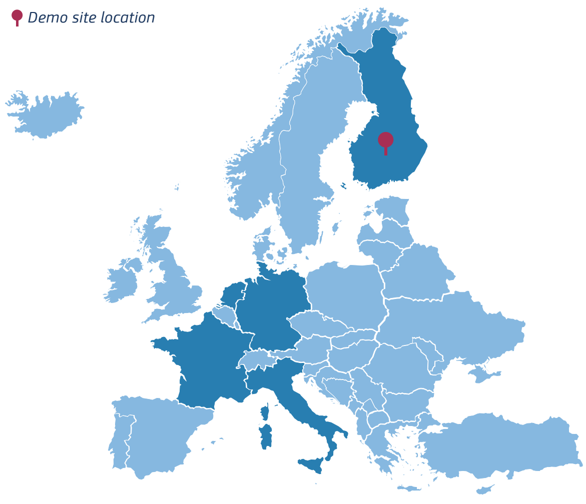
NEWGEN is a project that aims to develop and demonstrate new insulation materials, cable manufacturing solutions, online condition monitoring technologies, and life and reliability modelling tools for next-generation of extruded high voltage direct current (HVDC) cables and cable systems. The project's main objectives are to: (i) develop novel space charge mitigating additives and cable extrusion solutions for highly-reliable polymeric HVDC cables; (ii) develop and demonstrate a novel online global monitoring system for pre-fault detection and health status evaluation of HVDC cable systems; (iii) develop a comprehensive life and reliability model for HVDC cable systems.

FROM	October 2022
TO	September 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
7 602 980,50 €	7 602 980,50 €	https://www.newgen-project.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	High Voltage Direct Current
Other Technologies and Services	Innovative materials; Life cycle assessment

PROJECT PARTNERS' COUNTRIES



COORDINATOR	TEKNOLOGIAN TUTKIMUSKESKUS VTT

OTHER PARTNERS

- ALMA MATER STUDIORUM - UNIVERSITA DI BOLOGNA (Italy)
- MAILLEFER EXTRUSION OY (Finland)
- TECHIMP - ALTANOVA GROUP SRL (Italy)
- UNIVERSITEIT TWENTE (Netherlands)
- TAMPEREEN KORKEAKOULUSAATIO SR (Finland)
- GREENDELTA GMBH (Germany)
- SUPERGRID INSTITUTE (France)
- CLIC INNOVATION OY (Finland)
- TERNA RETE ITALIA SPA (Italy)

Project Description

Context

The project's context is related to the European Green Deal and the decarbonization of the energy sector: NEWGEN contributes to the European Green Deal by enabling the long-distance transmission of electricity from renewable energy sources with minimal losses and increased reliability. The project also supports the digitalisation of the energy system by developing online monitoring and modelling tools for HVDC cable systems. Moreover, the project considers the sustainability and circular economy aspects of the new materials and technologies, as well as the social and economic impacts of the HVDC cable systems.

Project presentation, technical description and implementation

The project addresses four main technological challenges: (i) space charge accumulation and ageing phenomena in HVDC cable insulation; (ii) defect detection and pre-fault monitoring of HVDC cable systems; (iii) life and reliability estimation and optimization of HVDC cable systems under various working stresses; and (iv) firewall capability and resilience of HVDC cable links in hybrid AC/DC transmission grids. The project adopts a novel technical approach that combines the following innovations: (i) molecularly defined and sustainable space charge mitigating additives for PP- and XLPE-based HVDC cable insulation matrices; (ii) new HVDC cable extrusion equipment and process solutions for thermoplastic insulations; (iii) a novel leakage current measurement technique and an online global monitoring system for HVDC cable systems; and (iv) a comprehensive life and reliability model for HVDC cable.

Project Impacts

The impacts are being evaluated in the later stage in the project when the results are near completion.

Innovative aspects of the project

NEWGEN will deliver new materials, solutions, and tools for next-generation extruded HVDC cable systems, which will enable the integration of renewable energy sources, increase the reliability and resilience of the transmission grid, and reduce the environmental and social impacts of HVDC cable systems.

Expected key exploitable results of the project

NEWGEN expects to achieve the following key exploitable results: (i) novel space charge mitigating additives and HVDC insulation compounds that can reduce the electric field stress and extend the lifetime of extruded HVDC cables; (ii) new cable extrusion equipment and process solutions that can improve the quality, efficiency, and sustainability of thermoplastic HVDC cable production; (iii) a novel online global monitoring system that can detect and locate pre-fault conditions and faults in HVDC cable systems; and (iv) a comprehensive life and reliability model that can optimize the design and operation of HVDC cable systems and assess their firewall capability and impact on the transmission grid.

HORIZON-CL5-2021-D3-02-07: Reliability and resilience of the grid: Measures for vulnerabilities, failures, risks and privacy

Back to projects' list

Electricity grids | System integration | Market Design

R2D2

Reliability, Resilience and Defense technology for the griD

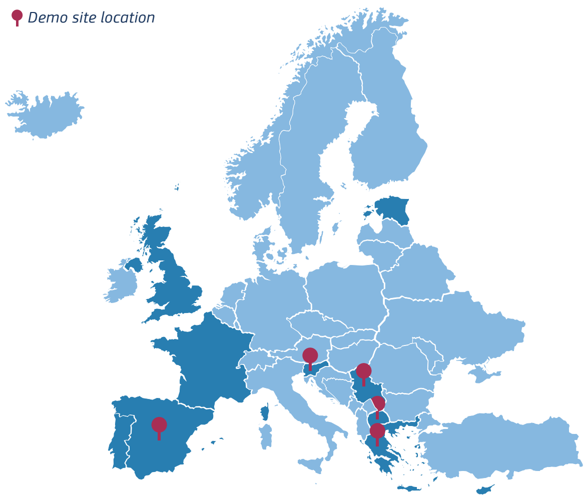
R2D2 aims to enhance EPES resilience against threats like extreme weather and cyber risks. Key activities include dynamic risk assessment, TSO-DSO interaction, and cyber-security tools. Measurable outcomes include reduced power losses and enhanced supply security. Research areas cover risk assessment, resilience, cybersecurity, and asset maintenance. The project's theme centers on bolstering EPES resilience for reliable energy supply.

FROM	October 2022
TO	September 2025

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
9 747 375,00 €	7 335 337,50 €	https://r2d2project.eu/

TECHNOLOGIES AND SERVICES DEPLOYED		
Grid Technologies	Network management	

PROJECT PARTNERS' COUNTRIES



COORDINATOR	ETRA INVESTIGACION Y DESARROLLO SA (Spain)

OTHER PARTNERS

- S2 GRUPO (Spain)
- ELPROS (Slovenia)
- GUARDTIME OU (Estonia)
- CYBER NOESIS IKE (Greece)
- INSTITUTE OF COMMUNICATION AND COMPUTER SYSTEMS - ICCS (Greece)
- SS. CYRIL AND METHODIUS UNIVERSITY IN SKOPJE (North Macedonia)
- SECURITY COORDINATION CENTRE SCC LTD BELGRADE (Serbia)
- EMS SERVICES DOO (Serbia)
- DIACHEIRISTIS ELLINIKOU DIKTYOU DIANOMIS ELEKTRIKIS ENERGEIAS AE - HEDNO (Greece)
- ELEKTRO LJUBLJANA (Slovenia)
- ELEKTRO LJUBLJANA OVE (Slovenia)
- EDP NEW (Portugal)
- EDP SPAIN (Spain)
- INSTITUT MIHAJLO PUPIN (Serbia)
- UNIVERSITY OF CYPRUS (Cyprus)
- RTE INTERNATIONAL (France)
- IMPERIAL COLLEGE OF SCIENCE TECHNOLOGY AND MEDICINE (United Kingdom)

Project Description

Context

The R2D2 project addresses critical issues identified by the European Commission regarding the resilience and reliability of Electrical Power and Energy Systems (EPES). It aligns with EU priorities, including sustainability, digitalization, and economic growth, by enhancing EPES resilience against threats such as extreme weather events and cybersecurity risks. By improving system reliability and security, R2D2 contributes to the EU's goal of achieving a sustainable and resilient energy transition while fostering digital innovation and economic resilience across Europe.

Project presentation, technical description and implementation

The R2D2 project tackles EPES challenges, focusing on resilience against extreme weather and cyber risks. Unique aspects include dynamic risk assessment and predictive maintenance. The project methodology involves real-world testing of innovative tools. Key components like risk assessment tools directly enhance EPES resilience.

Project Impacts

Economic impacts:

- Increased market share through enhanced EPES reliability.
- New market opportunities for predictive maintenance technologies.

Social impacts:

- Creation of new jobs in EPES resilience and cyber-security sectors.
- Improved quality of life due to more reliable energy supply.

Environmental impacts:

- Reduced environmental impact from power outages.
- Energy savings through optimized asset maintenance.

Technological impacts:

- Development and adoption of innovative dynamic risk assessment tools.
- Integration of predictive maintenance technologies into EPES operations.

Innovative aspects of the project

The most impactful aspect of R2D2 lies in its integration of dynamic risk assessment and predictive maintenance technologies, revolutionizing EPES resilience. By proactively addressing threats and optimizing asset management, R2D2 ensures a more robust and reliable energy infrastructure, crucial for sustainable development.

Expected key exploitable results of the project

Key Exploitable Results:

- Dynamic risk assessment tools for EPES resilience enhancement.
- Predictive maintenance technologies for optimized asset management.

Sub-Key Exploitable Results:

- Enhanced TSO-DSO interaction frameworks for improved coordination.
- Cyber-security prevention tools for safeguarding EPES infrastructure.
- Contingency analysis techniques for effective response to potential threats.

Key exploitable results and sub-key exploitable results achieved to date

Key Exploitable Results Achieved:

- Development of dynamic risk assessment tools for EPES resilience enhancement.
- Initial implementation of predictive maintenance technologies for asset management optimization.

Sub-Key Exploitable Results in Progress:

- Further refinement of TSO-DSO interaction frameworks for enhanced coordination.
- Ongoing development of cyber-security prevention tools for EPES infrastructure protection.
- Continued research on contingency analysis techniques for effective threat response.

HORIZON-CL5-2021-D3-02-07: Reliability and resilience of the grid: Measures for vulnerabilities, failures, risks and privacy

Back to projects' list

Electricity grids | Digitalisation | System integration

eFORT

Establishment of a FramewORk for Transforming current EPES into a more resilient, reliable and secure system all over its value chain

The main objective of eFORT is to make European power grids more resilient and reliable to failures, cyberattacks, physical disturbances and data privacy issues. To this end, a set of technological innovations will be developed for the detection, prevention and mitigation of risks and vulnerabilities with positive impacts on power system operation and stability. The eFORT solutions will be demonstrated at TSO, DSO, substation and consumer levels in 4 real demonstration grids that have been selected considering their complementarities and relevance to tackle the main threats of current European power systems.

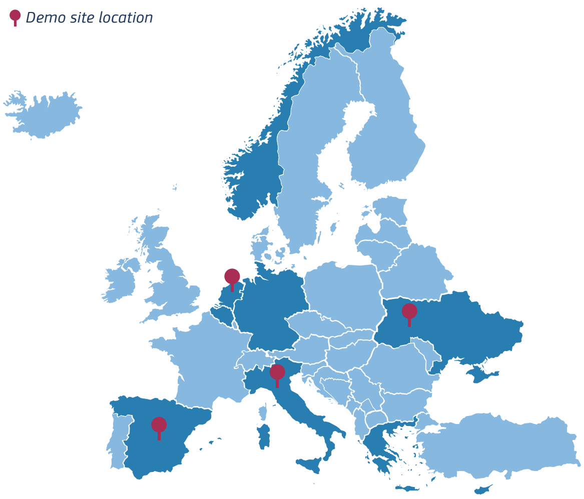
FROM	September 2022
TO	August 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
9 321 022,50 €	7 996 531,00 €	https://efort-project.eu/

TECHNOLOGIES AND SERVICES DEPLOYED

Grid Technologies	Micro-grid; Protections; Network management; Monitoring and control tools
Other Technologies and Services	Cyber dynamic risk assessment, IoT security advances, AI-based control algorithms for islanding operations, Automated digital substation 4., BIM methodology to substations, Dynamic device modelling for analyzing Inter-area oscillations impact on transmission networks, Data Confidentiality Procedures, Blockchain layer for resiliency, Secure TSO-DSO data sharing procedures, Digital twin of interconnected grids and operators training in a Control Room of the Future (CRoF), Real-time decision support system for grid restoration, Edge device for security management (SecureBox), IDS/IPS and SIEM at the edge level, an Intelligent Platform tailored for the specific needs of security management in the EPES."

PROJECT PARTNERS' COUNTRIES



COORDINATOR: FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS (Spain)

OTHER PARTNERS

- EUROPEAN NETWORK FOR CYBER SECURITY COOPERATIEF UA (NETHERLANDS)
- TENNET TSO BV (NETHERLANDS)
- NEDERLANDSE ORGANISATIE VOOR TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK TNO (NETHERLANDS)
- TECHNISCHE UNIVERSITEIT DELFT (NETHERLANDS)
- DNV NETHERLANDS BV (NETHERLANDS)
- RINA CONSULTING SPA (ITALY)
- DIGITALPLATFORMS S.P.A. (ITALY)
- EDYNA SRL (ITALY)
- FONDAZIONE LINKS - LEADING INNOVATION & KNOWLEDGE FOR SOCIETY (ITALY)
- FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER
- ANGEWANDTEN FORSCHUNG EV (GERMANY)
- CUERVA ENERGIA SLU (SPAIN)
- SISTEMAS INFORMATICOS ABIERTOS SA (SPAIN)
- UNIVERSIDAD PONTIFICIA COMILLAS (SPAIN)
- SCHNEIDER ELECTRIC ESPANA SA (SPAIN)
- JOINT-STOCK COMPANY PRYKARPATTYAOBLENERGO (UKRAINE)
- ISOLUTIONS LLC (UKRAINE)
- UBITECH ENERGY (BELGIUM)
- SUITE5 DATA INTELLIGENCE SOLUTIONS LIMITED (CYPRUS)
- HYPERTECH KENTRO EPISTIMONIKON KAI TECHNOLOGIKON EREVNON AEIFORIAS ASTIKI MI KERDOSKOPIKI ETAIREIA (GREECE)
- ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS (GREECE)
- B2B CONSULTING GROUP SL (SPAIN)
- SMART INNOVATION NORWAY AS (NORWAY)

Project Description

Context

Prompted by the need to comply with environmental and societal concerns, Electrical Power and Energy Systems are undergoing an unprecedented transformation, demanding urgent upgrades to make them more reliable, resilient and secure. Modernization of current grids will greatly reduce the frequency and duration of power blackouts, diminish the impact of disruptive events and restore service faster when outages occur, creating broad benefits to society and economy. eFORT approach will enable the further upgrading of the energy grid without affecting the security of supply and increasing their reliability and resiliency against extreme weather events, man-made hazards and equipment failures.

Project presentation, technical description and implementation

The project will put in place a set of solutions at the cyber and physical layers for detecting, preventing and mitigating vulnerabilities and threats. Among them, an interoperable Intelligent Platform will set a common foundation for grid characterization and vulnerability overseeing, as well as gather information from smart grid components and apply heavy-duty algorithms, whereas Asset Management developments will strengthen grid infrastructure robustness, which will be empowered by the addressed Digital Technologies. All these elements will be validated at 4 demo sites covering the whole grid value chain: a transmission network; a remote distribution grid; a digital substation; and a microgrid. Moreover, eFORT relies on several horizontal actions aiming at empowering EPES players (i.e. common regulatory and standardisation framework, CBA, new business models and replication potential)

Project Impacts

Scientific: New breakthrough knowledge and progress beyond SoA for grid asset management, digitalisation and protection of infrastructures. Reports, roadmaps and papers on leveraging EU EPES security, reliability and resiliency.

Economic/Technological: Validation of technical solutions to prevent, protect and mitigate grid damage and consequent blackouts, ensuring thus the stability of the electricity supply vs. disruptive events. Unlocking potentially profitable business models. Improved EU independence in the energy sector and prices for users.

Societal: Improved engagement across energy sector; enhanced collaborative networks; reduction of detrimental effects on the environment linked to a better integration/distribution of renewable energies; new job opportunities.

Innovative aspects of the project

4 main innovation pillars: 1) the development of tools for better analyse main threats and vulnerabilities of current grids; 2) design, develop and test a set of technologies aiming at enhancing grid robustness against the identified threats and secure a power deliver in accordance to end user demands; 3) improve data secure and privacy exchange through the grid assets; and 4) establish operational strategies targeting quick recovery in case of disruptive events.

Expected key exploitable results of the project

- KER 1: Intelligent Platform. It will be composed by tools for prevention, detection and monitoring of threats, grid adaptation, interactive visualization tool and data collection/sharing mechanisms enabling collaborative response to threats.
- KER 2: Technologies for EPES physical layer protection. They are composed by self-healing algorithm (TSO level), islanding operation algorithm (DSO level), secure communications for digital substations, methodologies for making IoT secure and blockchain (micro-grid level) and the intelligent decision support system for OT.
- KER 3: SecureBox. An embedded device focused on real-time cyber protection in a local scope.
- KER 4: Training though CRoF and digital twin of the power grids. Materials aiming at training CSIRT and grid operators in the solutions of the project.
- KER 5: Standards and recommendations on the implementation of eFORT solutions.

HORIZON-CL5-2021-D3-02-06: Increasing energy system flexibility based on sector-integration services to consumers (that benefits system management by DSOs and TSOs)

Back to projects' list

Electricity grids | Digitalisation | Consumers/prosumers

STREAM

Streaming Flexibility to the Power System

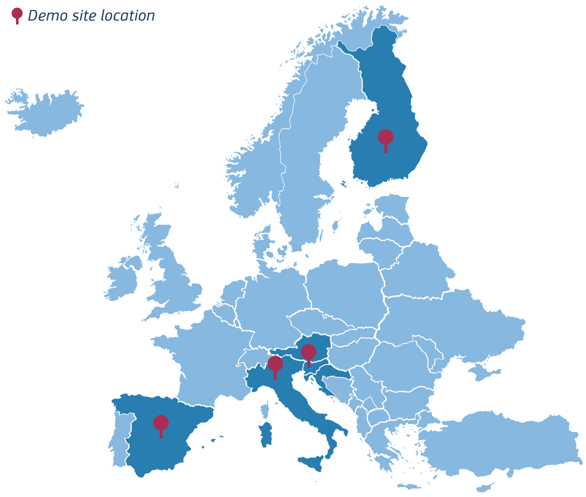
The ambition of the STREAM project (STREAM) is the creation of an innovative and robust flexibility ecosystem on the low voltage (LV) grid side of existing power markets. The success of the STREAM ecosystem relies on the benefit realized through the new business models developed in project, built upon local LV flexibility markets and novel barter-like mechanism. STREAM will connect data, technologies, stakeholders and markets on the one hand, and will facilitate the flexibility provision through open data sharing to enable other citizen services designed through a User-centric Approach to improve their acceptance and uptake, providing a variety of energy services supporting power markets.

FROM	October 2022
TO	September 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
10 364 936,93 €	7 929 958,00 €	https://stream-he-project.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	Micro-grid; Network management; Monitoring and control tools
Market	Ectricity market; Ancillery services; Other market services (Non-energy services, consumer focussed)
Other technology and services	Energy system modelling

PROJECT PARTNERS' COUNTRIES



COORDINATOR	University of Ljubljana (Slovenia)

OTHER PARTNERS

- ETRA INVESTIGACION Y DESARROLLO SA (Spain)
- OMI-POLO ESPANOL SA (Spain)
- BORZEN, OPERATER TRGA Z ELEKTRIKO, D.O.O. (Slovenia)
- CYBERGRID GMBH & CO KG (Austria)
- ELES DOO SISTEMSKI OPERATER PRENOSNEGA ELEKTROENERGETSKEGA OMREZJA (Slovenia)
- KOLEKTOR SETUP, STORITVE ENERGETSKEGA UPRAVLJANJA, D.O.O. (Slovenia)
- COOPERATIVA ELECTRICA BENEFICA SAN FRANCISCO DE ASIS SOCIEDAD COOPERATIVA VALENCIANA (Spain)
- ELEKTRO PRIMORSKA, PODJETJE ZA DISTRIBUCIJO ELEKTRICNE ENERGIJE DD (Slovenia)
- TEKNOLOGIAN TUTKIMUSKESKUS VTT OY (Finland)
- EMOTION SRL (Italy)
- VOIMATEL OY (Finland)
- AVANT CAR D.O.O. ZA USLUGE I POSLOVNO SAVJETOVANJE (Croatia)
- ENGINEERING - INGEGNERIA INFORMATICA SPA (Italy)
- JOANNEUM RESEARCH FORSCHUNGSGESELLSCHAFT MBH (Austria)
- IDEAZ STORITVE DOO (Slovenia)
- ASM TERNI SPA (Italy)

Project Description

Context

STREAM will directly impact the EU Energy Strategy and assist the implementation of the Clean Energy Package: promote the diversification of EUs energy resources, a higher utilization of decentralized RES capacity, and improve security of energy supply through a higher reliance on local power generation and distribution and thus reducing the need for energy imports. STREAM will optimize existing power and flexibility assets, resulting in lower energy bills of customers, reduced reliance on external energy suppliers and reduced GHG emissions. The user-centric design and use of flexibility devices will unlock generation and distribution potential and monetary streams for consumers.

Project presentation, technical description and implementation

Objective of STREAM Ecosystem is to promote the use of various flexibility services, offered by LV consumers, to network operators on LV, MV and HV level and the local and wholesale market, enabling them to develop new business models and markets for different types and scales of flexibility services and to interact with various distributed resources in real-time. For this, a dedicated ecosystem is needed to maximize their benefits in local, national and international power markets by way of optimizing security, reliability and cost-effectiveness of market operations on different levels. Ecosystem will allow scaling up solutions through addressing different technical, regulatory, commercial, and social challenges and power market opportunities over medium to long-term, ensuring stakeholder inclusiveness, ease & efficiency of use of the ecosystem, and its longevity.

Project Impacts

1. End consumer:

- 15% Expected energy cost savings by flexibility provision.
- 33% Cheaper electricity.
- [For industry similar impact magnitudes are expected].

2. Supplier:

- Achieve energy efficiency savings up to 4% (example Finland).

3. DSO:

- Overcome local congestions (“nonwire investment”).
- Avoided (or deferred) grid updates.

4. TSO:

- Reliable, cheap and fast means to balance grid and ensure reserves.
- Demand control is available when demand is highest.

5. Generators

- Manage intermittency of renewables.
- Avoided (or deferred) capacity costs.
- Avoid costs, close inefficient power plants and better use other assets.

6. Policy makers

- Enable reduction of CO_2 emissions by 6,4 mio t CO_2 p.a.
- Competition: Enhance consumers’ market power, innovative services.
- Social: Reduce costs for all consumers and finance smart homes for all that want it.

Innovative aspects of the project

The key building blocks of the stream ecosystem:

- Secure energy assets data sharing & energy- and other service design, supporting integration of various devices and technologies to offer energy flexibility services.
- Local LV power market design to ensure a seamless integration of local LV power market stakeholders to reflect the local conditions via a standardized device register as an entering point of a given local power market ensuring standardized pre-qualification process.

Expected key exploitable results of the project

- Data platform: flexibility data sharing and usage access control from end users.
- P2P market place: Innovative tokenized solution for reciprocal data assets.
- Local markets: New, user-centric trading facilitation framework on LV grids.
- LV grid state estimation and grid pre-qualification: Enhanced management of power network operational risks by enabling DSOs to operate on local flexibility markets.
- EnC management platform + end user mobile app: App providing up-to-date information regarding the operational aspects of a given energy community.
- Evaluation and planning tool: Enhanced decision-making processes of DSOs through improved LV grid operation planning and analytics.
- Central flexibility management system.
- Device registry: Central repository for flexibility device owners/aggregators to register devices and offer flexibility.

Key exploitable results and sub-key exploitable results achieved to date

The first version of the Exploitation and Business Plan for the STREAM project presents the strategy to move the STREAM KERs toward successful commercialization. The strategy is based on four steps: KER identification, market analysis, business plan development, and go-to-market strategy. The initial steps have commenced, with an exploitation session in October 223 focusing on Intellectual Property Rights (IPR) and the introduction of the overall exploitation strategy.

- 1 KERs by 7 partners have been identified. For these KERs, the IPR were assigned and a value proposition canvas highlighting the main characteristics of the tools is presented. Additionally, a market screening provides insights into similar tools, facilitating a comparative analysis of strengths and weaknesses against STREAM tools.
- As the project moves along the tools will become more detailed and more information will be included in the report, including a financial analysis for the five years after STREAM. This task will continue until the end of STREAM, by when a detailed business plan for each KER as well as the next steps after STREAM to bring the product closer to the market will be designed.

HORIZON-CL5-2021-D3-02-06: Increasing energy system flexibility based on sector-integration services to consumers (that benefits system management by DSOs and TSOs)

Back to projects' list

Digitalisation | Consumers/prosumers | Market Design

ENFLATE

ENabling FLexibility provision by all Actors and sectors through markets and digital TEchnologies

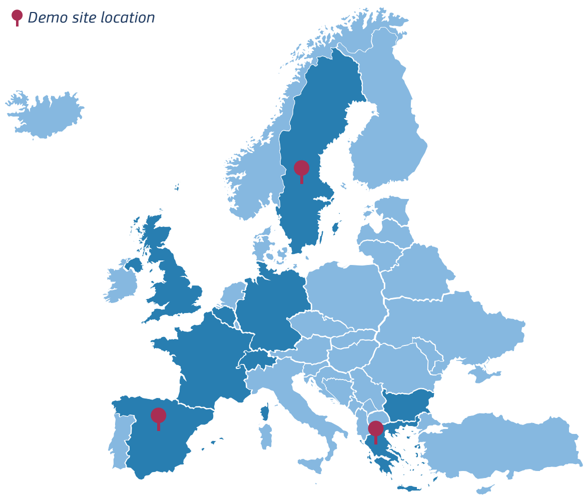
The project aims to develop collaborative platforms for consumer-driven energy services, integrating flexibility resources from various sectors. Activities include upgrading existing solutions, replicating them across Europe, and developing innovative market designs. Measurable outcomes include scalability of the interoperable platform, mitigation of energy poverty, reduction of carbon footprint, and policy recommendations for regulatory barriers. Primary research areas include data-driven energy, health, and mobility services, decentralized flexibility marketplaces, and real-time control algorithms for heat networks and buildings.

FROM	September 2022
TO	August 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
9 313 018,75 €	7 929 958,00 €	https://enflate.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	High Voltage Alternating Current; High Voltage Direct Current; Micro-grid; Monitoring and control tools
Large Scale Storage Technologies	Power to gas; Compressed air energy storage; Hydro storage
Distributed Storage Technologies	Batteries

PROJECT PARTNERS' COUNTRIES



COORDINATOR: NOVA TELECOMMUNICATIONS & MEDIA SINGLE MEMBER SA (Greece)

OTHER PARTNERS

- UBITECH ENERGY (Belgium)
- CORDIS NAMEETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS (Greece)
- ARTELYS (France)
- FUNDACION CARTIF (Spain)
- ETHNIKO KAI KAPODISTRIAKO PANEPISTIMIO ATHINON (Greece)
- EUROPAISCHES INSTITUT FUR INNOVATION - TECHNOLOGIE EV (Germany)
- REGULATORY AUTHORITY FOR ENERGY (RYTHMISTIKI ARHI ENERGIAS) (Greece)
- DIACHEIRISTIS ELLINIKOU DIKTYOU DIANOMIS ELEKTRIKIS ENERGEIAS AE (Greece)
- INDEPENDENT POWER TRANSMISSION OPERATOR SA (Greece)
- UNIVERSITY OF PIRAEUS RESEARCH CENTER (Greece)
- DIMOS SKIATHOU (Greece)
- EPEX SPOT (France)
- MONTAJES ELECTRICOS CUERVA S.L. (Spain)
- TURNING TABLES SOCIEDAD LIMITADA (Spain)
- AYUNTAMIENTO DE LACHAR (Spain)
- EKSTA BOSTADSAKTIEBOLAG (Sweden)
- IVL SVENSKA MILJOEINSTITUTET AB (Sweden)
- NODAIS AB (Sweden)
- BLOKS ZDRAVNI I SOTSIALNI GRIZHI EOOD (Bulgaria)
- YUGOIZTOCHNOEVROPEYSKA TEHNOLOGICHNA KOMPANIA OOD (Bulgaria)
- ELECTRODISTRIBUTION GRID WEST AD (Bulgaria)
- ELEKTROENERGIEN SISTEMEN OPERATOR EAD (Bulgaria)
- FACHHOCHSCHULE ZENTRALSCHWEIZ - HOCHSCHULE LUZERN (Switzerland)
- St. Gallisch-Appenzellische Kraftwerke AG (Switzerland)
- TRANSPORTS PUBLICS GENEVOIS (Switzerland)
- UNIVERSITE DE GENEVE (Switzerland)
- Hitachi ABB Power Grids Ltd. (Switzerland)
- TECH INSPIRE LTD (United Kingdom)

Project Description

Context

The project aligns with the European Commission's priorities by addressing key thematic areas such as sustainability, digitalization, and inclusion. It aims to enhance flexibility in energy markets, supporting the transition to renewable energy sources and promoting grid stability. By empowering consumers and leveraging digital technologies, the project contributes to a more inclusive energy system. Additionally, it fosters economic growth by promoting innovation and the development of new market mechanisms, in line with Europe's energy and climate objectives.

Project presentation, technical description and implementation

The project addresses the challenge of enhancing energy system flexibility by empowering consumers and leveraging digital technologies. Objectives include developing a collaborative platform for energy services, integrating multi-vector flexibility, and promoting cross-industry services like health and mobility. ENFLATE approach prioritizes interoperability, security, and user empowerment. We'll leverage existing solutions and tools, integrating decentralized flexibility marketplaces, cloud platforms, and real-time control algorithms. Key components enable dynamic response to grid conditions, maximizing flexibility resource utilization. Integration ensures scalability and accessibility across sectors and geographies.

Project Impacts

Economic impacts: Increased revenue streams for consumers, enhanced market competitiveness, new business opportunities in energy services sector.

Social impacts: Improved quality of life through better healthcare and mobility services, increased access to energy services, job creation in the energy sector.

Environmental impacts: Reduced carbon footprint through enhanced energy efficiency and increased use of renewable energy sources.

Technological impacts: Development and deployment of innovative digital technologies for energy management and grid flexibility.

Policy impacts: Policy recommendations for regulatory frameworks to support cross-sectoral energy services, contributing to European energy policy objectives.

Innovative aspects of the project

One of the most innovative aspects of the project is the collaborative platform that integrates energy, health, and mobility services. This platform enables consumer-driven business models, maximizing the utilization of multi-vector flexibility potential. This approach promotes cross-sectoral synergy, enhancing overall system efficiency and resilience.

Expected key exploitable results of the project

- Development of a secure and interoperable platform for valorization of cross-energy carrier flexibility.
- Establishment of a decentralized flexibility marketplace for small-scale DERs based on DLT infrastructure.
- Creation of an integrated marketplace for local flexibility, coordinating TSOs, DSOs, and FSPs.
- Implementation of a scalable cloud platform for LEC operators, integrating IoT with a digital twin of the grid.
- Deployment of real-time data-driven control algorithms for heat networks and buildings.
- Introduction of an efficient energy management tool for electrified mobility infrastructure.

Key exploitable results and sub-key exploitable results achieved to date

- Establishment of a secure and interoperable platform for valorization of cross-energy carrier flexibility.
- Implementation of a decentralized flexibility marketplace for small-scale DERs based on DLT infrastructure.

- Development of an integrated marketplace for local flexibility, coordinating TSOs, DSOs, and FSPs.
- Deployment of a scalable cloud platform for LEC operators, integrating IoT with a digital twin of the grid.
- Introduction of real-time data-driven control algorithms for heat networks and buildings.
- Initiation of an efficient energy management tool for electrified mobility infrastructure.

HORIZON-CL5-2021-D3-02-06: Increasing energy system flexibility based on sector-integration services to consumers (that benefits system management by DSOs and TSOs)

Back to projects' list

Electricity grids | Digitalisation | Consumers/prosumers

BEFLEXIBLE

Boosting Engagement to Increase Flexibility

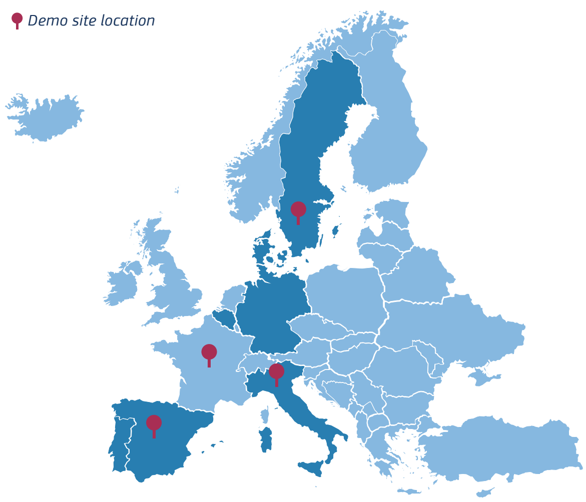
BEFLEXIBLE project aims to overcome existing limitations in the electricity markets by applying versatile solutions that allow grids to adapt to upcoming scenarios. Thus, it will promote mechanisms that provide benefits to all actors in the energy market (from market operators to end users), responding to all types of consumer needs. BEFLEXIBLE's objective is to increase the flexibility of the energy system, improve cooperation between Distribution System Operators (DSOs) and Transmission System Operators (TSOs) and facilitate the participation of all energy-related stakeholders.

FROM	September 2022
TO	August 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
10 383 163,75 €	7 999 744,75 €	https://beflexible.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response; Smart appliances; Heating/cooling peak load management
Grid Technologies	Grid Technologies Monitoring and control tools; Other grid technologies (Operation with Flexibility)
Large Scale Storage Technologies	Hydro storage
Distributed Storage Technologies	Batteries Electric Vehicles
Generation Technologies	PV
Market	Ancillary services; Other market services (Flexiility Markets)

PROJECT PARTNERS' COUNTRIES



COORDINATOR	i-DE (SPAIN)

OTHER PARTNERS

- IBERDROLA ENERGIA ESPANA SAU (Spain)
- ENEL GLOBAL INFRASTRUCTURE AND NETWORKS S.R.L. (Spain)
- EDISTRIBUCION REDES DIGITALES SL (Spain)
- E-DISTRIBUZIONE SPA (Italy)
- Gridspertise s.r.l. (Italy)
- TERNA - RETE ELETTRICA NAZIONALE SPA (Italy)
- ARETI S.P.A. (Italy)
- RICERCA SUL SISTEMA ENERGETICO - RSE SPA (Italy)
- E ON ENERGIDISTRIBUTION AB (Sweden)
- E.ON Energiinfrastruktur (Sweden)
- SAP SE (Germany)
- SCHNEIDER ELECTRIC ESPANA SA (Spain)
- UNIVERSIDAD PONTIFICIA COMILLAS (Spain)
- INESC TEC- INSTITUTO DE ENGENHARIA DE SISTEMAS E COMPUTADORES, TECNOLOGIA E CIENCIA (Portugal)
- RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (Germany)
- ENGINEERING - INGEGNERIA INFORMATICA SPA (Italy)
- STEMY ENERGY (Spain)
- THERMOVAULT (Belgium)
- SOULSIGHT DESIGN STRATEGY, S.L. (Spain)
- SMART INNOVATION NORWAY AS (Denmark)
- TIME.LEX (Belgium)
- EUROPEAN DISTRIBUTION SYSTEM OPERATORS FOR SMART GRIDS (Belgium)
- ZABALA INNOVATION CONSULTING, S.A. (Spain)

Project Description

Context

The EU aims to establish a modern design for the electricity market, adapted to new commercial realities: more flexible, market-based, and better placed to integrate a higher share of renewables. BEFLEXIBLE is aligned with the current climate targets and the Fit for 55 packages, in addition to the Recovery Plan and the roadmaps implemented by ETIP SNET.

The renewable energy generated is increased and production is no longer centralized; it originates from multiple locations before distribution. This is affecting electricity markets. The system demands flexibility and new business models for traditional utilities and distribution companies.

Project presentation, technical description and implementation

BEFLEXIBLE is based on 4 blocks:

1. Analyzing markets and regulations to establish a flexible framework for new business opportunities.

2. Defining and adapting the service ecosystem with a diverse range of flexibility and cross-sector solutions for end-users.

3. Implementing platforms and architectures, including the design of a Grid Business and Data Network (GDBN) and ensuring complete data interoperability through system architecture.

4. Prioritizing customer engagement and adopting a social co-creation approach to address consumer needs.

The concept's versatility will be demonstrated through pilots in Italy, Sweden, Spain, and France, covering diverse consumer behaviours, grid types, and climates. This aims to evaluate the impact of services and engagement strategies, aligning with national plans for the 23 energy transition.

Project Impacts

1. Design a whole value chain framework within the energy and cross-sector for flexibility-centric services and business models as a basis to create sustainable revenue streams for consumers.

2. Test and validate an open pool of adaptive, interoperable, intuitive, multidevice and secure 32 data-driven services, creating the Be Flexible open services ecosystem.

3. The optimal design of the Acquisition flexibility mechanisms and the Assessment of market designs will contribute to the creation of accessible, cost-efficient and competitive markets.

4. Increase the number of users to drive transaction costs down.

5. Contribute to a higher resistance of the energy system.

6. Deliver Enabled efficient functioning, standardized and interoperable energy services/platforms through digital technologies.

7. The strategy for the exploitation will allow to define the pathway for the mid-term new profitable business models, which will enable a smooth market introduction and proper orientation of the future services.

8. Allow in a later stage the exploitation of protected knowledge in strategic target markets.

9. Ensure the most efficient pathway to maximise awareness on BeFlexible digital solutions.

10. Define a co-creative strategy to increase social acceptance.

11. Act as facilitators for the interaction of active and intermediary actors of the energy and non-energy value chain. Act as a common data space exchange to enable different flows of information supporting flexibility-centric business models.

Innovative aspects of the project

- A comprehensive market design framework will be developed to improve the efficiency of the electricity system.

- An innovative energy ecosystem, integrating cross-sector services into flexibility-centric models and testing innovative business models.
- A cloud-based multi-tenant platform considering DSOs of different sizes and interoperable with existing systems and platforms.
- Tested value propositions, co-created by targeted market actors, will articulate new flexibility business models.

Expected key exploitable results of the project

The project's results will directly feed the shaping of upcoming policy by participating in further innovation projects and sandboxes regarding flexibility mechanisms in grid-centric services and customer-centric services. Regulatory rules have to be defined to enable the use of flexibility services. The research and pilots in BeFlexible project will serve as guidance for the implementation of flexible solutions by prioritizing customer engagement and overcoming the existing regulatory barriers, adapting the service ecosystem with a diverse range of flexibility solutions and implementing platforms and architectures ensuring complete data interoperability.

HORIZON-CL5-2021-D3-02-05 - Energy Sector Integration: Integrating and combining energy systems to a cost-optimised and flexible energy system of systems		Back to projects' list
Electricity grids	Energy storage	Digitalisation

FEDECOM

FEDErated "system of systems" approach for flexible and interoperable energy COMmunities

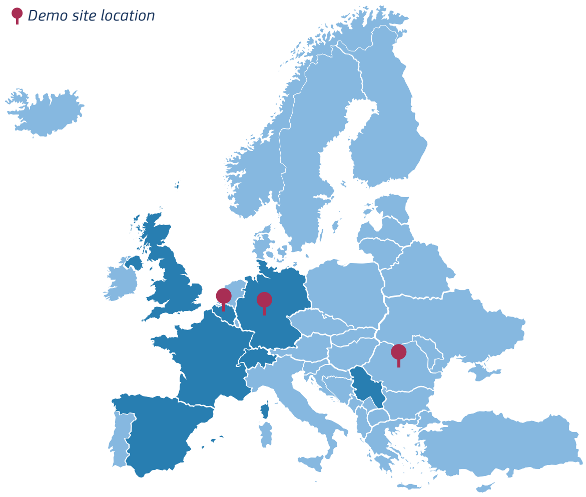
The main focus of FEDECOM is to implement integrated local energy systems through sector coupling and cross-energy vector integration. Its activities include developing a scalable cloud platform, demonstrating energy sector coupling benefits, and optimizing energy management strategies. Key measurable outcomes include energy savings, grid CAPEX and OPEX reductions, increased consumer engagement, and contributions to EU renewable energy and GHG emission reduction targets. The project addresses research areas such as grid technologies, large-scale and distributed storage, generation technologies, digitalization, and market design to achieve these objectives.

FROM	October 2022
TO	September 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
9 474 375,00 €	7 635 000,00 €	https://fedecom-project.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response; Smart appliances; Heating/cooling peak load management
Grid Technologies	High Voltage Alternating Current; High Voltage Direct Current; Micro-grid; Network management
Distributed Storage Technologies	Batteries; Electric vehicles
Generation Technologies	Batteries; Electric vehicles

PROJECT PARTNERS' COUNTRIES



COORDINATOR	GIROA SOCIEDAD ANONIMA (Spain)

OTHER PARTNERS

- Fundacion Tekniker (Spain)
- Universite Catholique De Louvain (Belgium)
- Fraunhofer Gesellschaft Zur Forderung Der Angewandten Forschung Ev (Germany)
- Iberdrola (Spain)
- R2M Solution (Spain)
- Grid Singularity (Germany)
- Institut Mihajlo Pupin (Serbia)
- AUG-e (Belgium)
- ENBRO (Belgium)
- Smart Energy Europe (Belgium)
- Energies 2050 (France)
- UR BEROA (Spain)
- Azienda Elettrica Di Massagno (Switzerland)
- Hive Power (Switzerland)
- Scuola Universitaria Professionale Della Svizzera Italiana (Switzerland)
- Heriot-Watt University (UK)

Project Description

Context

The FEDECOM project aligns closely with the thematic priorities of the European Commission, particularly in advancing sustainable energy systems and promoting digitalization. By focusing on sector coupling and cross-energy vector integration, FEDECOM addresses the need for decarbonization and the integration of renewable energy sources, in line with EU goals. Additionally, the project contributes to enhancing grid stability, improving energy efficiency, and fostering consumer engagement, thereby supporting broader objectives of sustainability, digitalization, inclusion, and economic growth outlined by the EU.

Project presentation, technical description and implementation

The FEDECOM project addresses challenges in energy systems by enabling sector coupling and integrating local energy systems for grid stability and decarbonization. Objectives include: developing a scalable cloud platform for analysis and optimization, leveraging sector coupling across power, gas, heating, and mobility. The approach involves a multi-layered 'System of Systems' approach, combining predictive analytics, distributed optimization, and model predictive control algorithms. By integrating technologies such as energy storage and renewable generation, the project aims to optimize energy management strategies and enhance grid flexibility.

Project Impacts

Technological impacts: development of new technologies of TES coupled with power cycle and heat pump.

Economic impacts:

- Increased revenue opportunities for energy service companies
- Enhanced market competitiveness through new technological solutions

Social impacts:

- Creation of new skilled jobs in the energy sector
- Improved quality of life through increased access to renewable energy

Environmental impacts:

- Reduction in CO2 emissions through increased use of renewable energy sources
- Energy savings and resource efficiency

Technological impacts:

- Development and deployment of innovative energy storage technologies
- Advancement of digital tools for smart grid management

Innovative aspects of the project

The most impactful aspect of the project is the implementation of a federated "system of systems" approach, enabling flexible and interoperable energy communities. This approach integrates various local energy systems, fostering economic benefits, grid stability, and decarbonization. It stands out for its scalability, adaptability, and potential to revolutionize energy management practices.

Expected key exploitable results of the project

- Scalable and adaptable cloud platform for integrated local energy systems
- Analysis, modeling, and optimization services for planning, monitoring, and control
- Predictive analytics for demand-side management and grid operation optimization
- Distributed optimization services for integrated energy systems scheduling
- Model predictive control algorithms for optimal energy profiles and control setpoints

Key exploitable results and sub-key exploitable results achieved to date

- Developed scalable cloud platform for integrated local energy systems
- Implemented analysis, modeling, and optimization services for planning and monitoring
- Deployed predictive analytics for demand-side management and grid operation optimization
- Initiated development of distributed optimization services for energy systems scheduling
- Started work on model predictive control algorithms for optimal energy profiles

HORIZON-CL5-2021-D3-02-05 - Energy Sector Integration: Integrating and combining energy systems to a cost-optimised and flexible energy system of systems

Back to projects' list

Energy storage | Digitalisation | Consumers/prosumers

ELEXIA

Demonstration of a digitized energy system integration across sectors enhancing flexibility and resilience towards an efficient, sustainable, cost-optimised, affordable, secure and stable energy supply

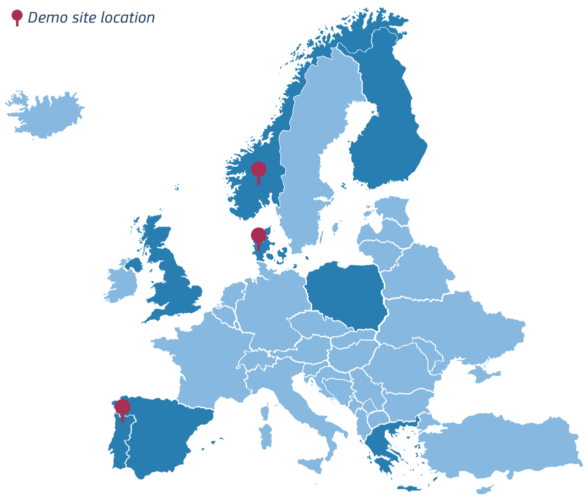
The ELEXIA project aims to develop tools for integrated energy system planning and management across sectors, focusing on digitalization, resilience, and flexibility. Key activities include developing a System Planning Toolbox, Energy Management Systems, and a Digital Services Platform. The project will demonstrate these tools in three pilot sites in Portugal, Denmark, and Norway. Measurable outcomes include reducing energy and grid demand, achieving significant CO2 emissions reductions, and contributing to EU policy frameworks for energy integration and sustainability. The main objectives are to enable cost-optimized and resilient energy systems, promote sector coupling, and support the EU'

FROM	October 2022
TO	September 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
11 001 822,25 €	9 552 297,63 €	https://www.elexia-project.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response; Smart appliances; Smart metering; Heating/cooling peak load management
Grid Technologies	High Voltage Alternating Current; High Voltage Direct Current; Micro-grid; Network management; Monitoring and control tools
Large Scale Storage Technologies	Power to gas; Compressed air energy storage; Hydro storage; Molten salt storage
Distributed Storage Technologies	Batteries; Electric vehicles; Thermal energy production, distribution and storage; Flywheels
Generation Technologies	Wind turbines; Photovoltaic; Solar thermal; Biogas; Tidal energy; Micro-generation; Floating offshore wind; Floating

PROJECT PARTNERS' COUNTRIES



COORDINATOR	NORCE NORWEGIAN RESEARCH CENTRE AS

OTHER PARTNERS

- EDP LABELEC (Portugal)
- UNIVERSITY OF DURHAM (United Kingdom)
- TECHNICAL UNIVERSITY OF DANMARK (Denmark)
- VTT TECHNICAL RESEARCH CENTRE OF FINLAND LTD (Finland)
- FUNDACIÓN TECNALIA RESEARCH & INNOVATION (Spain)
- CENTER DENMARK APS EU Digital Innovation Hub HØJE-TAASTRUP MUNICIPALITY (Denmark)
- CITY OF BERGEN (Norway)
- TMROW APS (Denmark)
- BIR AS (Norway)
- BIR NETT AS (Norway)
- WINGS ICT SOLUTIONS INFORMATION & COMMUNICATION TECHNOLOGIES IKE (Greece)
- WESTEGENS KRAFTVARMESELSKAP IS (Denmark)
- CORE INNOVATION (Greece)
- CORE INNOVATION CENTRE NPO (Greece)
- ENFOR (Denmark)
- BKK NETT AS (Norway)
- EVINY TERMO AS (Norway)
- APS - ADMINISTRACAO DOS PORTOS DE SINES E DO ALGARVE, S.A. (Portugal)
- AMCTECH (Poland)
- CLIMIFY APS (Denmark)

Project Description

Context

The project addresses the European Commission's priorities by focusing on energy system integration, which is essential for achieving sustainability and decarbonisation goals. It aligns with broader objectives of promoting digitalisation and enhancing resilience in energy systems. By integrating various energy vectors and sectors, the project contributes to a more efficient, flexible, and cost-effective energy supply, supporting Europe's transition towards a low-carbon economy and fostering economic growth through innovation and technological advancements.

Project presentation, technical description and implementation

The project addresses challenges in integrating diverse energy systems to enhance flexibility and resilience. It aims to develop tools for effective sector coupling, optimize energy system operation, and foster digitalization.

ELEXIA approach is unique in its comprehensive system-level perspective, emphasizing modularity, openness, and scalability to support diverse pilot sites and replication.

Methodology involves developing a System Planning Toolbox, implementing Energy Management Systems, and deploying a Digital Services Platform.

Key components like smart meters and data analytics enable real-time optimization, contributing to enhanced energy system flexibility and efficiency. This supports the project's goals of cost optimization and sustainability.

Project Impacts

Economic impacts:

- Increased market share for integrated energy solutions.
- New revenue streams from energy management services.
- Job creation in digital energy sectors.

Social impacts:

- Improved quality of life through enhanced energy resilience.
- Skills development and training opportunities for local stakeholders.

Environmental impacts:

- Reduced carbon emissions through optimized energy use.
- Energy and resource savings from enhanced system efficiency.

Technological impacts:

- Development and diffusion of advanced digital energy tools.
- Integration of innovative energy storage and management technologies.

Other impacts:

- Increased cross-sectoral collaboration and knowledge-sharing.
- Policy recommendations for sustainable energy integration.

Innovative aspects of the project

The most innovative aspect of the project is the development of integrated energy management tools that optimize across sectors, leveraging digital technologies like AI and IoT. This approach enables cost-effective and resilient energy systems, fostering cross-sectoral collaboration and accelerating the transition to sustainable energy.

Expected key exploitable results of the project

- Development of an integrated energy management system for sector coupling.
- Deployment of digital tools and platforms for energy optimization and flexibility.
- Creation of advanced forecasting and grid mod-

eling tools.

- Establishment of data exchange and interoperability standards.
- Implementation of cybersecurity solutions for energy systems.

Key exploitable results and sub-key exploitable results achieved to date

Key exploitable results achieved to date:

- Development of an integrated energy management system prototype.
- Successful deployment and demonstration of digital tools for energy optimization.
- Initial testing and validation of forecasting and grid modeling technologies.
- Establishment of preliminary data exchange standards and interoperability protocols.
- Progress in implementing cybersecurity solutions for energy systems.
- Early adoption and feedback on consumer-centric smart technologies.
- Formation and initial operation of pilot energy communities for collective flexibility.

Sub-key exploitable results in progress:

- Refinement and commercialization planning for the integrated energy management system.
- Continued development and enhancement of digital tools for broader market deployment.
- Advancement in forecasting accuracy and grid modeling capabilities.
- Further standardization efforts for data exchange and interoperability.
- Strengthening cybersecurity solutions to meet evolving energy sector needs.
- Expansion of consumer-centric smart technology offerings based on pilot feedback.
- Scaling up pilot energy communities for wider adoption and replication.

HORIZON-CL5-2021-D3-02-05 - Energy Sector Integration: Integrating and combining energy systems to a cost-optimised and flexible energy system of systems

Back to projects' list

Electricity grids | Energy storage | Digitalisation

SENERGY NETS

Increase the synergy among different energy networks

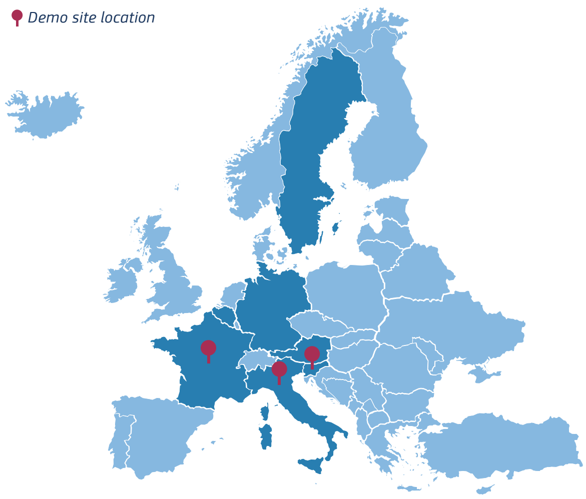
SENERGY NETS aims at demonstrating the technical and economic capability of multi-energy systems to decarbonize the heating and cooling, power and gas sectors through renewable energy sources produced locally as well as sector integration, by primarily focusing on promising infrastructure and business models.

FROM	September 2022
TO	August 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
9 938 450,75 €	8 223 108,66 €	https://senergynets.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response; Heating/cooling peak load management
Grid Technologies	Network management Monitoring & control tools
Distributed Storage Technologies	Batteries; Electric vehicles; Thermal energy production, distribution and storage
Generation Technologies	Photovoltaic; Solar thermal; Micro-generation

PROJECT PARTNERS' COUNTRIES



COORDINATOR	EIFER EUROPAISCHES INSTITUT FUR ENERGIEFORSCHUNG EDF KIT EWIV (Germany)

OTHER PARTNERS

- ELECTRICITE DE FRANCE (France)
- A2A SPA (Italy)
- A2A CALORE & SERVIZI SRL (Italy)
- ASSOCIAZIONE ITALIANA RISCALDAMENTO URBANO (Italy)
- CYBERGRID GMBH & CO KG (Austria)
- EUROHEAT & POWER (Belgium)
- ELEKTRO LJUBLJANA PODJETJE ZADISTRIBUCIJO ELEKTRICNE ENERGIJE D.D. (Slovenia)
- JAVNO PODJETJE ENERGETIKA LJUBLJANA DOO (Slovenia)
- OPERATO (Slovenia)
- RICERCA SUL SISTEMA ENERGETICO - RSE SPA (Italy)
- UNARETI Spa (Italy)
- MALARDALENS UNIVERSITET (Sweden)
- UNIVERSITAET KASSEL (Germany)
- DALKIA (France)
- FUNDACION TECNALIA RESEARCH & INNOVATION (Spain)
- VEOLIA SERVICIOS LECAM SOCIEDAD ANONIMA UNIPERSONAL (Spain)
- UNIVERZA V LJUBLJANI (Slovenia)
- FEDERCONSUMATORI MILANO APS (Italy)

Project Description

Context

SENERGY NETS aims at demonstrating the technical and economic capability of multi-energy systems to decarbonize the heating and cooling, power and gas sectors through renewable energy sources produced locally as well as sector integration, by primarily focusing on promising infrastructure and business models.

Scope. The objective is to develop a set of tools and platforms aimed to optimize the planning and operation of District Heating and Cooling as well as distribution grids with sector coupling consideration and allow the provision of flexibility services to Distribution and Transmission System Operators. The solutions developed in SENERGY NETS will be implemented on three pilot sites.

Project presentation, technical description and implementation

Development of a set of planning tools for the design and simulation of MES (multi-carrier and networks), pluri-annual planning and operational planning of the distribution grid considering flexibility provision from MES for DSO.

Development and testing of an optimized flexibility trading tool, building up on the prototype developed in MAGNITUDE. Using flexibility and price forecasts, the tool will calculate the market bids with best revenue expectations.

To support the demonstration of flexibility provision from MES to DSO, an auxiliary platform based on the INTEGRID project will be developed and tested.

Development of a methodology for the evaluation of the overall (technical, economic, environmental, social) value created by sector integration.

Project Impacts

Replicability. The SENERGY NETS solutions will be tested by MES operators (DHC) and DSO, allowing DSO and MES operators to integrate this solution in further activities.

Socioeconomics. SENERGY NETS solutions will enable DHC systems to reduce their carbon emission by shifting the peak loads and optimizing their energy mix. They will also contribute to the reduction of energy poverty and increase of end user's involvement, as DHC are less influenced by the fluctuation of gas and electricity prices according to their share of renewable energy. Outage probabilities will also be reduced, thus increasing the quality of services provided by the DSO to its customers.

Environment. The use of already available MES for flexibility provision should reduce the use of existing dedicated industrial power plants and the construction of new ones. As a consequence, it limits impact on land use and air quality, thus preserving the local environment and living space quality.

Market transformation. The development of ancillary services markets (ASM) for DSO will bring additional revenue to MES and might reduce the flexibility needs on the transportation grids by managing the integration of RES and new usages of electricity closer to the source.

Policy. The consortium will develop policy recommendations to foster the creation of a supportive regulatory framework in the field of energy systems integration and energy market strategy in line with the 23 and 25 goals

Innovative aspects of the project

Tools and platforms development, aimed to optimise the planning of District Heating and Cooling as well as distribution grids with sector coupling consideration.

Optimised operations of coupled networks with improved planning of integration of power, heat, gas, industry with a production site(s) of renewable energy.

Assessment of benefits of sector integration in different geographic, climate and economic conditions and evaluation of the economics impacts on the overall value creation.

Expected key exploitable results of the project. Tools for the design and simulation of MES and operational planning of the distribution grid, enabling the integration of sectors and allowing to shift flexibility between energy carriers.

Implementation of technical (14 conversion and storage technologies) and digital (9 tools and platforms) solutions including an open-source tool for the design and simulation of MES and networks, EMS for 3rd, 4th and 5th generation DHC, new functionalities for DSO operational planning tools, procurement and activation platforms, and a flexibility trading optimizer.

Methodology for the evaluation of the overall (technical, economic, environmental, social) value created by sector integration.

Three large-scale demonstrators where the operational improvement strategy using advanced planning and control algorithms and tools will be tested to provide flexibility services to the electricity system.

HORIZON-CL5-2021-D3-02-01 - Demonstration of wave energy devices to increase experience in real sea condition

Back to projects' list

Electricity grids

WEDUSEA

Wave Energy Demonstration At Utility Scale To Enable Arrays

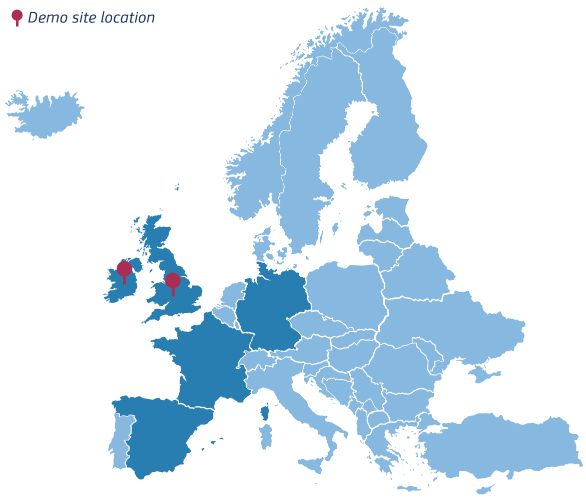
WEDUSEA aims to demonstrate a grid-connected 1MW floating wave energy converter at the European Marine Energy Centre in Orkney, Scotland. The project's primary focus is on validating the technology's performance, reliability, and environmental impact in real sea conditions. Key objectives include showcasing the viability of wave energy devices for utility-scale deployment, contributing to policy development and technical standards, and increasing investor confidence in wave energy projects. Measurable outcomes include the demonstration of technology suitable for mass production, competitive Levelized Cost of Energy (LCOE), realization of multi-megawatt array deployments, and public acceptan.

FROM	October 2022
TO	August 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
13 086 433,75 €	9 636 874,38 €	https://wedusea.eu/

TECHNOLOGIES AND SERVICES DEPLOYED		
H2	**Large Scale Storage Technologies**	Other large-scale storage technologies (Generation technologies - focusing on wave energy conversion)

PROJECT PARTNERS' COUNTRIES



COORDINATOR	NEW WAVE TECHNOLOGIES LIMITED (Ireland)

OTHER PARTNERS

- INNOSEA (FR)
- AST (ES)
- Fraunhofer IEE (DE)
- MaREI UCC (IRL)
- Gavin Doherty Geosolutions (IRL)
- Exceedence (IRL)
- Wood Group (IRL)
- Hydro Group (UK)
- European Marine Energy Centre (UK)
- Longitude Engineering (UK)
- INNOSEA Ltd (UK)
- Green Marine UK (UK)

Project Description

Context

Project WEDUSEA aligns with the thematic areas and priorities identified by the European Commission, particularly in the context of sustainable energy transition and renewable energy development. By focusing on the demonstration of a grid-connected wave energy converter, the project contributes to enhancing energy security, reducing greenhouse gas emissions, and promoting the use of clean and renewable energy sources. Moreover, WEDUSEA integrates digitalization and innovation by deploying advanced technologies for wave energy conversion and grid integration, thereby fostering technological advancements and economic growth in the clean energy sector. Additionally, the project aims to enhance

Project presentation, technical description and implementation

The WEDUSEA project demonstrates a 1MW floating wave energy converter in real sea conditions. The project goal is to validate its reliability and environmental impact for commercial viability. It uses use the OE Buoy FLOWC device, featuring a single moving part for reliability. Methodologically, we the project conducts a 2-year demonstration at EMEC, Scotland, analyzing performance and environmental impacts. Key components include the FLOWC device, grid integration technologies, and environmental monitoring systems.

Project Impacts

Technological impacts: development of new technologies of TES coupled with power cycle and heat pump.

Economic impacts:

- Increased market share for wave energy technology providers.
- Job creation in the renewable energy sector.

Social impacts:

- Enhanced quality of life in coastal communities through sustainable energy development.
- Increased public awareness and acceptance of wave energy as a renewable energy source.

Environmental impacts:

- Reduction in greenhouse gas emissions through the use of clean, renewable energy.
- Mitigation of environmental degradation by reducing reliance on fossil fuels.

Technological impacts:

- Advancement in wave energy converter technology, contributing to the development of renewable energy solutions.
- Transfer of innovative technologies and practices to other sectors.

Other impacts:

- Contribution to the achievement of European Union Green Deal targets.
- Promotion of sustainable development and energy security.

Innovative aspects of the project

The most impactful aspect of the project lies in the demonstration of a grid-connected 1MW floating wave energy converter in real sea conditions. This showcases the viability of wave energy as a renewable resource and contributes to policy, technical standards, and investor confidence, fostering the transition to clean energy.

Expected key exploitable results of the project

- Commercial-scale grid-connected 1MW floating wave energy converter (WEC).
- Certification and accreditation of the WEC technology.
- Technological advancements leading to cost reduction and increased reliability.
- Establishment of international standards for wave energy conversion.
- Development of multi-MW array deployments for renewable energy integration.

- Public acceptance and awareness of wave energy as a viable renewable energy source.

Key exploitable results and sub-key exploitable results achieved to date

- Successful demonstration of a grid-connected 1MW floating wave energy converter (WEC).
- Initial certification and accreditation progress for the WEC technology.
- Technological advancements showing promise for cost reduction and increased reliability.
- Initial steps towards the establishment of international standards for wave energy conversion.
- Progress towards the development of multi-MW array deployments for renewable energy integratio.
- Initial efforts in enhancing public acceptance and awareness of wave energy as a viable renewable energy source findings of the extended deployment, environmental assessment and contributions to the IEC standards.

HORIZON-CL5-2021-D3-01-03 - Interoperability community | Back to projects' list

Electricity grids | Energy storage

int:net

Interoperability Network for the Energy Transition

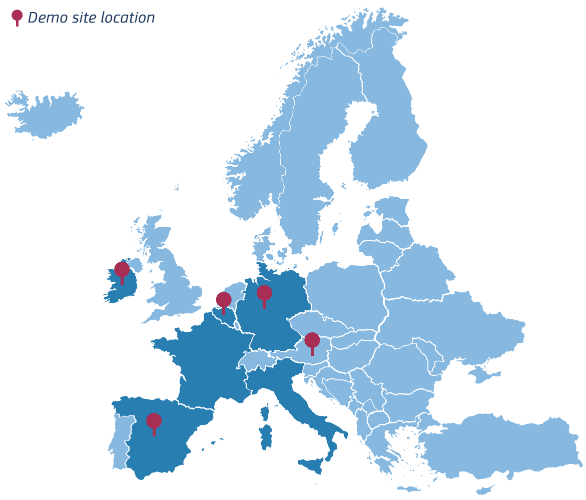
The project focuses on fostering interoperability in the European energy sector through the establishment of an open and cross-domain community known as the Interoperability Network for the Energy Transition (int:net). Key objectives include creating a common knowledge base for interoperability activities, developing an Interoperability Maturity Model, establishing a framework for interoperability testing, and building a community network for a European interoperability ecosystem. Measurable outcomes include increased interoperability of energy services and platforms, the adoption of interoperability maturity models, and the establishment of a sustainable network of interoperability testing

FROM	May 2022
TO	April 2025

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
4 995 541,50 €	4 995 541,50 €	https://intnet.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	High Voltage Alternating Current; High Voltage Direct Current; Multi-terminal; Micro-grid; Semiconductor devices and power converters; Grid inertia
Large Scale Storage Technologies	Compressed air energy storage; Hydro storage; Molten salt storage
Distributed Storage Technologies	Batteries Thermal energy production, distribution and storage
Generation Technologies	Wind turbines; Photovoltaic; Biogas
Market	Electricity market; Ancillery services

PROJECT PARTNERS' COUNTRIES



COORDINATOR	FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V. (Germany)

OTHER PARTNERS

- AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH (Austria)
- B.A.U.M. CONSULT GMBH (Germany)
- OFFIS EV (Germany)
- EPRI EUROPE DAC (Ireland)
- VDE VERBAND DER ELEKTROTECHNIK ELEKTRONIK INFORMATIONSTECHNIK EV (Germany)
- FUNDACION TECNALIA RESEARCH & INNOVATION (Spain)
- EUROPEAN NETWORK OF TRANSMISSION SYSTEM OPERATORS FOR ELECTRICITY AISBL (Belgium)
- EUROPEAN DISTRIBUTION SYSTEM OPERATORS FOR
- SMART GRIDS (Belgium)
- EUROPEAN UNIVERSITY INSTITUTE (Italy)
- RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (Germany)
- TRIALOG (France)

Project Description

Context

The project aligns with the European Commission's priorities by addressing sustainability, digitalisation, and inclusion. It aims to enhance energy transition through interoperability, promoting cross-domain collaboration. By fostering digital tools and system integration, it contributes to sustainable energy practices and economic growth. This initiative reflects EU's emphasis on advancing clean energy technologies while ensuring accessibility and efficiency, thus supporting Europe's transition to a greener and more digitally integrated future.

Project presentation, technical description and implementation

The project, int:net, establishes an interoperability network for the energy transition. It addresses complex interfaces, promotes open standards, and fosters collaboration among stakeholders. The approach involves developing a comprehensive Interoperability Maturity Model (IMM), testing framework, and community network. Technologies deployed include demand response, smart metering, grid management tools, and various energy storage and generation technologies. This effort facilitates seamless integration of energy services, enhancing grid flexibility and supporting Europe's energy transition goals.

Project Impacts

Economic impacts:

- Increased market share for interoperable energy services.
- Facilitated market entrance for new energy solutions.
- Enhanced revenue streams for stakeholders through interoperable platforms.

Social impacts:

- Creation of new jobs in the energy sector.
- Improved quality of life through efficient and reliable energy services.
- Increased community engagement in energy management.

Environmental impacts:

- Reduced $CO2$ emissions through optimized energy systems.
- Energy savings resulting from improved grid management.

Technological impacts:

- Development and adoption of new interoperable technologies.
- Diffusion of innovative solutions for energy transition.

Policy impacts:

- Influence on regulatory frameworks for interoperability standards.
- Support for European energy policy objectives.

Innovative aspects of the project

The most innovative aspect of the project lies in the establishment of an open and cross-domain community focused on interoperable energy services. By fostering collaboration among diverse stakeholders, the project aims to drive the development, testing, and deployment of interoperable energy solutions, ultimately accelerating the transition to a more sustainable and efficient energy system.

Expected key exploitable results of the project

- Development of a common knowledge base for interoperability activities on energy services in Europe, facilitating increased interoperability of energy services, data, and platforms.
- Establishment of a comprehensive and accepted Interoperability Maturity Model (IMM) to ensure continuity of interoperability efforts.
- Creation of a framework for interoperability testing in a network of testing facilities, harmonizing testing procedures and fostering a self-sustained network of interoperability labs.
- Formation of a community network for a Eu-

ropean interoperability ecosystem, promoting horizontal coordination and sustainable uptake of interoperable energy services, data spaces, and digital twins.

Key exploitable results and sub-key exploitable results achieved to date

- Establishment of a common knowledge base for interoperability activities on energy services in Europe, enhancing interoperability of energy services, data, and platforms.
- Development of an Interoperability Maturity Model (IMM) to assess and improve the interoperability of energy services, ensuring continuity of interoperability efforts.
- Progress towards creating a framework for interoperability testing in a network of testing facilities, aiming to harmonize testing procedures and establish a network of interoperability labs.
- Advancement in forming a community network for a European interoperability ecosystem, fostering coordination and uptake of interoperable energy services, data spaces, and digital twins.
- Sub-key exploitable results in the early stages may include initial data collection and analysis for the knowledge base, preliminary development of the Interoperability Maturity Model, and early planning for the framework of interoperability testing.

HORIZON-CL5-2021-D3-01-01 - Establish the grounds for a common European energy data space

Back to projects' list

Electricity grids | Energy storage | Digitalisation

SYNERGIES

Shaping consumer-inclusive data pathwaYs towards the eNERGy transItion, through a reference Energy data Space implementation

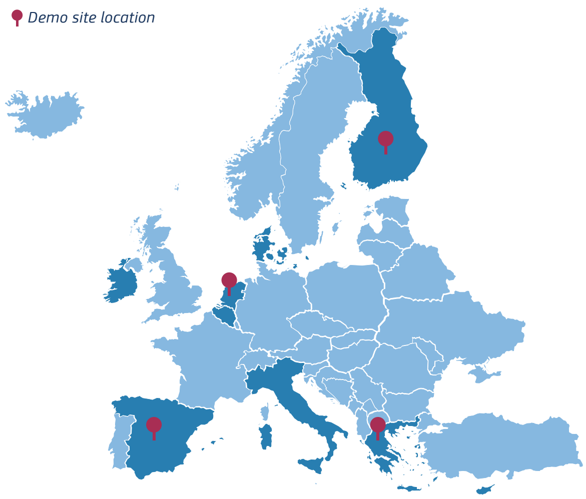
The SYNERGIES project aims to create a reference Energy Data Space Implementation to facilitate data-driven innovation and sharing across the energy value chain. It focuses on leveraging data from diverse energy actors and sectors to improve efficiency and inclusiveness. The project will involve activities such as diagnostics, technology configuration, deployment, and business innovation planning. Measurable outcomes include increased revenues from data-driven services, consumer empowerment in energy transactions, CO2 emissions reduction, and the creation of a new market for data-driven services..

FROM	September 2022
TO	February 2026

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
10 180 687,50 €	7 972 950,00 €	https://energydataspaces.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	High Voltage Alternating Current; High Voltage Direct Current; Micro-grid; Grid inertia; Network management; Monitoring and control tools
Large Scale Storage Technologies	Compressed air energy storage, Hydro storage, Molten salt storage
Distributed Storage Technologies	Batteries, Electric vehicles, Thermal energy production, distribution and storage
Generation Technologies	Wind turbines, Photovoltaic, Biogas
Market	Electricity market, Ancillery services

PROJECT PARTNERS' COUNTRIES



COORDINATOR	TXT e-solutions spa (IT)

OTHER PARTNERS

- INSTITUTE OF COMMUNICATIONAND COMPUTER SYSTEMS (EL)
- DIACHEIRISTIS ELLINIKOUDIKTYOUDIANOMIS
- ELEKTRIKIS ENERGEIAS AE(EL)
- INDEPENDENTPOWER TRANSMISSIONOPERATOR SA (EL)
- ENERGEIAKI KOINOTITAPERIORISMENISEVTHINIS (EL)
- FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS (ES)
- CUERVA ENERGÍA SLU (formerly MONTAJES ELECTRICOS CUERVA S.L) (ES)
- SUITES DATA INTELLIGENCE SOLUTIONS LIMITED (CY)
- IES R&D (IE)
- ETRA INVESTIGACION Y DESARROLLO SA (ES)
- GIOUMPITEK MELETI SCHEDIASMOS YLOPOIISI KAI POLISI ERGONPLIROFORIKIS ETAIREIA PERIORISMENIS EFTHYNIS (EL)
- ARTHUR'S LEGAL BV (NL)
- TEKNOLOGIANTUTKIMUSKESKUS VTT OY (FI)
- UNIVERSITY OF PELOPONNESE(EL)
- MAGGIOLI SPA (IT)
- DANMARKS TEKNISKEUNIVERSITET(DK)
- BORNHOLMS ENERGI OG FORSYNING AS (DK)
- TREFOR EL NET OST AS (DK)
- PROSPEXINSTITUTE(BE)
- INTERSOFTROMANIA SOFTWARESRL()
- AYUNTAMIENTODEFORNES (ES)
- TURNING TABLES SOCIEDAD LIMITADA (ES)

Project Description

Context

The project operates within the framework of the European Commission's thematic priorities, focusing on sustainability, digitalization, inclusion, and economic growth. It aligns with EU objectives of transitioning to a sustainable energy system, fostering digital innovation, empowering consumers, and promoting economic development. By leveraging digital tools and energy data, the project aims to enhance energy efficiency, integrate renewable energy sources, and promote consumer participation in the energy transition. This aligns with the EU's efforts to achieve climate neutrality, promote digitalization across sectors, ensure social inclusion, and drive economic prosperity.

Project presentation, technical description and implementation

1. Addressing energy data management challenges, the project aims to develop a reference Energy Data Space Implementation prioritizing consumer engagement.

2. The project approach emphasizes inclusivity and interoperability, enabling data-driven innovation and cross-sector collaboration, setting it apart from existing solutions.

3. Methodology involves four phases: Diagnostics, Technology Configuration, Integration, and Business Innovation, ensuring user involvement and real-life validation.

4. Key components include digital tools for smart grid management, data exchanges, and consumer-centric technologies, contributing to enhanced energy efficiency and sustainability.

Project Impacts

Economic impacts: Increased market share, New market entrance, Increased direct revenues.

Social impacts: New jobs created, Increased quality of job, Improved quality of life.

Environmental impacts: Decreased CO2 emissions, Energy savings, Resources savings.

Technological impacts: Development and diffusion of new digital technologies and data-driven innovations.

Policy impacts: Contributing to standardization efforts and policy recommendations for sustainable energy transition.

Innovative aspects of the project

The project introduces a pioneering Energy Data Space Implementation, fostering data-driven innovation in the energy sector. By prioritizing consumer data ownership and promoting cross-sectoral data sharing, it unlocks untapped potential for optimized energy operations and market transactions, driving efficiency and sustainability.

Expected key exploitable results of the project

- Reference Energy Data Space: A comprehensive platform for energy data innovation.
- Consumer Data Ownership: Protocols for consumer data control.
- Cross-Sector Data Sharing: Mechanisms for stakeholder collaboration.
- Intelligent Analytics Tools: Advanced tools for optimized decision-making.
- Standardized Data Exchange: Protocols for seamless data exchange.
- Data Monetization Models: Business strategies for data-driven revenue.

Key exploitable results and sub-key exploitable results achieved to date

- Developed prototype of the Reference Energy Data Space (REDS).
- Established protocols for consumer data ownership and control.
- Implemented mechanisms for cross-sector data sharing.

- Deployed intelligent analytics tools for optimized decision-making.
- Initiated development of standardized data exchange protocols.
- Explored potential business models for data-driven revenue generation.

HORIZON-CL5-2021-D3-01-01 - Establish the grounds for a common European energy data space

Back to projects' list

Digitalisation

OMEGA-X

Orchestrating an interoperable sovereign federated Multi-vector Energy data space built on open standards and ready for GAia-X

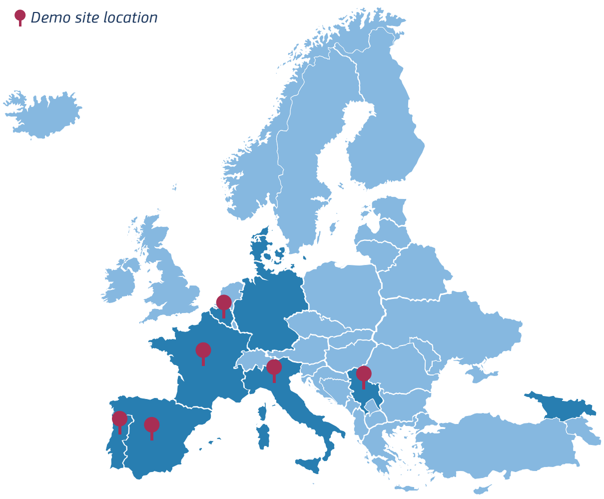
The aim of OMEGA-X is to implement a Data Space (based on European common standards), including federated infrastructure, data marketplace and service marketplace, involving data sharing between different stakeholders and demonstrating its value for real and concrete Energy use cases and needs, while guaranteeing scalability and interoperability with other Data Space initiatives, not just for energy but also cross-sector.

FROM	May 2022
TO	April 2025

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
10 223 435,00 €	7 995 320,38 €	https://omega-x.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response
Grid Technologies	Network management, monitoring and control tools
Other Technologies and Services	Data Spaces, Data Marketplaces, Services Marketplaces

PROJECT PARTNERS' COUNTRIES



COORDINATOR	ATOS IT SOLUTIONS AND SERVICES IBERIA SL (Spain)

OTHER PARTNERS

- Atos Worldgrid (FR)
- Tecnalia (SP)
- EDF (FR)
- ENGIE (FR)
- EDP (PT)
- Estabanell (SP)
- Elia (BE)
- Polytechnic University of Catalunya (SP)
- IDSA (GE)
- Intracom (GR)
- Odit-e (FR)
- Open & Agile Smart Cities (BE)
- RINA Consulting (IT)
- Municipality of Maia (PT)
- Aarhus University (DK)
- IMT Transfert (FR)
- Maiêutica – Cooperativa de Ensino Superior (PT)
- Institut Mihajlo Pupin (SRB)
- SENER (SP)
- Estabanell y Pahisa MERCATOR (SP)
- Astea (IT)
- Universidade Catolica Portuguesa (PT)
- GIREVE (FR)
- Energy Web (GE)
- LichtBlick (GE)

Project Description

Context

Relying on European common standards, the EU-funded OMEGA-X project aims to implement an energy data space. This will include federated infrastructure, data marketplace and service marketplace, involving data sharing between different stakeholders and demonstrating its value for concrete energy use cases while guaranteeing scalability and interoperability with other data space initiatives.

OMEGA-X set up four use case families that will showcase the value of having a common energy data space for a particular problem identified by energy stakeholders: renewables, local energy communities, electromobility and flexibility.

Project presentation, technical description and implementation

OMEGA-X proposed concept and architecture heavily rely on the approaches adopted by both IDSA and Gaia-X, as major EU references regarding Data Spaces, including also additional references such as FIWARE, BDVA/DAIRO and SGAM (purely on the energy sector). IDSA approach focuses on data sovereignty, as the ability of a given actor (corporate or person) to act as self-determined for its own data. Therefore, the primary goal of its reference architecture relies on deriving appropriate requirements for a sound, secured and trusted data trading.

The development of easy-to-access business analytics and services on top of the existing data, is expected to support the clean energy transition and boost value creation. Providing energy data to a wide-open access platform, could enable stakeholders, such as municipalities, to create new business cases triggering economic and social value from it.

Project Impacts

OMEGA-X will develop an Energy Data Space that enables multiple actors sharing data and services while ensuring privacy, security and sovereignty. This will specifically address the current problem of low availability of data for innovative uses in the energy sector and beyond. OMEGA-X will collaborate with stakeholders to identify where energy-based service improvements and innovation are required, and how OMEGA-X could potentially be used and adopted to address the needs: How can companies and organizations share their data safely; Empower new participants and market roles and create an opportunity for new business models to emerge; Develop and promote inclusive and collaborative behaviors.

Innovative aspects of the project

Implementation of a Data Space (based on European common standards), including federated infrastructure, data marketplace and service marketplace, involving data sharing between different stakeholders and demonstrating its value for real and concrete Energy use cases and needs, while guaranteeing scalability and interoperability with other Data Space initiatives, not just for energy but also cross-sector.

Expected key exploitable results of the project

- 1 OMEGA-X cloud based data space components: Horizontal modules allowing federation and data exchange on the Data Space, excluding the part on Marketplaces.
- 2 OMEGA-X Data/service marketplace: Data sharing between different stakeholders and demonstrating its value for real and concrete Energy use cases and needs, allowing the exchange and monetization of data and services.
- 3 OMEGA-X Common Semantic Data Models: Common semantic data models defined in OMEGA-X based on the use case requirements and leveraging existing open-source standard ontologies.

HORIZON-CL5-2021-D3-01-01 - Establish the grounds for a common European energy data space

Back to projects' list

Electricity grids | Digitalisation | Consumers/prosumers

ENERSHARE

European commoN EneRgy dataSpace framework enabling data sHaring-driven Acrossand beyond- eneRgy sErvices

Enershare

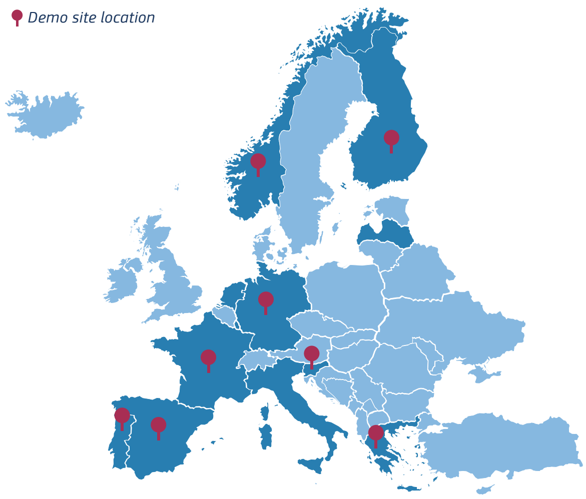
ENERSHARE aims to develop and demonstrate a European Common Energy Data Space, fostering interoperable and trusted data sharing among stakeholders. The project will create an Energy Data Ecosystem enabling access to fragmented data sources and facilitating data-driven cross-value chain services. Measurable outcomes include the establishment of a Reference Architecture, deployment of blockchain-enabled marketplace, and co-designing consumer-centric business models. Key research areas include data interoperability, blockchain technology, and consumer empowerment. The overarching theme is to promote data sharing for enhanced market efficiency and sustainability in the energy sector.

FROM	July 2022
TO	June 2025

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
9 593 822,50 €	7 999 711,75 €	https://enershare.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	High Voltage Alternating Current; High Voltage Direct Current; Micro-grid
Large Scale Storage Technologies	Power to gas; Compressed air energy storage;
Distributed Storage Technologies	Batteries; Electric vehicles; Thermal energy production, distribution and storage

PROJECT PARTNERS' COUNTRIES



COORDINATOR: ENGINEERING INGEGNERIA INFORMATICA SPA (ITALY)

OTHER PARTNERS

- RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (Germany)
- EUROPEAN DYNAMICS SA (Luxembourg)
- FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV (Germany)
- FUNDACION TECNALIA RESEARCH & INNOVATION (Spain)
- INESC TEC - INSTITUTO DE ENGENHARIADE SISTEMAS E COMPUTADORES, TECNOLOGIA E CIENCIA (Portugal)
- SMART ENERGY LAB - ASSOCIATION (Portugal)
- NEDERLANDSE ORGANISATIE VOOR TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK TNO (The Netherlands)
- ETHNICON METSOVION POLYTECHNION (Greece)
- TRIALOG (France)
- COMSENSUS, KOMUNIKACIJE IN SENZORIKA (Slovenia)
- ENVIRODUAL, TRAJNOSTNO OKOLJSKO IN ENERGETSKO UPRAVLJANJE, RAZISKAVE IN IZOBRAZEVANJE, D.O.O. (Slovenia)
- SMART INNOVATION NORWAY AS (Norway)
- INTERNATIONAL DATA SPACES EV (Germany)
- ENVIRODUAL, TRAJNOSTNO OKOLJSKO IN ENERGETSKO UPRAVLJANJE, RAZISKAVE IN IZOBRAZEVANJE, D.O.O. (Slovenia)
- CENTRO DE INVESTIGACAO EM ENERGIA REN - STATE GRID SA (Portugal)
- ASM TERNI SPA (Italy)
- ELES DOO SISTEMSKI OPERATER PRENOSNEGA ELEKTROENERGETSKEGA OMREZJA (Slovenia)
- ENGIE (France)
- DEPA COMMERCIAL SA (Greece)
- CLUSTER DE ENERGIA (Spain)
- EMOTION SRL (Italy)
- HINE RENOVABLES SL (Spain)
- ELECTRICITE DE FRANCE (France)
- KOMUNALNO PODJETJE VELENJE DOO (Slovenia)
- FORTUM OYJ (Finland)
- NOKIA OYJ (Finland)
- ELEKTRO CELJE D.D. (Slovenia)
- FIWARE FOUNDATION EV (Germany)
- ELEKTRO LJUBLJANA PODJETJE ZADISTRIBUCIJO ELEKTRICNE ENERGIJE D.D. (Slovenia)
- VIDES INVESTICIJU FONDS SIA (Latvia)

Project Description

Context

The project addresses critical challenges in the European energy sector, aligning with EU priorities such as sustainability, digitalization, and economic growth. By developing a European Common Energy Data Space, it promotes data sharing and interoperability, essential for creating a consumer-centric and decarbonized energy system. This initiative supports EU policies aiming to enhance energy efficiency, integrate renewable energy sources, and foster innovation. Furthermore, by enabling cross-sector collaboration and empowering consumers, ENERSHARE contributes to a more inclusive and resilient energy transition, essential for achieving the EU's long-term climate and energy goals.

Project presentation, technical description and implementation

The project aims to address several technological challenges in the European energy sector. It focuses on developing a European Common Energy Data Space to facilitate data sharing among stakeholders, promoting interoperability and trust. The project objectives include creating a robust data ecosystem, enhancing cross-value chain services, and deploying digital twins for various purposes.

What sets our technical approach apart is its comprehensive nature. The project integrates SGAM, IDSA, and GAIA-X architectures to develop a hybridized Reference Architecture for the Energy Data Space. This approach combines data value chain perspectives with energy sector requirements, ensuring privacy, security, and sovereignty.

The methodology involves evolving interoperability, trust, and governance building blocks to TRL 6-7 IDSA-compliant standards. Our methodology involves evolving interoperability, trust, and governance building blocks to TRL.

Project Impacts

Economic impacts:

- Increased market share for energy services providers participating in the Energy Data Space.
- New revenue streams from value-added services enabled by data sharing.
- Enhanced competitiveness of European energy companies in global markets.

Social impacts:

- Creation of new job opportunities in the energy data sector.
- Improved quality of life for consumers through access to innovative energy services.
- Increased trust and transparency in energy transactions, fostering community engagement.

Environmental impacts:

- Reduction in carbon emissions through optimized energy management and decarbonization efforts.
- Promotion of renewable energy integration and energy efficiency measures.
- Conservation of natural resources through more sustainable energy practices.

Technological impacts:

- Development and deployment of new data sharing technologies and standards.
- Accelerated innovation in digitalization and energy sector transformation.
- Facilitation of cross-sector collaboration and interoperability in the energy ecosystem.

Innovative aspects of the project

The project's most innovative aspect lies in establishing a European Energy Data Space, fostering cross-sector interoperability and trust. By enabling stakeholders to access and share data securely, it promotes data-driven services and Digital Twins, fostering a more efficient and consumer-centric energy system.

Expected key exploitable results of the project

- Development of a European Energy Data Space framework.
- Creation of interoperable energy data ecosystem.
- Deployment of cross-value chain data-driven service.s
- Establishment of Digital Twins for various purposes.
- Implementation of privacy-preserving federated learning for value-added services.

Key exploitable results and sub-key exploitable results achieved to date

- Development of a Reference Architecture for a European Energy Data Space, integrating SGAM with IDSA and GAIA-X architectures.
- Advancement of interoperability, trust, and governance building blocks to TRL o 6-7 IDSA-compliant standards.
- Deployment of cross-sector data enhancement technologies and standardizable interfaces.
- Establishment of a blockchain-based marketplace for tokenized asset exchange.
- Integration of privacy-preserving federated learning for value-added services and Digital Twins.
- Co-designing consumer-centric business models for energy data sharing.
- Contributing to EU-level initiatives for data space standardization.

HORIZON-CL5-2021-D3-01-01 - Establish the grounds for a common European energy data space

Back to projects' list

Electricity grids | Digitalisation | Consumers/prosumers

EDDIE

European Distributed Data Infrastructure for Energy

The Clean Energy Package establishes customer rights to access energy data and share it with chosen eligible parties, fostering the development of new data-driven services within and beyond the energy sector. The lack of standardized procedures across the EU poses a significant obstacle to the implementation of such solutions. Currently, actors adhere to national practices, hindering interoperability and limiting growth opportunities.

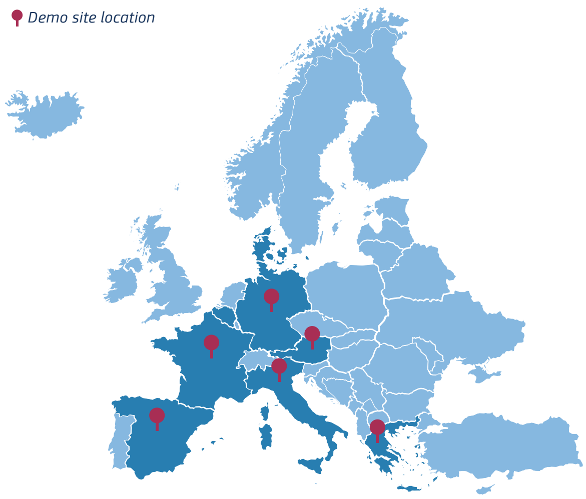
FROM	January 2023
TO	December 2025

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
8 800 168,77 €	7 989 333,01 €	https://eddie.energy/

TECHNOLOGIES AND SERVICES DEPLOYED

Technologies for consumer	Demand response; Smart appliances; Smart metering
Grid Technologies	Monitoring and control tool
Other Technology and Services	Energy system modelling

PROJECT PARTNERS' COUNTRIES



COORDINATOR: FH OO FORSCHUNGS & ENTWICKLUNGS GMBH (Austria)

OTHER PARTNERS

- COPENHAGEN BUSINESS SCHOOL (Denmark)
- EUROPEAN UNIVERSITY INSTITUTE (Italy)
- UNIVERSITAT WIEN (Austria)
- FH OO FORSCHUNGS & ENTWICKLUNGS GMBH (Austria)
- THE LISBON COUNCIL FORECONOMIC COMPETITIVENESS ASBL (Belgium)
- PONTON GMBH (Germany)
- ASOCIACION DE EMPRESAS DE ENERGIA ELECTRICA (Spain)
- DIMOSIA EPICHEIRISI DIKTYON DIANOMIS AERIOU MONOPROSOPI ANONYMI ETAIREIA (Greece)
- EDA ENERGIEWIRTSCHAFTLICHER DATENAUSTAUSCH GMBH (Austria)
- SUDTIROLER ENERGIE VERBAND GENOSSENSCHAFT (Italy)
- FLEXIDAO S.E.S., SOCIEDAD LIMITADA (Spain)
- DIGITAL4GRIDS (France)
- EUROPEAN ASSOCIATION FOR THE STREAMLINING OF ENERGY EXCHANGEGAS (France)
- ENTARC.EU (Austria)

Project Description

Context

The fast-growing need for more flexibility across sectors requires to rethink current approaches to ease and accelerate the deployment of energy data-based services taking advantage of the large deployment of Smart metering and new IoT sensors within and beyond the energy sector. However, the main barrier to facilitate reuse of this data is that there is currently no large scale, uniform, and easy access to consumer energy data across European Member States (MSs), which is a significant barrier to develop these services across Europe, whether as web-based or mobile applications to citizen energy awareness and foster development of new energy management and flexibility offerings.

Project presentation, technical description and implementation

Project EDDIE (https://eddie.energy, funded from 223-225 by the Horizon Europe Program) investigates another direction to establish a European communication layer above the MS data exchange environments to provide a harmonized European interface. Considering the shortfalls experienced through the deployment of centralised, inter-dependent and inflexible platform, the EDDIE consortium proposes a completely decentralised, distributed, open-source Data Space solution, aligned with directions of the work on the Implementing Acts on Interoperability as mandated by Article 24 of Directive (EU) 219/944, the European Data Strategy and accommodated with the European Data Spaces Initiative. From the project's viewpoint, grid operators, smart energy system actors infrastructure operators must team up to unlock the full potential of data-driven services.

Project Impacts

Data Interoperability, drastically lowered costs for startups, Energy Communities, aggregators and other data-driven services.

Innovative aspects of the project

EDDIE creates a "Write Once, Run Anywhere" for Energy data-driven solutions across EU and beyond. In addition to that, EDDIE's AIIDA (Administrative Interface for In-House Data Access) component makes it easy to connect with final customers for the realisation of smart Energy Communities and Distributed Flexibility schemas.

Expected key exploitable results of the project

EDDIE aims to achieve 6 key objectives:

- OBJ#1: Deliver a unified, de-central and highly scalable European interface.
- OBJ#2: Develop a consent-based interface – the Administrative Interface for In-house Data Access (AIIDA)
- OBJ#3: Provide demonstrated connectors to that unified European interface for more than 7% of EU MSs, UK, AUS and US
- OBJ#4: Carry out scientific assessment of relevant aspects of energy data-sharing
- OBJ#5: Ensure that EDDIE is ready to be used, to stay, and to be further developed by an Open Source Community.
- OBJ#6: dentify and disseminate small or big hurdles while conceptualizing and developing EDDIE to Member State (MS) data-sharing infrastructure operators, national and European legislation to allow for improvement and convergence in that sector.

Key exploitable results and sub-key exploitable results achieved to date

Running online demo (https://online.eddie.energy, account on request) realising a unified interface for AT, ES, FR, DK and others)

HORIZON-CL5-2021-D3-01-01 - Establish the grounds for a common European energy data space

Back to projects' list

Electricity grids | Energy storage | Digitalisation

DATA CELLAR

Data Hub for the Creationof Energy communities at Local Level and to Advance Research on them

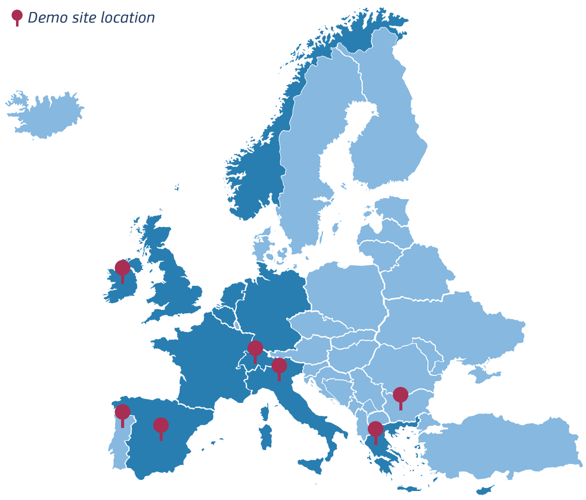
DATA CELLAR aims to create a public energy dataspace that will support the creation, development and management of LECs in EU. Such dataspace will be easy to be populated (also via an innovative rewarded private metering approach) and easy to interact with, also guaranteeing a smooth integration with other EU energy dataspaces and providing to LEC stakeholders services and tools for developing their activities. DATA CELLAR will implement a collaborative platform.

FROM	June 2022
TO	November 2025

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
8 530 793,93 €	6 954 062,50 €	https://datacellarproject.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand Response; Smart Appliance Heating/cooling peak load management
Market	Electricity Market Ancillary Services

PROJECT PARTNERS' COUNTRIES



COORDINATOR	Rina Consulting SPA (Italy)
OTHER PARTNERS	CERTH (Greece); CIRCE (Spain); UBITECH(Belgium); NODES(Norway); QUE (Greece); POLITO (Italy); AEM (Switzerland); LINKS (Italy); CTIC (Spain); EDF (France); EUNICE(Germany); TRI (Ireland); TRI (UK); RUG (Netherland); ZABALA (Belgium); ZABALA INN (Spain); EPL (Cyprus); FOSS (Cyprus)

Project Description

Context

Local Energy communities have been recognized by EC as key measure to boost EU energy transition by promoting collective self-consumption, more flexibility, and equity in energy services. At the same time digitalization of EU energy system and proper data sharing among energy players look crucial to foster best practice sharing and the creation of a knowledge community to tackle one of the most urgent global crisis of our society:climate change. Moreover, the European strategy for data aims to create a single data market to support both Europe's global competitiveness and sovereignty focusing on the concept of Data Space.In this context DATA CELLAR aims to create an open Energy Data Space.

Project presentation, technical description and implementation

DATA CELLAR is going to develop and Energy Data Space compliant with GAIA-X and interoperable with other sister project with the final aim to create a Common European Energy Data Space (CEEDS). The Data Space will include components that implement required functionalities of an Minimum Viable Data space (MVD), namely the Identity Provider and the Catalogue are included in the overall architecture to ensure the development of a properly functional data space. The data space exchange protocol is implemented with the support of an enabling software component: the data space connector. A connector is integrated into each data space participant's infrastructure and all participants communicate via their connectors. The remaining Data Cellar data space participants (ecosystems) are divided into the following categories: Data Providers, Service Providers and Data Consumers.

Project Impacts

Economic impact: increment of investments by local partners and new Energy Communities creation

Environmental impact: decreased CO2

Technological impact: increment of RES self-consumed, larga amout of data avaialbe in the data space ecosystem, development of Data Space Platform, new services built up on large data avaialibility

Social impact: job creation and citizen engagement as well as Energy Communities involved

Innovative aspects of the project

In general the creation of a Data Space in a topic of great interest for the EC in the context of energy sector nowadays there is no open data space at European level and the work perfomed in DATA CELLAR will help doing a step forward in this direction

Expected key exploitable results of the project

DATA CELLAR Data Space Component (Catalogue and Connector), Marketplace, AI Models and libraries, Decision Support System, Digital Twin, Private metering system

LC-SC3-EC-3-2020 - Consumer engagement and demand response	Back to projects' list
Consumers/Prosumers	System integration

ACCEPT

ACtive Communities & Energy Prosumers for the energy Transition

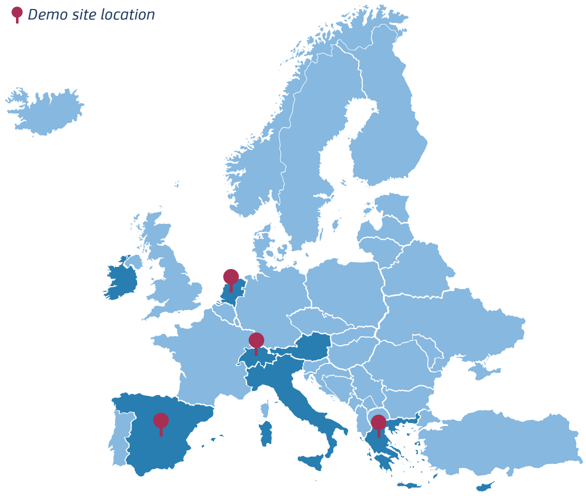
In order to maximize the grid integration of variable renewable energy sources in a cost-efficient way, ACCEPT aims to untap the demand flexibility potential from energy communities by actively involving them and their members in the project activities.To achieve this, the project will develop and deliver a digital toolbox which will be used by the energy communities and prosumers to achieve certain objectives. These objectives include i) the development of innovative digital services, for the community members and customers and ii) the access to revenue streams that will support the longevity and the well-functioning of the community itself.

FROM	January 2021
TO	June 2024

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
7 458 194,90 €	5 862 476,38 €	https://www.accept-project.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response; Smart appliances; Heating/cooling peak load management; Other technologies for consumers (Citizen Application for accessing compound services)
Market	Electricity market; Other market services (Flexibility market / Local flexibility market)

PROJECT PARTNERS' COUNTRIES



COORDINATOR	HYPERTECH (CHAIPERTEK) ANONYMOS VIOMICHANIKI EMPORIKI ETAIREIA PLIROFORIKIS KAI NEON TECHNOLOGION (GR)

OTHER PARTNERS

- CIRCE (ES)
- GECO GLOBAL (DK)
- QUE TECHNOLOGIES (GR)
- ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS - CETH (GR)
- WITSIDE INTERNATIONAL MARKETS LIMITED (CY)
- UNIVERSITY COLLEGE CORK (IE)
- RINA CONSULTING SPA (IT)
- MYTILINEOS SA (GR)
- BEDRIJFSBUREAU ENERGIE SAMEN BV (NL)
- COOPERATIEF ENERGIE DIENSTENBEDRIJF RIVIERENLAND BA (NL)
- MY ENERGIA ONER SL (ES)
- LA SOLAR ENERGIA SOCIEDAD COOPERATIVA (ES)
- AZIENDA ELETTRICA DI MASSAGNO (AEM) SA (CH)
- VIESGO DISTRIBUCION ELECTRICA SL (ES)
- EUROPAISCHES ZENTRUM FUR ERNEUERBARE ENERGIE GUSSING GMBH (AT)

Project Description

Context

Core priorities of ACCEPT:

- Development of interoperable digital tools for delivering compound (energy & non-energy) services to energy communities and their members (value-adding services to consumers/ prosumers through increased digitalisaion of building sector)
- Direct engagement of communities and their members in the energy market (e.g., through demand response schemes) helping to increase grid resilience and renewable energy penetration (inclusion of citizens in energy transition, increased grid sustainability and energy sector decarbonisation)
- Citizen engagement in solution co-creation activities for increase acceptance (citizen in the epicenter of energy transition)

Project presentation, technical description and implementation

Challenge: Actively engage energy communities in DR schemes and value-adding compound services to increase grid resilience, renewable generation and generate benefits to citizens.

Objectives: Deliver an integrated, interoperable toolbox to promote the energy transition of communities, deliver a citizen engagement methodology for stimulating participation in energy system and community flourishing, new business models for participation of households in DR market.

Beyond SotA: citizen participatory design engagements, digital toolbox for energy community participation in energy market, novel compound services to community members.

Methodology: i) Tailored citizen engagement (living labs and solution co-creation), ii) ACCEPT digital toolbox for delivery of compound services, iii) Business modelling activities for viable business models' creation, iv) Demonstrations at 4 pilots.

Project Impacts

The main expected project impacts can be summarised as follows:

1. Increased use of demand response across EU energy system

2. Increased number and types of consumers engaged in demand-response across Europe

3. Demonstrated and improved viability of innovative energy services, best practices and effective incentives that can be replicated at large scale

4. Increased uptake of services that combine energy efficiency with other energy services, technologies and non-energy benefits

5. Increased reliability of innovative energy services and accessibility to them

6. Increased predictability of consumption patterns and consumer behaviour

7. Increased data protection and privacy for customers

8. Improved modelling of the flexibility levers from the new energy services

9. Increased share of energy or power that can be mobilised to provide flexibility to the grid and increase the hosting capacity of RES

As a result, the following categorised impacts can be expected:

Technological: increased grid resilience, development of interoperable digital tools that can help energy communities and their members participate in the energy transition, increased penetration of renewable energy, creation of local flexibility markets and increased self-consumption and self-sufficiency of energy communities.

Economic: creation of innovative compound services for end-users helping them to access benefits and new revenue streams, new business models for energy communities (energy community as aggregator, ESCo and retailer), increased cost savings for energy communities and their members through higher self-consumption and participation in implicit and explicit demand response schemes.

Environmental: contribution in decarbonisation of energy sector through increased use of renewable energy, energy efficiency and energy savings, emission savings from increased self-consumption.

Social: participatory design of solutions (co-creation activities), greater user acceptance of solutions, increased quality of life as solutions increase comfort and convenience of users.

Innovative aspects of the project

- A programme of cutting-edge, participative citizen engagements to develop consumer-centric energy services for adopting DR services and understand consumer acceptability.
- Consumer Digital Twin that enables correlation of consumer behaviour and energy and building assets enabling innovative business models and access of customers to human-centric compound services.
- A digital toolbox for energy community and community members' participation in the energy market.

Expected key exploitable results of the project

KERs

- Building Information Management Layer: enables bilateral communication between building assets and users.
- Consumer Digital Twin Model: a digital replica of citizens and households, allowing the correlation between consumer behaviour and building assets.
- On-Demand Flexibility Management Tool: the engine that optimises the operation of building assets based on certain operating scenarios (e.g., ToU tariffs, self-consumption increase).
- P2P Energy/Flex Exchange Platform: enables the exchange of energy within the energy community.
- District Asset Management component: optimises the operation of district-level assets.
- ACCEPT Citizen Application (UI).
- Energy Behaviour change method & tools.
- Energy Community Tools incl. a UI and business intelligence tool.
- Dynamic SRI-based performance rating framework.
- Optimised biomass boiler scheduling for grid flexibility services.

Key exploitable results and sub-key exploitable results achieved to date

From the abovementioned KERs, the following have already been achieved:

i) Building Information Management Layer.

ii) Consumer Digital Twin Model incl. the Non-Intrusive Load Monitoring component.

iii) On-Demand Flexibility Management Tool.

iv) P2P Flexibility Exchange Platform.

v) District Asset Management Component.

vi) Energy Behaviour change method & tools.

vii) Dynamic SRI-based performance rating framework.

viii) Optimised biomass boiler scheduling for grid flexibility services.

The following KERs are currently being further refined and will soon undergo user testing at the four demonstration sites:

ix) ACCEPT Citizen Application (UI).

x) Energy Community Tools incl. a UI and business intelligence tool.

With regards to specific activities for the exploitation of KERs, the following activities have been carried out to date:

- The characterization tables have been filled in for each KER -The initial stage in shaping and describing the final results, as well as the responsibilities, actions, and timing for partners that want to exploit it, is the characterisation table. The purpose of this first table is to examine the requirements or obstacles that the results will address or remove, to identify the customers and pertinent market categories, as well as the rival companies and their competing solutions.

- International patent scenario overview have been presented for each KER - For each KER, the related patents were identified by means of the PATSNAP search tool, inserting in the search bar the KER name and fine tuning the research if irrelevant patents (e.g., belonging to different fields) were obtained.

LC-SC3-EC-3-2020 - Consumer engagement and demand response

Back to projects' list

Electricity grids | Digitalisation | Consumers/Prosumers

HESTIA

Holistic dEmand response Services for European residenTIAl communities

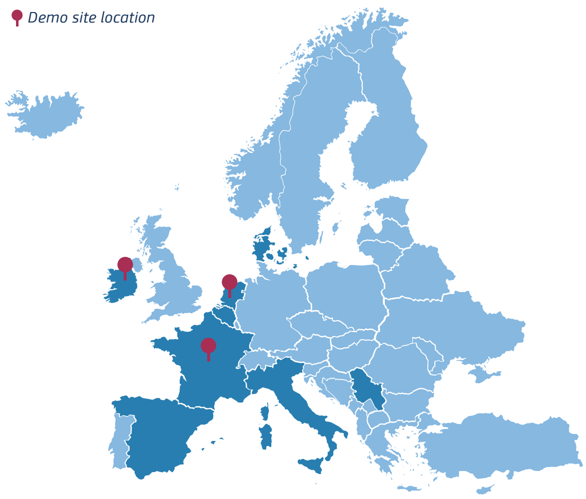
The project "HESTIA" focuses on developing a cost-effective solution for next-generation demand-side response services, engaging residential consumers in flexibility sharing and grid balancing. Key activities include exploiting energy demand flexibility, valorizing energy efficiency, and involving residents in solution design. Measurable outcomes include replicability through agent-based concepts, transforming residential customers into active energy sector participants, reducing emissions, and establishing an open flexibility marketplace. Overall, HESTIA aims to enhance sustainability, promote consumer engagement, and drive innovation in the energy sector.

FROM	November 2020
TO	September 2024

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
7 514 042,50 €	5 995 690,00 €	https://hestia-eu.com/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response
Grid Technologies	Grid inertia
Market	Electricity market

PROJECT PARTNERS' COUNTRIES



COORDINATOR	SINLOC – Sistema Iniziative Locali (IT)

OTHER PARTNERS

- AXPO ENERGY SOLUTIONS ITALIA - S.p.a. (Italy)
- ELECTRICITE DE FRANCE (France)
- AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH (Austria)
- R2M SOLUTION SPAIN SL (Spain)
- ENERGIES 2050 (France)
- MUNSTER TECHNOLOGICAL UNIVERSITY (Ireland)
- AALBORG UNIVERSITET (Denmark)
- I. LECO (Belgium)
- DUNEWORKS BV (Netherlands)
- FOR YOUR ENERGY FREEDOM BV (Netherlands)
- INSTITUT MIHAJLO PUPIN (Serbia)
- ALBEDO ENERGIE (France)
- COMMUNAUTE D'AGGLOMERATION COMMUNAUTE PARIS-SACLAY (France)
- GRID ABILITY SCARL (Italy)
- MIDAC SPA (Italy)
- DEVELCO PRODUCTS AS (Denmark)
- EUROPEAN INNOVATION MARKETPLACE ASBL (Belgium)
- ASSOCIACIO CLUSTER DIGITAL DE CATALUNYA (Spain)

Project Description

Context

The "HESTIA" project aligns with the European Commission's priorities by addressing sustainability, digitalization, and inclusion in the energy sector. It aims to empower residential consumers to participate actively in demand-side management, contributing to energy transition goals. By leveraging digital technologies and innovative demand-response strategies, HESTIA promotes energy efficiency, reduces emissions, and fosters community engagement. This aligns with EU policies promoting renewable energy, energy efficiency, and a sustainable, inclusive energy market, ultimately driving economic growth and enhancing energy security.

Project presentation, technical description and implementation

The "HESTIA" project tackles the challenge of integrating residential consumers into demand-side response (DSR) efforts, aiming to enhance grid flexibility and stability. Its objectives include developing user-friendly DSR services, optimizing energy efficiency, and fostering consumer engagement. What sets HESTIA apart is its focus on personalized services, leveraging advanced ICT platforms and agent-based concepts. The project employs a participatory co-design approach to involve residents in solution development. Key components like smart metering, grid technologies, and large-scale storage enable effective demand-side management. This holistic approach contributes to achieving technical goals by empowering consumers, optimizing energy use, and facilitating grid balancing.

Project Impacts

Economic impacts: Increased market opportunities for demand-side response services, potential revenue growth for energy service providers.

Social impacts: Creation of skilled job opportunities in the energy sector, improvement in energy affordability and accessibility for residential communities.

Environmental impacts: Reduction in greenhouse gas emissions and air pollutants through optimized energy consumption and grid balancing.

Technological impacts: Development of innovative ICT platforms and agent-based concepts for enhanced consumer engagement and grid management.

Other impacts: Promotion of sustainable energy practices, empowerment of residential consumers in the energy transition.

Innovative aspects of the project

The most impactful aspect of the project is the integration of user-personalized services and agent-based concepts in demand-side response (DSR) solutions. By tailoring services to individual consumer needs and leveraging advanced digital technologies, the project aims to enhance consumer engagement and enable efficient grid balancing.

Expected key exploitable results of the project

- Development of user-personalized demand-side response (DSR) services tailored to residential consumers' needs.
- Implementation of agent-based concepts for cooperative DSR strategies at the community level.
- Establishment of an open flexibility marketplace for energy trading and sharing among residents.
- Integration of multi-objective optimization approaches to enhance grid balancing and energy efficiency.
- Deployment of a fully service-oriented, flexible ICT platform for delivering user-personalized services and facilitating consumer engagement.

Key exploitable results and sub-key exploitable results achieved to date

- Development of user-personalized demand-side response (DSR) services tailored to residential consumers' needs.
- Implementation of agent-based concepts for cooperative DSR strategies at the community level.

- Establishment of an open flexibility marketplace for energy trading and sharing among residents.
- Integration of multi-objective optimization approaches to enhance grid balancing and energy efficiency.
- Deployment of a fully service-oriented, flexible ICT platform for delivering user-personalized services and facilitating consumer engagement.

LC-SC3-EC-3-2020 - Consumer engagement and demand response

Back to projects' list

Digitalisation | Consumers/Prosumers | System integration

SENDER

Sustainable Consumer Engagement and Demand Response

Sender

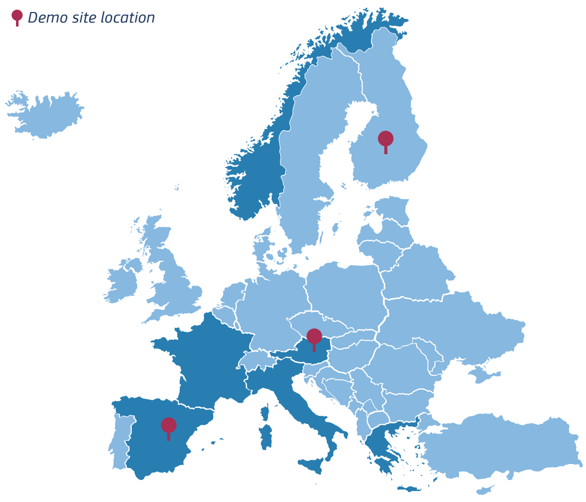
The project focus is to develop and test the next generation of energy service applications for demand-response, home-automation and -convenience. Objectives are to develop innovative strategies to co-create demand response mechanisms, generte new models to identify consumer patterns and better forecast consumption, develop digital twins to leverage demand-side flexibility potential, develop an innovative business model that shares profits between consumers and grid operators, and Contribute to the creation of a legal and regulatory framework that accelerates and facilitates the implementation of pattern-based DR technologies.

FROM	October 2020
TO	September 2024

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
6 619 688,73 €	5 836 574,96 €	https://www.sender-h2020.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response Smart appliance

PROJECT PARTNERS' COUNTRIES



COORDINATOR	SMART INNOVATION NORWAY AS (NORWAY)

OTHER PARTNERS

- HYPERTECH ANONYMOUS INDUSTRIAL TRADING COMPANY OF INFORMATION AND NEW TECHNOLOGY (Greece)
- TRIALOG (France)
- UNIVERSITY OF APPLIED SCIENCES UPPER AUSTRIA (Austria)
- ECOSERVEIS (Spain)
- WEIZER ENERGY AND RESEARCH CENTRE (Austria)
- PARAGON (Greece)
- AUSTRIAN INSTITUTE OF TECHNOLOGY (Austria)
- CENTRE FOR ADVANCED STUDIES, RESEARCH AND DEVELOPMENT IN SARDINIA (Italy)
- NXTECH (Norway)
- NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY (Norway)
- EUROQUALITY (France)
- DISTRIBUTION OF ELECTRICAL ENERGY OF ALGINET (Spain)
- TECHNICAL RESEARCH CENTRE OF FINLAND (Finland)
- QUE TECHNOLOGIES (Greece)

Project Description

Context

In the context of continuously increasing, highly distributed renewable generation, grid operators require more flexibility from the grid, to balance the increase of uncontrollable Renewable Energy Sources (RES) production. As major loads in the grid, and sometimes also as producers, consumers are at the core of the energy system and thus at the centre of developing Demand Response (DR) services. These services are expected to massively increase the efficiency and hosting capacity of distribution networks in the mid-term. It will allow for the tilization of flexibility in the distribution grid which will serve to improve frequency stability and congestion management.

Project presentation, technical description and implementation

SENDER will develop the next generation of energy service applications for demand-response, home-automation, -convenience and -security. It puts consumers at the heart of the energy market by engaging them in a co-creation process with other actors from the energy domain during the specification of pro-active DR mechanisms to cater for the consumers' long-term incentivization.Grid operators are the 2nd group of SENDER core beneficiaries. The project results will increase the efficiency/hosting capacity of distribution networks by improving the quality of load forecasts and providing access to load flexibility, which will allow to improve frequency stability, congestion management and increased RES integration. In addition, monetarization on the flexibility potential will be provided by the participation in balancing/ regulatory power markets.

Project Impacts

- Increased use of demand response across the European energy system.
- Increased number and types of consumers engaged in demand-response across Europe.
- Demonstrated and improved viability of innovative energy services, best practices and effective incentives that can be replicated at large scale.
- Increased uptake of services that combine energy efficiency with other energy services, technologies and non-energy benefits.
- Increased reliability of innovative energy services and accessibility to them. Developed and demonstrated viable solutions for customers: best practices and effective incentives that can be replicated at large scale.
- Increased predictability of consumption patterns and consumer behaviour.
- Increased data protection and privacy for customers.
- Improved modelling of the flexibility levers from the new energy services.
- Increased share of energy or power that can be mobilised to provide flexibility to the grid and increase the hosting capacity for RES.

Innovative aspects of the project

The main innovation of the project is the co-design with consumers of strategies to implement demand responses mechanisms that effectively contributes to the green transition.

Expected key exploitable results of the project

1. The SENDER Smart Box: an integrated Smart Home Gateway, enabling e.g. end-to-end interoperable communication between various Distributed Energy Resources elements (PV, battery storage, heat pumps, domestic hot water (DHW)) and various smart home devices.
2. The SENDER Flexibility profiling and management: A tool that will deliver holistic context-aware flexibility profiles, reflecting real-time demand and storage flexibility as a function of multiple parameters.
3. Smart charging EV energy management system and the methodology to design, integrate,

validate and assess interoperable, secured and scalable flexibility-based systems.

4. A Forecasting algorithm tool: probabilistic forecast tools for loads and DER genera.
5. A peer-to-peer trading system: a solution to reward flexibility and incentivise the adoption of renewables based on consumer-centric, local electricity markets.

LC-SC3-ES-10-2020 - DC – AC/DC hybrid grid for a modular, resilient and high-RES share grid development

Back to projects' list

Electricity grids | Energy storage | Digitalisation

HYPERRIDE

Hybrid Provision of Energy based on Reliability and Resiliency by Integration of Dc Equipment

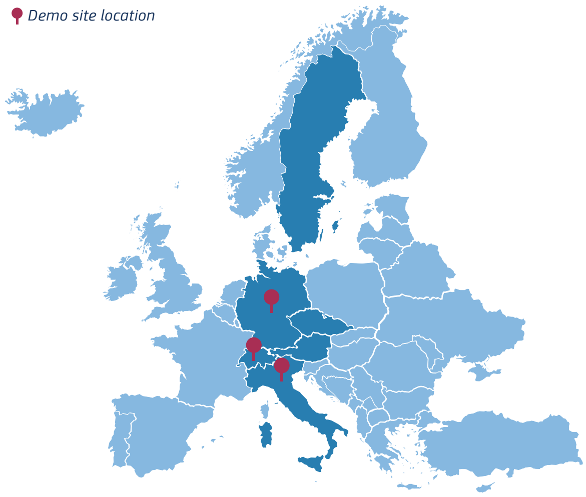
The HYPERRIDE project aims to implement DC and hybrid AC/DC grids to enhance energy distribution efficiency and resilience. Key objectives include technological advancements in DC grid components, resilience enhancement through fault mitigation and cybersecurity solutions, and renewable energy integration. Demonstrations in multiple countries validate the technologies, with outcomes including improved grid reliability, increased renewable energy penetration, and development of business models for new products/services. The project's focus lies in advancing grid technology, enhancing resilience, and facilitating renewable energy integration to support European energy efficiency and sustainability.

FROM	October 2020
TO	March 2025

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
8 233 501,25 €	6 965 520,50 €	https://cordis.europa.eu/project/id/957788

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	High Voltage Alternating Current; Semiconductor devices and power converters; Network management; Monitoring and control tools
Large Scale Storage Technologies	Compressed air energy storage; Hydro storage
Generation Technologies	Wind turbines; Photovoltaic

PROJECT PARTNERS' COUNTRIES



COORDINATOR	AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH (AUSTRIA)

OTHER PARTNERS

- SCIBREAK AB (Sweden)
- RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (Germany)
- EATON ELEKTROTECHNIKA SRO (Czech Republic)
- ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE (Switzerland)
- DR. TECHN. JOSEF ZELISKO FABRIK FUR ELEKTROTECHNIK UND MASCHINENBAU GMBH (Austria)
- ENGINEERING - INGEGNERIA INFORMATICA SPA (Italy)
- ASM TERNI SPA (Italy)
- FLEXIBLE ELEKTRISCHE NETZE FEN GMBH (Germany)
- EMOTION SRL (Italy)

Project Description

Context

The HYPERRIDE project aligns with the European Commission's priorities by addressing sustainability through the integration of renewable energy sources and low-carbon technologies. It contributes to decarbonization efforts by promoting the adoption of hybrid AC/DC grids and enhancing energy efficiency. Additionally, by incorporating digitalization and advanced grid technologies, HYPERRIDE supports the transition towards smart and resilient electricity grids, fostering innovation and economic growth while ensuring inclusivity by creating new opportunities for businesses and consumers alike.

Project presentation, technical description and implementation

1. HYPERRIDE tackles the challenge of integrating DC and hybrid AC/DC grids into existing infrastructure. Objectives include developing grid guidelines, advancing DC tech readiness, and demonstrating key components like MVDC breakers.

2. The project unique focus on MVDC and VDC circuit breakers, alongside network management tools, sets us apart. Raising tech readiness levels ensures field-ready solutions, differentiating us from traditional approaches.

3. The project methodology involves developing automation algorithms and cybersecurity measures, validated through real-world demonstrations across multiple countries, ensuring scalability and applicability.

4. Key components like MVDC breakers and sensors enhance grid automation and protection, supporting the integration of renewables and electric vehicles for more sustainable energy management.

Project Impacts

Economic impacts:

- Increased market share for DC technologies.
- New revenue streams from grid automation solutions.
- Entry into new markets with advanced grid planning tools.

Social impacts:

- Creation of high-quality jobs in the renewable energy sector.
- Enhanced quality of life through improved grid resilience and reliability.
- Increased access to sustainable energy solutions in underserved areas.

Environmental impacts:

- Reduction in CO2 emissions through increased integration of renewable energy sources.
- Energy savings through efficient grid management and optimization.
- Conservation of resources through the deployment of sustainable energy technologies.

Technological impacts:

- Development and diffusion of MVDC and VDC circuit breaker technologies.
- Advancement of grid automation and cybersecurity measures
- Demonstration of innovative DC grid architectures and components.

Other impacts:

- Contribution to EU energy policy objectives, such as decarbonization and digitalization.
- Promotion of cross-border collaboration in energy research and innovation.
- Alignment with global sustainability goals, fostering international cooperation in the energy sector.

Innovative aspects of the project. The most innovative aspect of the project is the development and demonstration of hybrid AC/DC grid architectures, integrating DC equipment for improved stability and efficiency. This approach enables higher penetration of renewable energy sources and enhances grid resilience, paving the way for a more sustainable and reliable energy future.

Expected key exploitable results of the project

- Development of MVDC circuit breakers and sensors for grid automation and protection.
- Adaptation of sizing tools for DC grids to facilitate grid planning.
- Creation of automation algorithms for efficient grid operation.
- Demonstration of field-ready devices in demo sites.
- Evaluation of integration potential of renewables and assessment of benefits.
- Creation of business models for products, services, and applications.
- Development of an open ICT platform for interoperability.
- Establishment of a data repository for reliability information.
- Demonstration of fault management and cybersecurity solutions.
- Compilation of recommendations for standardization and regulation bodies.
- Key exploitable results and sub-key exploitable results achieved to date
- Development of MVDC circuit breakers and sensors for grid automation and protection.
- Adaptation of sizing tools for DC grids to facilitate grid planning.
- Creation of automation algorithms for efficient grid operation.
- Demonstration of field-ready devices in demo sites.
- Evaluation of integration potential of renewables and assessment of benefits.
- Creation of business models for products, services, and applications.
- Development of an open ICT platform for interoperability.
- Establishment of a data repository for reliability information.
- Demonstration of fault management and cybersecurity solutions.
- Compilation of recommendations for standardization and regulation bodies.

LC-SC3-ES-10-2020 - DC – AC/DC hybrid grid for a modular, resilient and high-RES share grid development

Back to projects' list

Electricity grids

TIGON

Towards Intelligent DC-based hybrid Grids Optimizing the network performance

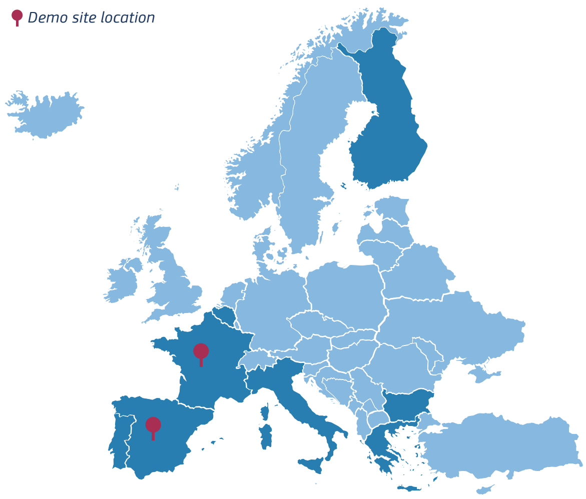
The main goal of TIGON is to enable a smooth deployment and integration of intelligent DC-based grid architectures within the current energy system, while providing ancillary services to the main network. To do so, TIGON proposes a four-level approach aiming at improving (1) Reliability, (2) Resilience (3) Performance, and (4) Cost Efficiency of hybrid grids through the development of an innovative portfolio of power electronic solutions and software systems and tools focused on the efficient monitoring, control and management of DC grids. These solutions will be demonstrated in two main Demo-Sites located in France and Spain.

FROM	September 2020
TO	August 2025

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
7 616 521,25 €	6 957 197,01 €	https://tigon-project.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	High Voltage Direct Current

PROJECT PARTNERS' COUNTRIES



COORDINATOR	FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS - CIRCE (Spain)

OTHER PARTNERS

- ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS - CERTH (Greece)
- FUNDACION CARTIF - CARTIF (Spain)
- COMMISSARIAT A L'ENERGIE ATOMIQUE ET AUX
- ENERGIES ALTERNATIVES - CEA (France)
- CENTRO DE INVESTIGACIONES ENERGETICAS, MEDIOAMBIENTALES Y TECNOLOGICAS - CIEMAT (Spain)
- EFACEC ENERGIA - MAQUINAS E EQUIPAMENTOS ELECTRICOS SA - EFACEC (Portugal)
- UBITECH ENERGY - UBE (Belgium)
- AKUO ENERGY SAS - AKUO (France)
- PREMO S.A.U. - PREMO (Spain)
- HYPERTECH (CHAIPERTEK) ANONYMOS VIOMICHANIKI EMPORIKI ETAIREIA PLIROFORIKIS KAI NEON TECHNOLOGION - HYPER (Greece)
- TURUN AMMATTIKORKEAKOULU OY - TUAS (Finland)
- INNOVATIVE ENERGY AND INFORMATION TECHNOLOGIES LTD - IEIT (Bulgaria)
- METROPOLITEN JSC - MetroS (Bulgaria)
- RINA CONSULTING SPA - RINA-C (Italy)
- FONDAZIONE ICONS - ICONS (Italy)

Project Description

Context

DC grids attractiveness has been increased in the last years due to the high proliferation of renewable energy sources together with the increase in DC loads (electronics, LED lighting, electric vehicles, energy storage…). However, there is a need for demonstration of DC technologies and grid topologies so that these solutions are able to evolve from a promising solution for the future smart grids to a commercially available technological option. Under this context, TIGON aims to achieve a smooth deployment and integration of intelligent DC-based grid architectures within the current energy system while providing ancillary services to the main network.

Project presentation, technical description and implementation

A modular concept of DC-based grid topology is proposed consisting on a MVDC line connecting the main grid with the LV hybrid grid. Based on this concept, TIGON demonstrators will integrate in a more efficient way distributed RES, energy storage and a variety of loads including electric vehicles. The first innovation introduced by TIGON is the Solid-State Transformer (SST), In addition to the SST, TIGON will integrate novel typologies of high efficiency DC/DC converters.These converters will make possible, on the one hand, to directly connect the MV network to novel topologies of PV plants (French demo-site) and battery storage systems (Spanish demo-site). Protection schemes will be complemented by the implementation of a WAMPAC system and TIGON will make use of the results obtained and the characteristics of the solutions and grids under analysis for the development of a DSS.

Project Impacts

Increasing penetration of RES in the power network, Lower environmental Impact and CO2 savings, Facilitating planning and targeting investments in the sector, Increasing resilience of the electricity grid to faults and cyberattacks, Increasing the efficiency of the electricity system, Contribution to policy and standards, Increase sustainability and security of supply, Market growth & job creation,

Innovative aspects of the project

TIGON develops an innovative portfolio of power electronic solutions and software systems and tools focused on the efficient monitoring, control and management of DC grids, which are: Innovative SiC WBG DC/DC converters topologies with improved efficiency and power density for a better conversion ratio in DC-based architectures, development of the Solid Smart Transformer, and a smart EMS able to control in a centralized manner the hybrid micro-grid and of a Decision Support System (DSS) tool.

Expected key exploitable results of the project

1. KER 1 – Solid State Transformer (SST).
2. KER 2 – SiC DC/DC converters.
3. KER 3 – DC protection schemes.
4. KER 4 – MVDC PV plant.
5. KER5 – WAMPAC system.
6. KER6 – Energy Management Systems (EMS).
7. KER7 – DSS tool for DC-based grids.
8. KER8 – Cybersecurity Defence System .

LC-SC3-ES-4-2018-2020 - Decarbonising energy systems of geographical Islands

Back to projects' list

Electricity grids | Energy storage | Digitalisation

IANOS

IntegrAted SolutioNs for DecarbOnisation and Smartification of Islands

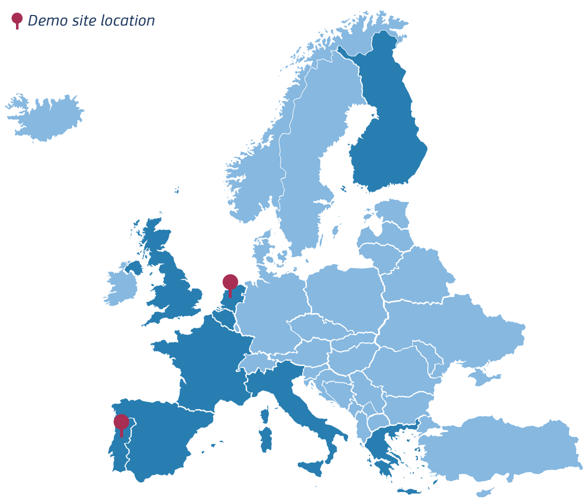
The project, IANOS, aims to revolutionize energy systems in European islands by demonstrating integrated solutions for decarbonization and smartification. It focuses on deploying advanced technologies like smart grids, renewable energy generation, and energy storage systems. Key objectives include enhancing energy efficiency, promoting renewable energy adoption, and empowering local communities. Measurable outcomes include increased renewable energy penetration, reduced carbon emissions, and improved energy self-sufficiency. Overall, IANOS seeks to serve as a model for island decarbonization and contribute to broader European energy transition goals.

FROM	October 2020
TO	September 2024

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
8 786 838,75 €	6 999 654,65 €	https://ianos.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	High Voltage Alternating Current; High Voltage Direct Current; Network management; Monitoring and control tools
Large Scale Storage Technologies	Power to gas; Compressed air energy storage; Hydro storage
Generation Technologies	Wind turbines; Photovoltaic; Biogas

PROJECT PARTNERS' COUNTRIES



COORDINATOR	CNET CENTRE FOR NEW ENERGY TECHNOLOGIES SA (Portugal)

OTHER PARTNERS

- UNINOVA (Portugal)
- EFACEC ENERGIA - MAQUINAS E EQUIPAMENTOS ELECTRICOS SA (Portugal)
- EDA - ELECTRICIDADE DOS ACORES SA (Portugal)
- EFACEC ELECTRIC MOBILITY, SA (Portugal)
- GOVERNO REGIONAL DOS ACORES (Portugal)
- VIRTUAL POWER SOLUTIONS SA (Portugal)
- TERALOOP OY (Finland)
- SUNAMP LIMITED (United Kingdom)
- BEMICRO LDA (Portugal)
- GEMEENTE AMELAND (Netherlands)
- STICHTING NEW ENERGY COALITION (Netherlands)
- ALLIANDER NV (Netherlands)
- SUWOTEC BV (Netherlands)
- AMELANDER ENERGIE COOPERATIE (Netherlands)
- Stichting Hanzehogeschool Groningen (Netherlands)
- NEDERLANDSE ORGANISATIE VOOR TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK TNO (Netherlands)
- NEROA BV (Netherlands)
- REPOWERED BV (Netherlands)

OTHER PARTNERS	
	• SEAQURRENT HOLDING BV (Netherlands) • BAREAU BV (Netherlands) • GASTERRA BV (Netherlands) • COMUNE DI LAMPEDUSA E LINOSA (Italy) • CONSIGLIO NAZIONALE DELLE RICERCHE (Italy) • COMMUNE DE BORA BORA (French Polynesia) • AKUO ENERGY SAS (France) • DIMOS NISUROU (Greece) • ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS (Greece) • ETRA INVESTIGACION Y DESARROLLO SA (Spain) • ENGINEERING–INGEGNERIA INFORMATICA (Italy) • RINA CONSULTING SPA (Italy) • EUROPEAN RENEWABLE ENERGIES FEDERATION-FEDERATION EUROPEENE DES ENERGIES RENOUVELABLES (Belgium) • ELLINIKI ETAIREIA ENERGEIAKIS OIKONOMIAS (Greece) • UBITECH ENERGY (Belgium)

Project Description

Context

The project operates within the thematic areas prioritized by the European Commission, focusing on sustainability, digitalization, and inclusion. It aligns with EU policy objectives by addressing the decarbonization of energy systems, enhancing energy efficiency, and promoting the integration of renewable energy sources. By leveraging digital technologies, the project aims to optimize energy management, enhance grid resilience, and foster consumer engagement. Overall, it contributes to achieving the EU's goals for a sustainable, inclusive, and digitally enabled energy transition, driving economic growth while ensuring environmental protection.

Project presentation, technical description and implementation

The project aims to address the technological challenges of decarbonizing energy systems on islands, where high energy costs and reliance on fossil fuels persist. Objectives include integrating renewable energy sources, optimizing energy storage, and enhancing grid management to achieve greater sustainability and resilience. The project approach stands out for its focus on symbiotic energy stream operation, combining various renewable sources and storage technologies for efficient energy utilization. Methodologically, the project employs advanced AI-based Virtual Power Plant technology to orchestrate decentralized energy resources seamlessly. Key components such as smart grids, distributed storage, and renewable generation contribute to achieving the technical goals of maximizing renewable energy penetration and minimizing carbon emissions in island communities.

Project Impacts

Economic impacts:

- Increased market share for renewable energy technologies.
- New market entrance for energy storage solutions.
- Enhanced revenue streams for local energy communities.

Social impacts:

- Creation of new jobs in the renewable energy sector.
- Improved quality of life through access to cleaner and more affordable energy.
- Empowerment of local communities through participation in energy projects.

Environmental impacts:

- Decreased CO2 emissions from reduced reliance on fossil fuels.
- Reduction of other pollutants through the adoption of cleaner energy technologies.
- Conservation of natural resources through energy efficiency measures.

Technological impacts:

- Development and diffusion of innovative energy storage and grid management technologies.
- Advancement of digital tools for smart grid operation and optimization.

Innovative aspects of the project

The most impactful aspect of the project is the integration of various renewable energy sources and storage technologies in island settings, optimizing their symbiotic operation. This innovative approach maximizes energy self-sufficiency, resilience, and decarbonization potential, serving as a blueprint for sustainable island energy systems worldwide.

Expected key exploitable results of the project

- Development of an intelligent Virtual Power Plant (iVPP) based on AI for decentralized renewable energy resource management.
- Novel technologies demonstrated in smart grids, energy storage, and renewable energy generation.
- Island Energy Planning and Transition Suite (IEPT) toolkit for renewable energy portfolio development and grid optimization.
- Crowd equity platform for community engagement and investment in renewable energy projects.
- Life Cycle Assessment (LCA) / Life Cycle Costing (LCC) toolkit for decision-making.
- Grid-oriented optimizers for detailed modeling and grid scenario simulations.
- Key exploitable results and sub-key exploitable results achieved to date.
- Development of an intelligent Virtual Power Plant (iVPP) prototype based on AI algorithms.
- Successful demonstration of smart grid technologies including fog-enabled intelligent devices and smart energy routers.
- Testing and validation of energy storage solutions such as flywheels and biobased saline batteries.
- Deployment of renewable energy generation systems like tidal kites and auto generative high-pressure digesters.
- Progress made in the development of the Island Energy Planning and Transition Suite (IEPT) toolkit, including crowd equity platform and grid-oriented optimizers.
- Initial stages of Life Cycle Assessment (LCA) / Life Cycle Costing (LCC) toolkit development for decision-making support in renewable energy projects.

LC-SC3-ES-4-2018-2020 - Decarbonising energy systems of geographical Islands

Back to projects' list

Energy storage | Consumers/prosumers | System integration

ISLANDER

Accelerating the decarbonisation of islands' energy systems

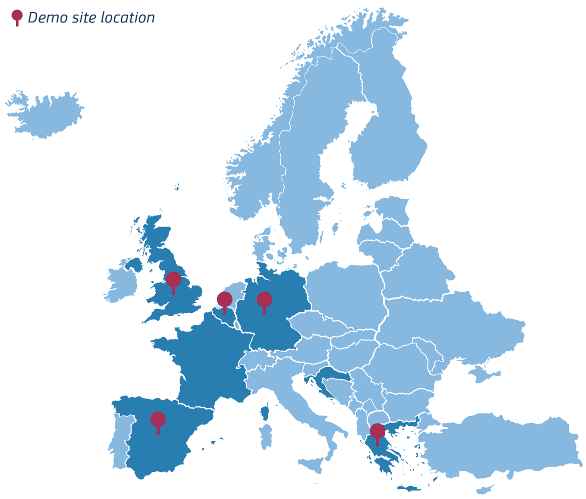
The ISLANDER project focuses on decarbonizing Borkum Island's energy system through the integration of renewable energy, storage, and electric vehicles. Its main objectives include deploying distributed renewable energy systems, large-scale storage technologies, and a smart IT platform for optimal energy management. Key research areas include renewable energy integration, storage optimization, and community engagement. Measurable outcomes include reduced carbon emissions, increased renewable energy penetration, and enhanced grid flexibility, contributing to the broader goal of island decarbonization across Europe.

FROM	October 2020
TO	September 2025

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
8 336 492,50 €	6 996 000,00 €	https://islander-project.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Smart metering
Grid Technologies	Micro-grid; Network management; Monitoring and control tools
Large Scale Storage Technologies	Hydrogen
Distributed Storage Technologies	Batteries
Generation Technologies	Photovoltaic
Other Technoogies and Services	Electricity market Ancillary services

PROJECT PARTNERS' COUNTRIES



COORDINATOR	AYESA ADVANCED TECHNOLOGIES SA (Spain)

OTHER PARTNERS

- IDENER RESEARCH & DEVELOPMENT AGRUPACION DE INTERES ECONOMICO (Spain)
- STEINBEIS INNOVATION (Germany)
- NORDSEEHEILBAD BORKUM (Germany)
- ZIGOR RESEARCH & DEVELOPMENT (Spain)
- CEGASA ENERGIA (Spain)
- BCM ENERGY (France)
- KATHOLIEKE UNIVERSITEIT LEUVEN (Belgium)
- THE EUROPEAN MARINE ENERGY CENTRE LIMITED (United Kingdom)
- DIKTYO AEIFORIKON NISON TOY AIGAIOUAE (Greece)
- REGIONALNA ENERGETSKA AGENCIJA KVARNER (Croatia)

Project Description

Context

The ISLANDER project addresses the technological challenges of decarbonizing island energy systems by integrating renewable energy sources, storage technologies, and electric vehicles. Objectives include optimizing energy management, enhancing grid stability, and reducing carbon emissions. Our approach stands out for its holistic integration of diverse energy assets and advanced forecasting algorithms for efficient operation. Methodology involves deploying distributed renewable energy systems, large-scale storage solutions, and innovative district heating technologies. Key components like smart IT platforms and demand response strategies contribute to achieving technical goals by enabling real-time monitoring and optimal asset coordination.

Project Impacts

Economic impacts:

- Increased direct revenues from energy generation and storage services.
- Indirect revenues from enhanced tourism due to sustainable energy initiatives.
- New market entrance opportunities for renewable energy technologies.

Social impacts:

- Creation of new jobs in renewable energy sector.
- Improved quality of life for island residents with cleaner air and reduced energy costs.
- Increased community engagement through Renewable Energy Community participation.

Environmental impacts:

- Decreased CO2 emissions through the adoption of renewable energy sources.
- Reduced air pollutants and improved air quality.
- Conservation of natural resources through efficient energy management.

Technological impacts:

- Development and deployment of innovative storage technologies.
- Advancement in smart grid technologies for efficient energy management.
- Promotion of digitalization and data-driven approaches in energy systems.

Other impacts:

- Enhanced resilience of island energy systems against climate change impacts.
- Contribution to achieving European Union's energy and climate objectives.

Innovative aspects of the project

The most impactful aspect of our project is the integration of heterogeneous energy storage, electric vehicles, and renewables using a smart IT platform. This holistic approach enables efficient energy management and fosters island decarbonization, setting a replicable model for other islands to achieve climate and energy objectives.

Expected key exploitable results of the project

- Development of a smart IT platform for integrated energy management.
- Deployment of distributed renewable energy systems with small-scale storage.
- Implementation of complementary large-scale electricity storage solutions.
- Installation of seawater district heating coupled with heat storage.
- Establishment of an EV charging network.
- Creation of a Renewable Energy Community for citizen engagement.
- Development of an optimization tool for designing zero-carbon island energy systems.
- Open-source distribution of the optimization tool for wider adoption.

Key exploitable results and sub-key exploitable results achieved to date

As of the current stage of the project, the following key exploitable results and sub-key exploitable results have been achieved:

1. Development of a smart IT platform for integrated energy management.

2. Deployment of distributed renewable energy systems with small-scale storage.

3. Implementation of complementary large-scale electricity storage solutions.

4. Installation of seawater district heating coupled with heat storage.

5. Establishment of an EV charging network.

6. Creation of a Renewable Energy Community for citizen engagement.

7. Development of an optimization tool for designing zero-carbon island energy systems.

8. Open-source distribution of the optimization tool for wider adoption.

Sub-key Exploitable Results:

1. Successful demonstration of the smart IT platform in real-world settings.

2. Validation of distributed renewable energy systems' performance and scalability.

3. Testing and optimization of large-scale electricity storage solutions for peak shaving.

4. Evaluation of seawater district heating effectiveness and efficiency.

5. Utilization and user acceptance assessment of the EV charging network.

6. Engagement and participation levels within the Renewable Energy Community.

7. Feedback and improvement suggestions for the optimization tool from project stakeholders.

8. Dissemination of project findings and best practices to encourage replication in other island communities.

LC-SC3-ES-4-2018-2020 - Decarbonising energy systems of geographical Islands | Back to projects' list

Electricity grids | Energy storage | Consumers/Prosumers

MAESHA

DeMonstration of smArt and flExible solutions for a decarboniSed energy future in Mayotte and otHer European islAnds

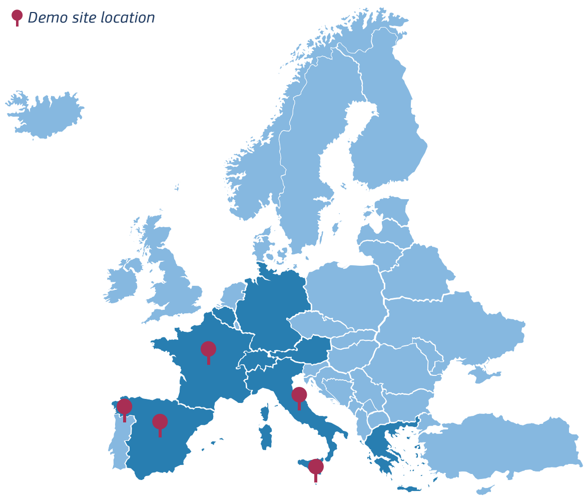
MAESHA aims to decarbonize the energy systems of geographical islands. MAESHA will develop the necessary flexibility, storage, and energy management solutions to facilitate a large penetration of renewable energies on island energy systems, and i) develop of a smart platform aggregating flexibility services, ii) reach up to 70 to 100% of RE penetration iii) create synergies between electricity and other sectors, iv) activate local communities, v) demonstrate the solutions on Mayotte, vi) ensure the replicability of the solutions through monitoring with follower islands, and vii) create a public available toolkit for wide replicability.

FROM	November 2020
TO	October 2024

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
11 790 955,00 €	8 879 045,51 €	www.maesha.eu

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response; Smart metering; eating/cooling peak load management
Grid Technologies	Network management; Monitoring and control tools
Distributed Storage Technologies	Electric vehicles Battery
Market	Ancillery services

PROJECT PARTNERS' COUNTRIES



COORDINATOR	TECHNISCHE UNIVERSITAT BERLIN (Germany)

OTHER PARTNERS

- COBRA INSTALACIONES Y SERVICIOS S.A. (Spain)
- CENTRICA BUSINESS SOLUTIONS BELGIUM (Belgium)
- TRIALOG (France)
- E3-MODELLING AE (Greece)
- CYBERGRID GMBH & CO KG (Austria)
- TECSOL (France)
- CREARA CONSULTORES SL (Spain)
- BOVLABS SAS (France)
- HIVE POWER SAGL (Switzerland)
- HUDARA GGMBH (Germany)
- ELECTRICITE DE MAYOTTE (France)
- ASSOCIATION LEONARD DE VINCI (France)
- COLLECTIVITE DE SAINT-BARTHELEMY (France)
- CONSORCIO PARA EL DISENO, CONSTRUCCION, EQUIPAMIENTO Y EXPLOTACION DE LA PLATAFORMA OCEANICA DE CANARIAS (Spain)
- COMUNE DI FAVIGNANA (Italy)
- THE GOZO BUSINESS CHAMBER ASSOCIATION (Malta)
- CONFERENCE DES REGIONS PERIPHERIQUES MARITIMES D EUROPE (France)
- GREENINGTHEISLANDS.NET SRL (Italy)
- EUROQUALITY SARL (France)
- TERRITOIRE DES ILES WALLIS ET FUTUNA (Wallis and Futuna)

Project Description

Context

More than 16 million people live on 24 islands of the EU. Islands are particularly vulnerable to the effects of climate change, as they directly experience a range of the effects of climate change, while at the same time facing restricted resource availability, and geographical isolation limiting ability to cope with the changing environment. To mitigate climate change and build resilience, the transition of their energy system is vital. However, islands suffer from high dependency of fossil fuels, low resiliency of networks, and high energy costs. A large penetration of RES ensures higher independence, better security of supply and grid stability while reducing the costs of energy.

Project presentation, technical description and implementation

MAESHA simultaneously tackles two great challenges associated with the energy transition on islands. First, the technical challenge of achieving a high penetration of RES in often unreliable power grids of islands will be facilitated by a smart platform aggregating flexibility services. The flexibility assets providing the services will be such that already exist on the island, but must be activated, e.g. demand response, and additional flexibility assets, i.e., EVs. Second, an energy transition is interlinked with a social transformation of the population. The active involvement of local citizens in the energy transition not only ensures the sustainable uptake of solutions but can intrinsically strengthen and accelerate the transition in a sustainable manner. MAESHA actively engages community members in various energy related activities, including LECs and capacity-building.

Project Impacts

Economic impacts: Reduced electricity costs, reduced grid operation costs, incentivation for green investments.

Technological impact: Enhanced grid stability, increased RES penetration, Increased RES forecasting accuracy; reduced number of black-outs and increased quality of supply.

Environmental impacts: Reduced GHG emission, reduced PM, Improved air quality.

Social impact: Increased capacity in energy and climate related activities; increased resilience and lowered vulnerability; Increased access to electricity.

Innovative aspects of the project

The project activities fosters energy access interventions (i.e., solar social housing) as a core LEC model, as energy access is recognized as an socio-technical imperative for social innovation, playing a pivotal role in facilitating a low-carbon energy transition, promoting civic empowerment and addressing to overarching (social) objectives of the project. The implementation of energy access activities within LEC concepts within a 'Global South setting' poses a novum.

Expected key exploitable results of the project

Software: Energy economy models, decentralized energy management, forecasting of S&D, Forecasting energy consumption and production algorithm, flexibility management and trading platform, Residential Energy Management Systems, Virtual power plant,.

Policy Guidelines: Energy Flexibility and Market Framework, User Manual for wide replication.

Process: Long-term and short-term scenarios of energy consumption, Energy flow data of the field tests as captured by EDM and each solution provider, Residential and industrial Demand Response Toolbox.

Demo: EV charging, Hybrid PV Plant and EV Charging Platform, Coupling of PV plants and EV charging stations, Local Energy Communities, Smart charging and Demand side flexibity from EVs.

LC-SC3-ES-4-2018-2020 - Decarbonising energy systems of geographical Islands

Back to projects' list

Electricity grids | Energy storage | System integration

ROBINSON

smart integRation Of local energy sources and innovative storage for flexiBle, secure and costefficIent eNergy Supply ON industrialized islands

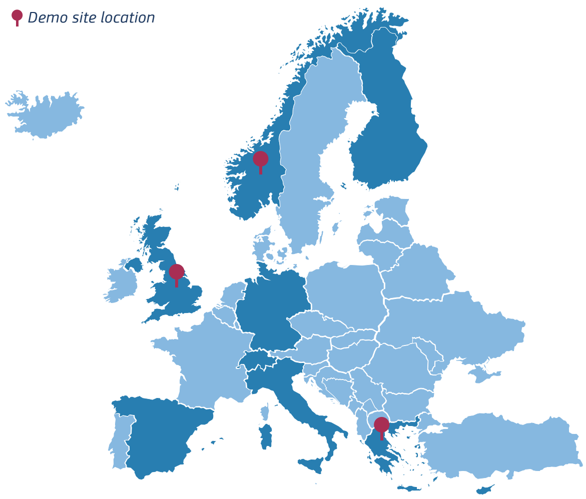
The ROBINSON project focuses on decarbonizing industrialized islands by integrating renewable energy sources, storage technologies, and innovative energy management systems. Key objectives include developing a flexible Energy Management System (EMS), optimizing renewable energy integration, biomass and wastewater valorization, and validating innovative technologies. Measurable outcomes include reduced CO2 emissions, improved energy reliability, and new business opportunities. Research areas encompass energy system optimization, renewable integration, and hydrogen technology advancement, aligning with European sustainability and decarbonization goals.

FROM	October 2020
TO	September 2024

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
8 369 532,50 €	6 994 901,01 €	https://www.robinson-h2020.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	High Voltage Alternating Current; Micro-grid; Network management
Distributed Storage Technologies	Batteries; Thermal energy production, distribution and storage
Generation Technologies	Wind turbines; Photovoltaic; Biogas

PROJECT PARTNERS' COUNTRIES



COORDINATOR	EUROPEAN TURBINE NETWORK (Belgium)

OTHER PARTNERS

- LEITAT (Spain)
- NORCE (Norway)
- EIGERSUND NAERING OG HAVN KF (Norway)
- Aurelia Turbines (Finland)
- PSI (Switzerland)
- UNIGE (Italy)
- ENERGY INNOVATION AS (Norway)
- DALANE ENERGI AS (Norway)
- REST UG (Germany)
- PRIMA PROTEIN AS (Norway)
- FUNDITEC (Spain)
- HYSYTECH (Italy)
- NORTH HIGHLAND COLLEGE (United Kingdom)
- COMHAIRLE NAN EILEAN SIAR – WESTERN ISLES COUNCIL (United Kingdom)
- POLYTECHNEIO KRITIS - TECHNICAL UNIVERSITY OF CRETE (Greece)
- KRITI – PERIFEREIA (Greece)
- STRATAGEM ENERGY LTD (Cyprus)

Project Description

Context

The project aligns with the European Commission's thematic priorities, focusing on sustainability, digitalisation, and inclusion. It addresses the need for clean energy solutions to combat climate change, promoting renewable energy integration and energy efficiency. By incorporating digital technologies, it enhances energy management and grid optimization. Additionally, the project fosters inclusivity by engaging consumers and communities in the energy transition, contributing to economic growth through innovation and market development.

Project presentation, technical description and implementation

The project aims to address the technological challenges of decarbonizing industrialized islands by integrating local energy sources and innovative storage solutions. Objectives include developing an integrated energy system on Eigerøy Island, Norway, utilizing hydrogen as an energy carrier. The approach differs by coupling renewable energy sources with storage infrastructure and managing non-electrical resources like biomass and wastewater. Methodology involves developing novel technologies like PEM electrolyzers and CHP units, integrating them into an Energy Management System. Key components like wind turbines and hydrogen storage contribute to achieving a clean, resilient, and cost-effective energy supply.

Project Impacts

Economic impacts: Increased revenue opportunities for local communities, new market opportunities for innovative technologies and services.

Social impacts: Creation of new jobs in the renewable energy sector, improved quality of life due to cleaner and more reliable energy supply.

Environmental impacts: Significant reduction in CO2 emissions, decreased dependency on fossil fuels, preservation of natural resources.

Technological impacts: Development and deployment of novel energy storage technologies, advancement of hydrogen-based energy systems.

Other impacts: Enhanced energy security for industrialized islands, fostering of sustainable development practices.

Innovative aspects of the project

Economic impacts: Increased revenue opportunities for local communities, new market opportunities for innovative technologies and services.

Social impacts: Creation of new jobs in the renewable energy sector, improved quality of life due to cleaner and more reliable energy supply.

Environmental impacts: Significant reduction in CO2 emissions, decreased dependency on fossil fuels, preservation of natural resources.

Technological impacts: Development and deployment of novel energy storage technologies, advancement of hydrogen-based energy systems.

Other impacts: Enhanced energy security for industrialized islands, fostering of sustainable development practices.

Expected key exploitable results of the project

- Intelligent Energy Management System (EMS) tailored for industrialized islands.
- Innovative technologies: small gas turbine-based Combined Heat and Power units (CHP), Anaerobic Digesters assisted by BioElectrochemical Systems (AD+BES), hydrogen-related technologies (electrolyzers, storage).
- Renewable energy generation: wind turbines, biomass gasification.
- Modular and scalable energy system architecture.
- Reliable, cost-efficient, and resilient energy supply system for decarbonization.

Key exploitable results and sub-key exploitable results achieved to date

- Development of Intelligent Energy Management

System (EMS) prototype.

- Successful integration and testing of small gas turbine-based CHP units.
- Initial design and testing of Anaerobic Digesters assisted by BioElectrochemical Systems (AD+BES).
- Progress in the development of hydrogen-related technologies (electrolyzers, storage).
- Establishment of renewable energy generation infrastructure: wind turbines, biomass gasification.
- Early-stage development of modular and scalable energy system architecture.

LC-SC3-ES-13-2020 - Integrated local energy systems (Energy islands): International cooperation with India	Back to projects' list

Electricity grids	Digitalisation	Consumer/prosumers

RE-EMPOWERED

Renewable Energy EMPOWERing European and InDian communities

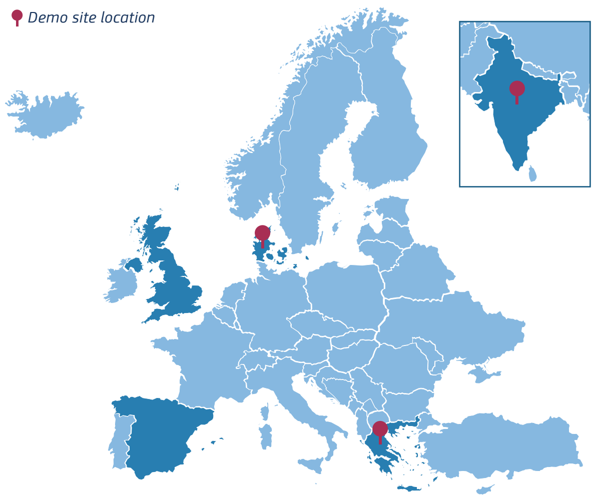
The main goal of RE-EMPOWERED is to develop and demonstrate solutions for the energy transition of local energy systems based on multi-energy microgrids, interconnecting multiple energy vectors. A complete set of solutions for local energy systems has been developed that will be demonstrated in four pilot sites, two European and two Indian. The solutions range from planning tools for designing or upgrading energy systems, to control and optimization tools for the management of microgrids, interoperable platforms for the integration of the available energy carriers, the digitization of the systems, community engagement mobile application and advanced power electronic interfaces.

FROM	July 2021
TO	December 2024

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
5 005 178,75 €	2 987 287,50 €	https://reempowered-h2020.com/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response; Smart metering; Heating/cooling peak load management
Grid Technologies	Micro-grid; Semiconductor devices and power converters; Network management; Monitoring and control tools
Generation Technologies	Wind turbines; Photovoltaic

PROJECT PARTNERS' COUNTRIES



COORDINATOR	EREVNITIKO PANEPISTIMIAKO INSTITOUTO SYSTIMATON EPIKOINONION KAI YPOLOGISTON (Greece)

OTHER PARTNERS

- Imperial College London (United Kingdom)
- Danmarks Tekniske Universitet (Denmark)
- Bornholms Varme As (Denmark)
- PROTASIS SA (Greece)
- Deloitte Advisory, S.L. (Spain)
- DAFNI (Greece)
- Indian Institute of Technology Bhubaneswar (India)
- Visvesvaraya National Institute of Technology (India)
- CSIR - Central Mechanical Engineering Research Institute (India)
- Indian Institute of Science (India)
- Indian Institute of Technology Delhi (India)
- Lab Concern India (India

Project Description

Context

The rapid penetration of RES to the electricity grid is a key factor for achieving the decarbonization goals of the EU. Local energy systems can support RES integration, using optimization techniques and exploiting synergies with different energy vectors, such as heating/ cooling, transport etc. Advanced system architectures, operation and planning, power electronic interfaces, digitalization and ICT, can contribute to addressing the RES challenges. The objectives of the project are organized in three pillars:(1)Increased energy efficiency, RES utilization and reliability. (2)Fostering sustainable and economic community development.(3)Exchange, replicability and scalability in EU and India.

Project presentation, technical description and implementation

To fulfil its objectives, RE-EMPOWERED project has developed novel tools (power electronic converters, energy management systems, smart meter, digital tools for community engagement and tool's interfacing, energy planning, charging station, resilient structures, air quality monitoring) for complete energy solutions for the islanded /isolated communities. The ecoToolset consists of 1 tools (ecoEMS, ecoMicrogrid, ecoDR, ecoPlatform ecoConverter, ecoVehicle, ecoMonitor, ecoResilience, ecoCommunity, ecoPlanning) that have been developed and lab validated. The tools will be demonstrated in four demo sites complementary in terms of size, primary resources and technical maturity; two in Europe (Denmark and Greece), and two in India. Most of the commercial equipment has been installed in the 4 demo sites, with special focus on the Indian demo sites. The deployment of the ecoTools is ongoing.

Project Impacts

- The technical deployment in the pilot sites aims to increase the local RES generation and energy efficiency leading to the decarbonisation of electricity in the local energy systems.
- A 13% increase of RES penetration in EU demo sites is targeted and full decarbonisation in the India demo sites. The electrification of the energy system will lead to reduction of air pollutants which are linked to decarbonisation and beyond.
- The Ghoramara microgrid in India will provide electric power to 11 houses in the area that didn't have access to electricity.
- A co-operative society has been formed in Keonjhar demo site (India). The community of the village actively participates in the construction and management of the power utility.
- Through tackling energy poverty, related health problems are expected to decrease by 5% in Ghoramara island and 2% in Keonjhar demo.
- The deployment of the developed solutions will enable businesses to grow and stimulate the local economies. Particularly on the Ghoramara island, where there was no electricity, RE-EMPOWERED will lead to the growth of the local economy and the creation of several jobs.
- Business models, legal framework, regulatory and financial obstacles and opportunities will be studied to propose mechanisms to create energy communities.
- Europe and India collaboration has been strengthen, joint activities and research visits have been organized.

Innovative aspects of the project

The set of solutions (ecoToolset) for efficient, RES-intensive, multi-energy local energy systems, covers a wide range of aspects of microgrid's/energy island's operation, optimization, digitalization and decarbonization and is easily replicable. Moreover, the case studies for the control, stability, reliability and the demonstration of the tools in the four demo sites will provide a holistic insight into the challenges related to energy transition in many realistic set ups.

Expected key exploitable results of the project

RE-EMPOWERED project's partners envision further exploitation of the tools developed in the project by commercializing them. To this end, a market research analysis investigated smart grid tools which are similar to the developed ecoTools, in both EU and Indian markets and performed a comparative analysis of the gaps and advantages of these tools compared to ecoTools. The supplementary climate, social and techno-economical conditions in the four demo sites sites will facilitate the replicability of this project, and consequently the potential for further exploitation of the solutions in different parts of the world after the end of the project.

Key exploitable results and sub-key exploitable results achieved to date

- A series of general demonstrations of the developed ecoTools has been organized. The primary objective of these internal trainings was to ensure that all relevant stakeholders, including demo site leaders, tool developers, and associated partners, have a thorough understanding of the eco tool's architecture.
- The first exploitation workshop has been organised to showcase the project solutions, particularly the ecoTools to various stakeholders. The presentation on the business model analysis of the ecoTools was based on the following aspects: development cost, operational and maintenance cost, estimated income and cost savings, internal rate of return and payback period.
- A Stakeholder Engagement Guide has been developed and is currently under review. Using the plentiful information related to the European demo sites, adjustments were made for the inclusion of the Indian demo-sites' needs.

LC-SC3-ES-13-2020 - Integrated local energy systems (Energy islands): International cooperation with India

Back to projects' list

Energy storage | Digitalisation | Consumers/Prosumers

SUSTENANCE

SUSTainable ENergy system for Achieving Novel Carbon neutral Energy communities

The overall objective of the project is to set up sustainable energy-systems for achieving novel carbon neutral energy communities. The project focuses on development of smart technological concepts, enabling a green transition of the energy systems with higher share of local renewable energy and more efficient integrated energy solutions for electric, heat, water, waste as well as transport infrastructures using smart control, balancing of grid, storage solutions and active load control.

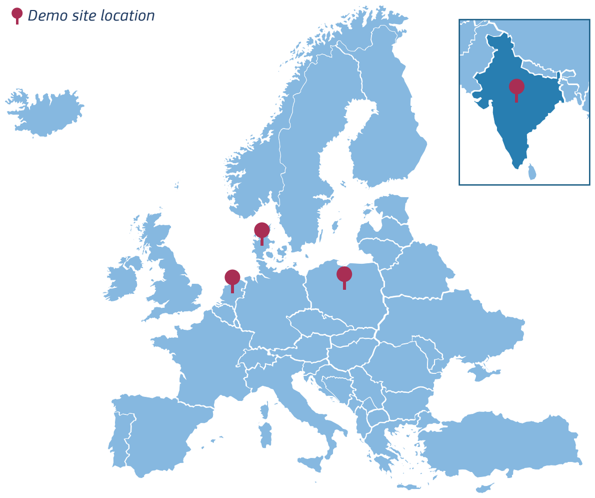
FROM	July 2021
TO	December 2024

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
6 669 677,74 €	3 491 307,13 €	https://h2020sustenance.eu/

TECHNOLOGIES AND SERVICES DEPLOYED

Technologies for consumer	Demand response; Smart appliances; Smart metering; Heating/cooling peak load management
Distributed Storage Technologies	Batteries; Electric vehicles; Thermal energy production, distribution and storage

PROJECT PARTNERS' COUNTRIES



COORDINATOR	Aalborg University (AAU) Denmark

OTHER PARTNERS

- Skanderborg Kommune (SKM), Denmark
- Aura Energi (AER), Denmark
- Neogrid (NGD), Denmark
- Bjerregaard Consulting (BJC), Denmark
- University of Twente (UTE), The Netherlands
- Saxion University of Applied Science (SAX), The Netherlands
- The Inst. of Fluid-Flow Machinery of the Polish Academy of Sciences (IMP), Poland
- Energa-Operator SA (EOR), Poland
- Stay-ON Energy Management (SON), Poland
- KEZO Foundation at Polish Academy of Science Research Centre (KEZ), Poland
- Indian Institute of Technology, Bombay (IITB), India
- Indian Institute of Science, Bangalore (IISc), India
- Indian Institute of Technology, Kharagpur (IITKGP), India
- Indian Institute of Technology, Delhi (IITDE), India
- National Institute of Technology, Tiruchirappalli (NITT), India
- National Institute of Technology, Silchar (NITS), India
- Visvesvaraya National Institute of Technology, Nagpur (VNIT), India
- Indian Institute of Technology, Bombay (IITB)

OTHER PARTNERS	
	• Indian Institute of Science, Bangalore (IISc) • Indian Institute of Technology, Kharagpur (IITKGP) • Indian Institute of Technology, Varanasi (IITBHU) • National Institute of Technology, Tiruchirappalli (NITT) • National Institute of Technology, Silchar (NITS) • Visvesvaraya National Institute of Technology, Nagpur (VNIT) • Motilal Nehru National Institute of Technology, Allahabad (MMNIT) • Innovation Laboratory Energy, Mumbai (ILABE) • Gram Oorja, Mumbai (GOR) • Urjalinks (URJA) • Motilal Nehru National Institute of Technology, Allahabad (MMNIT), India • Gram Oorja Private Solutions Ltd. (GOR), India

Project Description

Context

SUSTENANCE partners work towards local energy autarky via the demonstration of local integrated energy systems (employing locally available distributed generation, including PV, HP, flexible demand, energy storage, e-mobility).

The demonstration activities are in 4 countries: Denmark, the Netherlands, Poland and India, which differ in local energy resources, user behaviour, political structures, socio-economic and market conditions and regulations. However, SUSTENANCE will show how the same technical concepts e.g. the coupling of different energy vectors, storage solutions, demand response, smart control and digitalization, can be applied in each case, despite all these differences.

Project presentation, technical description and implementation

SUSTENANCE aims to demonstrate cost-effective, sustainable, and customer-centric solutions for effectively integrating different energy vectors in order to achieve sustainable development of regional communities by meeting their energy needs from the local RES and clean technology. This is realized by employing suitable locally available distributed generation including solar PV, biomass and biogas, flexible demand, energy storage technologies, electric mobility and reliable irrigation and clean cooking in energy domains like electricity, heat, transport, waste and water and focusing on attractive citizen centred business models.

Project Impacts

Economic: new business models developed.

Social: user and community involvement, contribution to the empowerment of women and children in rural areas of India by providing access to electricity, e-rickshaw mobility and a reliable water supply.

Technological: new technologies and innovations in terms of smart local energy systems, energy storage systems, energy flexibiity, demand response.

Environmental: decreased CO2 and other pollutants from combustion of fossil fuels.

Innovative aspects of the project. SUSTENANCE project seeks to apply a holistic system approach to find efficient, optimal and economical ways for the harmonised operation of heterogeneous energy carriers (electricity, heating, transport, cooking etc.) and infrastructures in local integrated 'energy islands' or integrated community energy systems, where citizens can be actively engaged to enable decarbonised energy communities.

Expected key exploitable results of the project

User friendly energy management system for private households: helps maximise the consumption from the grid at the times when costs are lowest (and where grid capacity is plentiful). It helps to balance local energy demand and production of intermittent renewable resources on the community level by using the energy flexibility that is provided by devices such as heat pumps, EV chargers and batteries.

iEMS - Intelligent Energy Management System: integrates all energy systems components into one "solution" making it "friendly" for all the potential users (at individual or community level) . It integrates two major system components, being "Local iEMS" and "iEMS Cloud", and translates complicated algorithms into an easy solution, without necessary input from stakeholder, which optimizes cost and usage of energy and maximizes auto-consumption at the same time.

LC-SC3-ES-3-2018-2020 - Integrated local energy systems (Energy islands)	Back to projects' list

Digitalisation	Consumers/prosumers	System integration

SERENE

Sustainable and Integrated Energy Systems in Local Communities

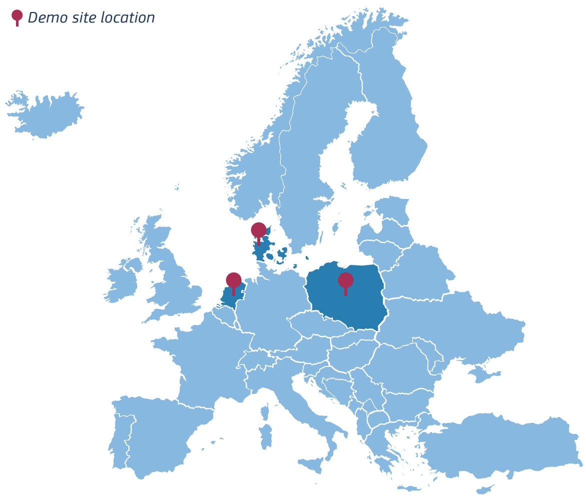
The aim of the SERENE project is to develop and demonstrate sustainable, integrated, cost-effective and customer-centric solutions for local communities. The idea is to integrate different energy system carriers and new renewable generation units in the local communities based on their social and technical status today to meet their energy needs in the coming years. The users has to be involved in the changes of the energy system and be informed about different technical opportunities and business cases to make decisions about their participation. Depending on the actual site, the new energy system involve different storage technologies (battery energy storages, heat storages, water storage-systems), demand response systems to enhance the flexibility of the systems (activating for instance electric vehicle charging stations and heat demand supplies), electric transportation systems like electrical vehicles or buses, heating system improvements using heat- pumps and integration of new renewable generation sources mainly in form of photo voltaics.

FROM	May 2021
TO	April 2025

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
5 683 012,50 €	5 112 163,39 €	https://h2020serene.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response; Smart metering; Heating/cooling peak load management; Micro-grid; Monitoring and control units; Batteries; Electric vehicles
Grid Technologies	Monitoring and control tools; Other grid technologies (OLTC Transformers)
Distributed Storage Technologies	Batteries; Electric vehicles; Thermal energy production, distribution and storage

PROJECT PARTNERS' COUNTRIES



COORDINATOR	AALBORG UNIVERSITY AAU (DK)

OTHER PARTNERS

- Skanderborg Municipality (DK)
- Aura Energi (utility company) (DK)
- Neogrid Technologies Aps. (DK)
- Suntherm Aps: SNT (DK)
- Bjerregaard Consulting Aps.: BJC (DK)
- Universiteit Twente (NL)
- Stichting Saxion:SAX (NL)
- Vereiniging Aardehuis Oost Nederland (NL)
- Loqio Services B.V. (NL)
- Gmina Przydwich: CCC (PL)
- Instytut Maszyn Preeplywowych im Roberta Swewalskiego Polskiej Akademii NA (PL)
- Energa Operato SA (PL)
- STAY-ON Pawel Grabowsky (PL)

Project Description

Context

Context. To accelerate the transition of the European electricity system to a more decentralized structure with local power production, the SERENE project aims to demonstrate -cost-effective and customer centric solutions for effectively integrating different energy

system carriers for the sustainable development of regional communities to meet their energy needs from local energy renewable energy sources. This is realized by activating suitable locally available distributed generation, demand response resources and energy storage technologies in various energy domains like electricity, heat, water treatment and transport, and focusing on attractive citizen-centered business models and local economies. These activities shall enhance the flexibility and efficient operation of the local electricity grids and energy networks, and further contribute to the central energy infrastructures and grids.

Scope

The focus of the SERENE project is to establish a community-driven low carbon multi-carrier energy systems for smaller cities and villages. The main objective of SERENE is to demonstrate smart technological, socio- economic, institutional and environmental solutions to enable local management of integrated energy systems and networks, utilisation of high share of local renewable energy and active consumer engagement in real neighbourhoods across different countries (Denmark, Netherlands and Poland) and further leading to the market introduction and replicability on the innovations in other energy communities across Europa and beyond.

Technical description and implementation

In each of the demonstrators of the SERENE project, two or more combinations of distributed energy resources and demand-side participation are integrated to supplement the existing local energy systems, based on its local requirements, conditions and characteristics, thereby formulating the pilot activities. This leads to the achievement of a collective focus on establishing innovative actions to establish a common cross-domain framework for the integrated community- based smart energy management systems and set-ups that integrate and synergize the operation of local generation and flexible demand units across different energy sectors and markets. It coordinates different modules of intelligent demand side management and aggregation, optimal use and control of local generation resources and storage elements, data management and automation, unit commitment and economic scheduling of all local units ensuring cheaper energy prices, and power management modules that maintain stability and reliability of the integrated energy system.

Impacts

Replicability – market transformation – policy –socio-economic in Denmark-Netherlands-Poland.

1) Validate solutions for decarbonization of the local energy system while ensuring a positive impact on the wider energy infrastructure, on the local economy and local social aspects, and local air quality.

2) Enhance the involvement of local energy consumers and producers, preferably by creating energy communities in the development and the operation of local energy systems and test new business models" across energy vectors (electricity, heating, cooling, water, wastes, etc.) so that it is able to integrate higher shares of renewables (than it would in case of separate operation of infrastructures)"

3) Benchmark technical solutions and business models that can be replicated in many local regions and that are acceptable by local citizens

4) Enhancement of innovation capacity.

5)Create new market opportunities.

6) Strengthen competitiveness.

7)Growth of companies.

8) Address issues related to climate change and the environment.

LC-SC3-ES-3-2018-2020 - Integrated local energy systems (Energy islands)

Back to projects' list

Electricity grids | Digitalisation | Consumers/Prosumers

LocalRES

Empowering local renewable energy communities for the decarbonisation of the energy systems

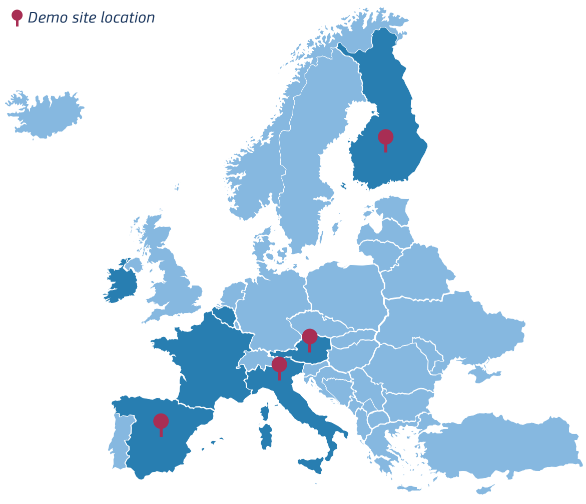
Community-led energy projects have a huge potential to drive the energy transition and offer new and attractive opportunities for decarbonising local energy systems. However, the design, planning and operation of RECs is still a great challenge for most citizens and local actors due to the novelty of this legal figure and the inherent complexity of community energy systems. LocalRES project aims at bridging these gaps and constituting a shuttle for the setting up of RECs by developing digital tools that support the co-design of the local energy landscape and enable the optimal management of energy systems.

FROM	May 2021
TO	April 2025

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
7 194 071,43 €	6 095 862,50 €	https://cordis.europa.eu/project/id/957819

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Smart appliance; Demand response; Smart metering
Grid Technologies	Micro-grid; Network management Monitoring and control units
Distributed Storage Technologies	Batteries; Electric vehicles; Thermal energy storage
Generation Technologies	Micro-wind turbines; PV; Micro-cogeneration

PROJECT PARTNERS' COUNTRIES



COORDINATOR	FUNDACION CARTIF (Spain)

OTHER PARTNERS

- AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH (Austria)
- ARTELYS (France)
- CENTRICA BUSINESS SOLUTIONS BELGIUM (Belgium)
- FLEXENS OY AB (Finland)
- RINA CONSULTING SPA (Italy)
- DOWEL INNOVATION (France)
- ENERGY CITIES ASSOCIATION (France)
- ACCADEMIA EUROPEA DI BOLZANO (Italy)
- MUNSTER TECHNOLOGICAL UNIVERSITY (Ireland)
- TEKNOLOGIAN TUTKIMUSKESKUS VTT OY (Finland)
- KOKAR KOMMUN (Finland)
- R2M ENERGY SRL (Italy)
- COMUNE DI BERCHIDDA (Italy)
- EZE BARRIZAR KOOP ELK TXIKIA (Spain)
- AYUNTAMIENTO DE ISPASTER (Spain)
- FUNDACION TECNALIA RESEARCH & INNOVATION (Spain)
- SISTEMES AVANCATS D ENERGIA SOLAR TERMICA SCCL (Spain)
- UNIVERSITAT PASSAU (Germany)
- LAB10 COLLECTIVE EG (Austria)
- MARKTGEMEINDE OLLERSDORF IM BURGENLAND (Austria)

Project Description

Context

The energy system in Europe currently undergoes profound changes, shifting from centralised towards decentralised, from fossil fuels to renewable energy, and from a passive to a more active role of users. This paradigm is a direct result of EU's plans to decarbonize the energy sector, deliver energy at affordable prices and enhance the security of supply. As part of this strategy, the new Clean Energy Package prioritised the empowerment of customers, and included the new figure of Renewable Energy Communities (RECs) within the revised Renewable Energy Directive (REDII).

Project presentation, technical description and implementation

LocalRES deploys innovative local energy systems led by RECs, promoting a socially fair energy transformation that empowers communities and citizens with renewable energy. The systems include decarbonization solutions (e.g. PV, power-to-vehicle, storage or ICT) and are being demonstrated in different rural sites across Europe with limited grid connections. LocalRES aims to actively engage citizens, local actors, and communities in the energy transition, focusing on RECs for leading the structural change towards decarbonising local energy systems. To do so, a holistic approach covering the whole value chain of RECs is proposed, including: learning and awareness raising, assessing REC-driven services and business models, co-designing RECs through participatory processes, integrating decarbonisation solutions, and promoting REC replicability alongside policy recommendations.

Project Impacts

LocalRES project is expected to have multiple impacts including:

1) a positive effect on local energy systems by deploying decarbonisation solutions, but also on the wider energy infrastructure and on economy, social aspects and air quality at local level;

2) the enhancement of the involvement of energy users in developing and operating local energy systems and in the test REC-driven business models;

3) the validation of approaches, strategies and tools to safely and securely operate an integrated local energy system across energy vectors;

4) the benchmarking of technical solutions and business models that can be replicated in various local regions.

Innovative aspects of the project

LocalRES will deliver new digital tools aimed at boosting the structural change in the energy system. A Planning Tool will enable local stakeholders, independently of their expertise on energy, being involved in the design process of their energy community. A Multi-Energy Virtual Power Plant (MEVPP) approach will allow providing different services adapted to RECs by integrating a range of assets. The LocalRES solutions will be demonstrated in isolated towns and geographical islands.

Expected key exploitable results of the project

LocalRES Planning Tool: to enable the participation of citizens and local actors in the decision-making processes associated to the planning of a REC. It will be co-designed by local stakeholders, and accessible for expert and no-expert users, promoting their understanding about energy systems and the feasibility of alternative scenarios, allowing them to make informed decisions. LocalRES Multi-Energy Virtual Power Plant (MEVPP) approach: to manage and optimize different energy vectors and to provide different services according to community interests, it will maximize the contribution of RES, enhance the system flexibility and supply security. The MEVPP approach will develop algorithms to provide collective services (e.g. collective self-consumption), local energy market services (e.g. congestion management or voltage control), or energy market services (e.g. ancillary services).

Key exploitable results and sub-key exploitable results achieved to date

The exploitable results are still under development.

LC-SC3-ES-3-2018-2020 - Integrated local energy systems (Energy islands)

Back to projects' list

Energy storage | Consumers/prosumers | Market Design

CREATORS

CREATing cOmmunity eneRgy Systems

CREATORS

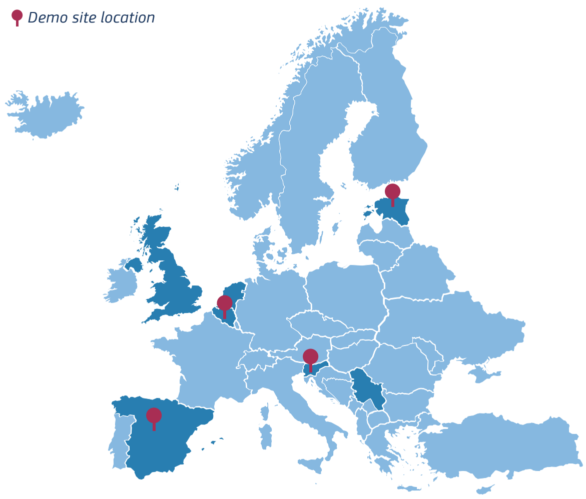
The BEST-Storage project aims to develop and demonstrate innovative thermal energy storage solutions for buildings, addressing peak load reduction, energy savings, and renewable energy integration challenges. Key activities include developing thermo-chemical and PCM slurry storage technologies, integrating smart control systems, and conducting real-world demonstrations across Europe. Measurable outcomes include optimized energy storage performance, reduced storage costs, improved building energy management, and enhanced environmental sustainability through peak load management. The project's focus is on advancing sustainable heating and cooling solutions while promoting economic and environm

FROM	September 2020
TO	June 2024

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
7 247 500,00 €	5 350 487,50 €	https://www.creators4you.energy/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Smart metering, Application CES-as-a-service
Grid Technologies	Feed low grade waste heat to the district heating networks
Large Scale Storage Technologies	Industrial battery
Distributed Storage Technologies	Storage for self- consumption, Hydrogen battery, V2G
Generation Technologies	Wind turbines; Photovoltaic; Biogas; Micro-generation
Market	Electricity price Reduction, flexibility services

PROJECT PARTNERS' COUNTRIES



COORDINATOR	CORDEEL ZETEL TEMSE (Belgium)

OTHER PARTNERS

- ACRONI PODJETJE ZA PROIZVODNJO JEKLA IN JEKLENIH IZDELKOV DOO (Slovenia)
- AUTORITAT PORTUARIA DE BARCELONA (Spain)
- BAX INNOVATION CONSULTING (Spain)
- BLAGOVNO TRGOVINSKI CENTER DD (Slovenia)
- COMSA INSTALACIONES Y SISTEMAS INDUSTRIALES (Spain)
- ELECTRO GORENJSKA PODJETJE ZA DISTRIBUCIJO
- ELEKTRICNE ENERGIJE DD (Slovenia)
- ENERGYPOLE CARAIBES (Spain)
- ENERGYPRO LIMITED (UK)
- FOR YOUR ENERGY FREEDOM BV (Netherlands)
- I.LECO (Belgium)
- INSTITUTE JOSEF STEFAN (Slovenia)
- MITTETULUNDUSUHING TARTU REGIOONI ENERGIAAGENTUUR (Estonia)
- R2M SOLUTION SPAIN SL (Spain)
- TAJFUN HIL DRUSTVO SA OGRANICENOM ODGOVORNOSCU ZA ISTRAZIVANJE, PROIZVODNJU, TRGOVINU I USLUGE NOVI SAD (Serbia)
- TARTU LINN (Estonia)
- TURBULENT (Belgium)

Project Description

Context

The project involves the advancement of smart energy community models, aiming to overcome barriers related to scalability, replicability, reliability, and viability. The project seeks to accelerate the integration of Community Energy Systems (CES) across Europe, enhancing their commercial readiness and unlocking local renewable energy generation. Additionally, it aims to increase flexibility in local grid balancing and activate and empower consumers and prosumers in the energy market.

Project presentation, technical description and implementation

Aims to support local initiators and service providers in establishing and operating Community Energy Systems (CES) through technical, financial, and social assistance. It will provide applications and service packages to facilitate the deployment of CES, with a focus on accelerating integration across Europe and enhancing commercial readiness. The project will develop and demonstrate these solutions in pilot sites across Belgium, Estonia, Slovenia, and Spain, with subsequent testing in six additional sites under varying market conditions. The services aim to reduce preparation and operational costs by 6%, decrease CAPEX by 2-35%, lower local energy prices by 5-1%, and create two full-time equivalent jobs in each CES. The project will progress the technology readiness level (TRL) from 6 to 8-9 and move from commercial readiness level (CRL) 2 to 3.

Project Impacts

Replicability: Demonstrating the tools in four projects and replicating them in six additional sites will cover different types of energy communities and regulatory frameworks, laying the groundwork for future replicability.

Socio-economics: The project aims to empower consumers and prosumers, activating around 15-2% of them in the market, thereby fostering greater participation in the energy sector.

Environment: By unlocking local renewable energy generation and improving the efficiency of local energy systems, the project anticipates a reduction of potentially 1.8 million tons of CO2 emissions per year.

Market Transformation: CREATORS will incentivize the creation of energy communities by delivering user-friendly tools in a CES-as-a-service package, with the aim of creating a market pull effect.

Policy Impact: The project aims to engage with key stakeholders such as energy agencies, regulators, and distribution system operators (DSOs) and transmission system operators (TSOs), potentially influencing energy policies in the participating countries to create a conducive environment for CES development.

Innovative aspects of the project

Comprehensive Support for CES: It provides comprehensive support to local initiators and service providers in initiating, planning, implementing, and operating a professional Community Energy System (CES), thus overcoming scalability, replicability, reliability, and sustainability barriers.

Applications and Service Packages: It offers a set of applications and service packages to support local initiators in deploying CES, aiming to reduce preparation and operational costs by 6% and investment costs by 2-35%.

Innovative Technologies: It implements innovative technologies such as smart metering, feeding low-grade heat into district heating networks, industrial battery, distributed storage for self-consumption, hydrogen battery, and vehicle-to-grid (V2G), among others.

CES-as-a-Service Business Model: It introduces the CES-as-a-service business model, making energy communities accessible and dynamic for integrators and local energy providers, enabling them to offer local energy services professionally and sustainably.

Cross-border and Transnational Development: It involves partners from different European countries to promote the development and dissemination of CES across Europe, thereby contributing to creating a conducive environment for CES adoption throughout the European Union.

Expected key exploitable results of the project

Developed Applications and Service Packages: The project will develop a set of applications and service packages tailored to support local initiators in deploying Community Energy Systems (CES) effectively.

Reduced Costs: By leveraging innovative technologies and streamlined processes, the project aims to reduce preparation and operational costs by 6% and investment costs by 2-35%.

Commercial Readiness of CES: CREATORS will enhance the commercial readiness of CES, making them more attractive and viable for local energy service providers and communities.

Job Creation: The deployment of CES is expected to create employment opportunities, with an estimated creation of 2 full-time equivalent (FTE) jobs in each CES.

Technology Maturation: The project will advance the maturity of CES-related technologies and solutions, moving them from Technology Readiness Level (TRL) 6 to TRL 8-9.

Market Pull Effect: By testing CES-as-a-service models in 1 pilot sites, CREATORS aims to create a market pull effect, encouraging wider adoption of CES across Europe.

Reduction in Energy Prices: Through increased efficiency and optimization, the project targets a reduction of local energy prices by 5-1%.

Carbon Emissions Reduction: By unlocking local renewable energy generation and improving the efficiency of local energy systems, CREATORS aims to reduce carbon emissions by an estimated 1.8 million tons per year.

Key exploitable results and sub-key exploitable results achieved to date

Developed Applications and Service Packages: Prototyped and tested various applications and service packages tailored for supporting local initiators in deploying Community Energy Systems (CES).

Cost Reduction Strategies Implemented: Identified and implemented cost reduction strategies, resulting in a significant decrease in preparation and operational costs, as well as investment costs for CES deployment.

Commercial Readiness Assessment: Conducted assessments to evaluate the commercial readiness of CES solutions, identifying areas for improvement and optimization.

Job Creation Initiatives: Initiated job creation initiatives within CES deployment projects, contributing to local employment opportunities and economic growth.

Technology Maturation Progress: Advanced the maturity level of CES-related technologies, moving them closer to commercial viability and widespread adoption.

Market Pull Effect Demonstrated: Demonstrated the market pull effect of CES-as-a-service models in pilot sites, attracting interest and participation from local energy service providers and communities.

Reduction in Energy Prices: Implemented measures to optimize energy systems and reduce local energy prices, enhancing affordability and accessibility for end-users.

Carbon Emissions Reduction Achieved: Implemented initiatives to unlock local renewable energy generation, resulting in a reduction of carbon emissions by an estimated 1.8 million tons per year.

LC-SC3-ES-3-2018-2020 - Integrated local energy systems (Energy islands)

Back to projects' list

Energy storage | Consumers/Prosumers | System integration

eNeuron

GreeN Energy HUbs for Local IntegRated Energy COmmunities optimisatioN

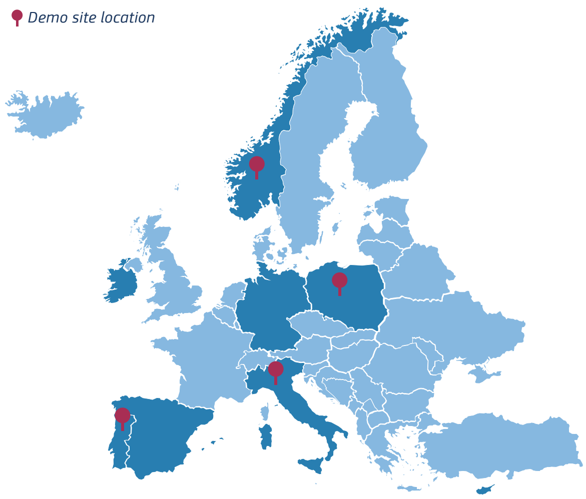
The eNeuron project intends to develop innovative instruments for the best design and performance of LECs, integrating distributed energy resources and multiple energy carriers at different levels. By promoting the Energy Hub concept as a conceptual model to control and manage multi-carrier and integrated energy systems, the project will propose instruments that promote tangible sustainability and energy security benefits for all stakeholders in LECs. The results will benefit local prosumers by reducing energy cost and promoting local low-carbon energy. It will provide developers and solution providers with new opportunities for technologies and benefit distribution system operators.

FROM	November 2020
TO	October 2024

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
6 317 818,39 €	5 731 117,50 €	https://eneuron.eu/

TECHNOLOGIES AND SERVICES DEPLOYED		
	Other technologies and Services	Integrated local energy communities

PROJECT PARTNERS' COUNTRIES



COORDINATOR	AGENZIA NAZIONALE PER LE NUOVE TECNOLOGIE, L'ENERGIA E LO SVILUPPO ECONOMICO SOSTENIBILE (Italy)

OTHER PARTNERS

- Technical Coordinator: UNIVERSITY OF CYPRUS (Cyprus)
- INSTYTUT ENERGETYKI (Poland)
- FUNDACIO INSTITUT DE RECERCA DE L'ENERGIA DE CATALUNYA (Spain)
- SINTEF ENERGI AS (Norway)
- FUNDACION TECNALIA RESEARCH & INNOVATION (Spain)
- European Distributed Energy Resources Laboratories e.V. (Germany)
- EPRI EUROPE DAC (Ireland)
- UNIVERSITÀ POLITECNICA DELLE MARCHE (Italy)
- UNIVERSIDAD POLITECNICA DE MADRID (Spain)
- ENEA OPERATOR SP ZOO (Poland)
- SKAGERAK NETT AS (Norway)
- LABELEC - ESTUDOS, DESENVOLVIMENTO E ACTIVIDADES LABORATORIALS SA (Portugal)
- FONDAZIONE ICONS (Italy)
- ENEIDA WIRELESS & SENSORS SA (Portugal)
- MINISTERIO DA DEFESA NACIONAL (Portugal)
- MIASTO BYDGOSZCZ (Poland)

Project Description

Context

LECs offer a decentralised and bottom-up approach to producing, managing and using energy. They are set to play a significant role in the energy transition, integrating multiple energy carriers such as electricity, gas, heat, cooling, hydrogen, mobility and water. While LECs are well placed to deliver on these goals in the longer term, they are inherently complex and require optimised design and operation. LECs are challenging to optimise as their related stakeholders – developers, asset owners, operators and end users – often have a wide range of action and conflicting objectives within communities. They also need to cater for renewable energy and manage its intermittency.

Project presentation, technical description and implementation

Using the energy hub concept, eNeuron will develop a set of pioneering tools for the optimal design and operation of multi-carrier energy systems. To achieve this, regulatory and technical bottlenecks will be mapped with existing LECs before building new use cases and business models for use at different scales. They will draw on the latest software and hardware solutions including a cloud-based management platform to balance supply and demand dynamically from multiple energy carriers. Once refined, the eNeuron LEC framework will be put to the test at four pilot schemes: a city and its major energy nodes (Poland), a football stadium and its vicinity (Norway), a naval district with its own distribution grid (Portugal), and a university campus (Italy). The overall purpose is to check the tool's effectiveness and replicability as a concept and solution for different local contexts.

Project Impacts

- Local prosumers (households, business and industry) stand to benefit from clean and affordable energy from local and renewable sources at lower costs.
- Developers and solution providers will find new opportunities for technology within integrated replicable business models.
- Distribution system operators (DSOs) will avoid grid congestion and deferring network investments.
- Policy makers will benefit from increasingly sustainable and secure energy supply systems.
- Rural areas will enjoy economic growth and better access to energy.
- The energy trilemma – energy democratisation, security and efficiency – will be better balanced.

Innovative aspects of the project

eNeuron project intends to develop innovative instruments for the best design and performance of LECs, integrating distributed energy resources and multiple energy carriers at different levels. By promoting the Energy Hub concept as a conceptual model to control and manage multi-carrier and integrated energy systems, the project will propose instruments that promote tangible sustainability and energy security benefits for all stakeholders in LECs.

Expected key exploitable results of the project

- Framework analysis of integrated local multivector energy systems.
- Optimisation of Energy Hubs.
- eNeuron Digital Tools.

LC-SC3-ES-3-2018-2020 - Integrated local energy systems (Energy islands)

Back to projects' list

Digitalisation | Consumer/Prosumers | General topics

RENergetic

Community-empowered Sustainable Multi-Vector Energy Islands

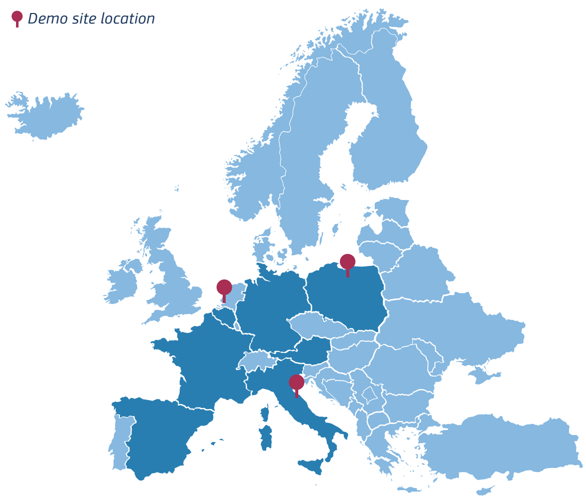
The project focuses on enhancing energy autonomy and efficiency in urban areas through the establishment of energy islands empowered by citizen communities. Key objectives include maximizing renewable energy integration, fostering community engagement, and enhancing economic viability. Measurable outcomes include increased energy autonomy levels, community participation rates, economic attractiveness of renewable systems, and replicability potential across Europe.

FROM	November 2020
TO	October 2024

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
6 905 688,61 €	5 959 425,75 €	https://www.renergetic.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Demand response; Smart metering
Grid Technologies	Network
Distributed Storage Technologies	Batteries

PROJECT PARTNERS' COUNTRIES



COORDINATOR	INETUM ES (SPAIN)

OTHER PARTNERS

- Inetum (Spain, France, and Belgium)
- Clean Energy Innovative Projects (Belgium)
- Gent University (Belgium)
- Poznan University of Technology, (Poland)
- Veolia (Poland)
- Poznan Supercomputing and Networking Center (Poland)
- Ospedale San Raffaele (Italy)
- Comune di Segrate
- University of Pavia (Italy)
- Energy Kompass GMBH (Austria)
- University of Mannheim and Passau (Germany).

Project Description

Context

The project aligns with the European Commission's priorities outlined in the European Green Deal and its focus on sustainability, digitalization, and economic growth. By empowering citizen energy communities, RENergetic contributes to local energy autonomy, renewable energy integration, and community engagement, thus advancing sustainability goals. Additionally, its emphasis on digital tools for energy optimization enhances efficiency and resilience while fostering inclusion by involving local communities in the energy transition. Overall, RENergetic supports broader European objectives of achieving carbon neutrality, fostering innovation, and promoting social and economic development.

Project presentation, technical description and implementation

Challenge: Actively engage energy communities in DR schemes and value-adding compound services to increase grid resilience, renewable generation and generate benefits to citizens.

Objectives: Deliver an integrated, interoperable toolbox to promote the energy transition of communities, deliver a citizen engagement methodology for stimulating participation in energy system and community flourishing, new business models for participation of households in DR market.

Beyond SotA: citizen participatory design engagements, digital toolbox for energy community participation in energy market, novel compound services to community members.

Methodology: i) Tailored citizen engagement (living labs and solution co-creation), ii) ACCEPT digital toolbox for delivery of compound services, iii) Business modelling activities for viable business models' creation, iv) Demonstrations at 4 pilots.

Project Impacts

The main expected project impacts can be summarised as follows:

1. Increased use of demand response across EU energy system

2. Increased number and types of consumers engaged in demand-response across Europe

3. Demonstrated and improved viability of innovative energy services, best practices and effective incentives that can be replicated at large scale

4. Increased uptake of services that combine energy efficiency with other energy services, technologies and non-energy benefits

5. Increased reliability of innovative energy services and accessibility to them

6. Increased predictability of consumption patterns and consumer behaviour

7. Increased data protection and privacy for customers

8. Improved modelling of the flexibility levers from the new energy services

9. Increased share of energy or power that can be mobilised to provide flexibility to the grid and increase the hosting capacity of RES

As a result, the following categorised impacts can be expected:

Technological: increased grid resilience, development of interoperable digital tools that can help energy communities and their members participate in the energy transition, increased penetration of renewable energy, creation of local flexibility markets and increased self-consumption and self-sufficiency of energy communities.

Economic: creation of innovative compound services for end-users helping them to access benefits and new revenue streams, new business models for energy communities (energy community as aggregator, ESCo and retailer), increased cost savings for energy communities and their members through higher self-consumption and participation in implicit and explicit demand response schemes.

Environmental: contribution in decarbonisation of energy sector through increased use of renewable energy, energy efficiency and energy savings, emission savings from increased self-consumption.

Social: participatory design of solutions (co-creation activities), greater user acceptance of solutions, increased quality of life as solutions increase comfort and convenience of users.

Innovative aspects of the project

- A programme of cutting-edge, participative citizen engagements to develop consumer-centric energy services for adopting DR services and understand consumer acceptability.
- Consumer Digital Twin that enables correlation of consumer behaviour and energy and building assets enabling innovative business models and access of customers to human-centric compound services
- A digital toolbox for energy community and community members' participation in the energy market

Expected key exploitable results of the project

Building Information Management Layer: enables bilateral communication between building assets and usersd.

Consumer Digital Twin Model: a digital replica of citizens and households, allowing the correlation between consumer behaviour and building assets

On-Demand Flexibility Management Tool: the engine that optimises the operation of building assets based on certain operating scenarios (e.g., ToU tariffs, self-consumption increase)

P2P Energy/Flex Exchange Platform: enables the exchange of energy within the energy community

- District Asset Management component: optimises the operation of district-level assets
- ACCEPT Citizen Application (UI)
- Energy Behaviour change method & tools
- Energy Community Tools incl. a UI and business intelligence tool
- Dynamic SRI-based performance rating framework
- Optimised biomass boiler scheduling for grid flexibility services

Key exploitable results and sub-key exploitable results achieved to date

From the abovementioned KERs, the following have already been achieved:

i) Building Information Management Layer

ii) Consumer Digital Twin Model incl. the Non-Intrusive Load Monitoring component

iii) On-Demand Flexibility Management Tool

iv) P2P Flexibility Exchange Platform

v) District Asset Management Component

vi) Energy Behaviour change method & tools

vii) Dynamic SRI-based performance rating framework

viii) Optimised biomass boiler scheduling for grid flexibility services

The following KERs are currently being further refined and will soon undergo user testing at the four demonstration sites:

ix) ACCEPT Citizen Application (UI)

x) Energy Community Tools incl. a UI and business intelligence tool

With regards to specific activities for the exploitation of KERs, the following activities have been carried out to date:

- The characterization tables have been filled in for each KER -The initial stage in shaping and describing the final results, as well as the responsibilities, actions, and timing for partners that want to exploit it, is the characterisation table. The purpose of this first table is to examine the requirements or obstacles that the results will address or remove, to identify the customers and pertinent market categories, as well as the rival companies and their competing solutions.
- International patent scenario overview have been presented for each KER - For each KER, the related patents were identified by means of the PATSNAP search tool, inserting in the search bar the KER name and fine tuning the research if irrelevant patents (e.g., belonging to different fields) were obtained.

LC-SC3-SCC-1-2018-2019-2020 - Smart Cities and Communities

Back to projects' list

Electricity grids | Digitalisation | System integration

POCITYF

A POsitive Energy CITY Transformation Framework

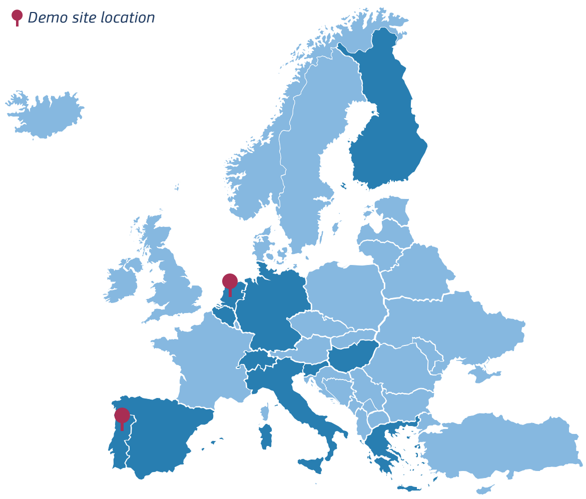
POCITYF is an EU-funded smart city project that will help historical cities to become greener, smarter and more liveable while respecting their cultural heritage and attending to their citizens' needs. By implementing and testing Positive Energy Districts in its 8 cities, POCITYF will support Europe in the race to become the first carbon neutral continent by 2050. Two cities, Alkmaar and Évora, are so-called Lighthouse cities as they will serve as testbed for POCITYF's innovative solutions. Six Fellow cities, Bari, Celje, Granada, Hvidovre, Ioannina and Ujpest, will observe and replicate the model that POCITYF will apply to support the energy transition of the Lighthouse cities.

FROM	October 2019
TO	September 2024

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
22 181 749,16 €	19 998 275,34 €	https://pocityf.eu/

TECHNOLOGIES AND SERVICES DEPLOYED	
Technologies for consumer	Smart appliances, Smart metering, Heating/cooling peak load management, Other technologies for consumers ((Positive Energy (stand-alone) Buildings)
Grid Technologies	Micro-grid,Network management, Monitoring and control tools, Other grid technologies (mart V2G EVs)
Generation Technologies	Photovoltaic, Solar thermal, Micro-generation
Distributed Storage Technologies	Electric vehicles
Market	Electricity market, Ancillery services

PROJECT PARTNERS' COUNTRIES



COORDINATOR	LABELEC ESTUDOS DESENVOLVIMENTO E ACTIVIDADES LABORATORIAIS SA (Portugal)

OTHER PARTNERS

- CAMARA MUNICIPAL DE EVORA (Portugal)
- UNINOVA-INSTITUTO DE DESENVOLVIMENTO DE NOVAS TECNOLOGIAS-ASSOCIACAO (Portugal)
- UNIVERSIDADE DE EVORA (Portugal)
- UBIWHERE LDA (Portugal)
- DECSIS SISTEMAS DE INFORMACAO S.A.(Portugal)
- SCHNEIDER ELECTRIC SPA (Italy)
- PACT PARQUE DO ALENTEJO DE CIENCIAE TECNOLOGIA(Portugal)
- MC SHARED SERVICES SA (Portugal)
- ELERGONE ENERGIA, LDA (Portugal)
- MODELO CONTINENTE HIPERMERCADOS S.A. (Portugal)
- ONYX SOLAR ENERGY SL (Spain)
- TEGOLA CANADESE SPA (Italy)
- IWIS INSULATION WATERPROOFING INDUSTRIAL SYSTEMS SRL (Italy)
- BETTERIES AMPS GMBH (Germany)
- KIMATICA MONOPROSOPI ETAIREIA PERIORISMENIS EUTHYNIS (Greece)
- INESC TEC - INSTITUTO DE ENGENHARIADE SISTEMAS E COMPUTADORES, TECNOLOGIA E CIENCIA (Portugal)
- GEMEENTE ALKMAAR (Netherlands)

OTHER PARTNERS	
	• STICHTING NEW ENERGY COALITION (Netherlands) • STICHTING HOGER ONDERWIJS NEDERLAND (Netherlands) • NV HVC (Netherlands) • NEDERLANDSE ORGANISATIE VOOR TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK TNO (Netherlands) • STICHTING WOONWAARD NOORD-KENNEMERLAND (Netherlands) • WONINGSTICHTING VAN ALCKMAER VOOR WONEN (Netherlands) • DUURZAAM BOUWLOKET B.V. (Netherlands) • CONNEXXION OPENBAAR VERVOER NV (Netherlands) • ALLIANDER NV (Netherlands) • NEROA BV (Netherlands) • AYUNTAMIENTO DE GRANADA (Spain) • ASOCIACION AGENCIA PROVINCIAL DE LA ENERGIA DE GRANADA (Spain) • INSTITUT DE TECNOLOGIA DE LA CONSTRUCCION DE CATALUNYA (Spain) • COMUNE DI BARI (Italy) • ENERGY@WORK SOCIETA' COOPERATIVA A R.L.(Italy) • MESTNA OBCINA CELJE (Slovenia) • ZAVOD ZA GRADBENISTVO SLOVENIJE (Slovenia) • BUDAPEST FOVAROS IV. KERULET UJPEST ONKORMANYZATA (Hungary) • EMI EPITESUGYI MINOSEGELLENORZO INNOVACIOS NONPROFIT KFT (Hungary) • MUNICIPALITY OF IOANNINA (Greece) • HVIDOVRE KOMMUNE (Denmark) • EUROPEAN GREEN CITIES APS (Denmark) • ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS (Greece) • TEKNOLOGIAN TUTKIMUSKESKUS VTT OY (Finland) • FONDAZIONE ICONS (Italy) • RINA CONSULTING SPA (Italy) • FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS (Spain) • AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH (Austria) • ASSOCIATION EUROPEENNE DES AGENCESDE DEVELOPPEMENT (Belgium) • ENERSIS SUISSE AG (Switzerland) • RIJKSUNIVERSITEIT GRONINGEN (Netherlands) • DIPUTACION PROVINCIAL DE GRANADA (Spain) • STITUTE FOR VALORISATION AND EXPERTISE OF THERMOCHEMICS ALKMAAR) (Netherlands)

Project Description

Context

By 2050 80% of population is expected to be living in urban areas.

- The majority of European cities has buildings of historical interest.
- Cities are responsible for 80% of the global energy consumption.

These facts show why it is vital for historic cities, which often face legal restrictions in the retrofitting of buildings of historical interest, to become more sustainable.

Cities are part of the problem but they can be also part of the solution.

Project presentation, technical description and implementation

POCITYF will demonstrate innovative smart city technologies in two Lighthouse Cities, Alkmaar (NL) and Evora (PT), and replicate them in 6 Fellow Cities. POCITYF combines Positive Energy Blocks (PEB) with grid flexibility, e-mobility, innovative ICT technologies and citizen engagement strategies, while respecting the urban cultural heritage.

POCITYF engages city administrators, planners, universities, entrepreneurs and citizens in a coordinated effort to model the future development of European cities.

To make sure that the project delivers long-term impact to the cities, POCITYF focuses on citizen needs and embraces citizen-centric design.

Project Impacts.

- Demonstrate in two lighthouse high solutions at building and district level that enable the increase of energy self-consumption, energy saving and high share of locally produced renewable energy. This will lead to the deployment of positive energy districts (PEDs) located in mixed use urban districts, including cultural heritage ones.
- P2P energy management and storage solutions supporting grid flexibility and curtailment reduction the integration of electro-mobility solutions as an enabler to grid flexibility the integration of the latest generation of ICT solutions within existing city platforms active citizen engagement services and solutions providing an open innovation ecosystem for

citizens to participate in co-creation, decision making, planning and problem solving.

- Replicate the solutions in the Light house cities, in the fellow cities and in many other EU cities. To facilitate this task the following actions will be undertaken:
- Identify related regulatory barriers, legal aspects and data security/protection and propose practical recommendations on how to overcome them.
- Design bankable business models and robust investment concepts that consider the whole PED lifecycle, and test them to reduce technical and financial risks for investors
- Strengthening the links and cooperative innovation with other Smart Cities and Communities Projects and establishing connections with cities ranging in size, geography, climatic zones and economic situations
- Create and coordinate a network of smart cities for cultural heritage areas.

According to the Historic Urban Landscape Approach adopted by UNESCO, urban heritage constitutes a key resource in enhancing the liveability of urban areas as it represents a source of social cohesion, combining factors of diversity and drivers of creativity, innovation and urban regeneration. By adapting to the Historic Urban Landscape Approach, POCITYF seeks to increase the sustainability of planning and design interventions by considering the existing built environment, intangible heritage, cultural diversity, socio- economic and environmental factors along with local community values.

SU-DS04-2018-2020 - Cybersecurity in the Electrical Power and Energy System (EPES): an armour against cyber and privacy attacks and data breaches

Back to projects' list

Electricity grids | Digitalisation | Decarbonisation

ELECTRON

rEsilient and seLf-healed EleCTRical pOwer Nanogrid

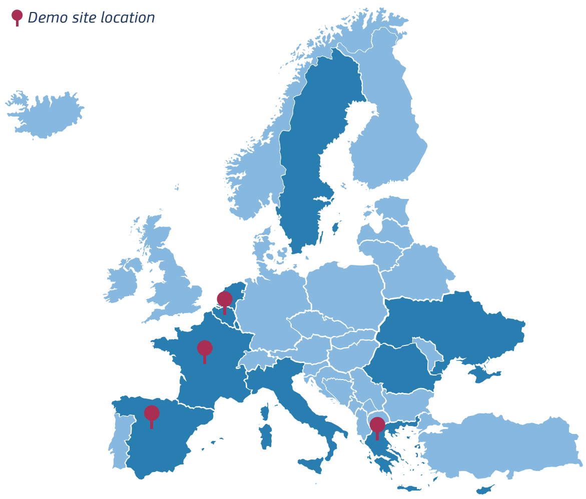
The ELECTRON project aims to enhance the resilience of Electrical Power and Energy Systems (EPES) against cybersecurity threats. It will develop an advanced EPES platform focusing on risk assessment, anomaly detection, failure mitigation, and personnel training using AR-VR technologies. The project targets improved cybersecurity, reduced downtime, enhanced system reliability, and better-trained personnel. Key impacts include strengthened EPES security and compliance with cybersecurity standards, aligning with EU priorities on critical infrastructure protection.

FROM	October 2021
TO	September 2024

PROJECT TOTAL COST	EU CONTRIBUTION	WEBSITE
10 312 814,69 €	7 998 887,01 €	https://cordis.europa.eu/project/id/101021936

TECHNOLOGIES AND SERVICES DEPLOYED	
Grid Technologies	High Voltage Alternating Current; High Voltage Direct Current; Multi-terminal; Micro-grid; Semiconductor devices and power converters; Protections; High Voltage Direct Current breaker; Grid inertia; Network management; Monitoring and control tools
Large Scale Storage Technologies	Power to gas; Compressed air energy storage; Hydro storage
Distributed Storage Technologies	Batteries; Electric vehicles

PROJECT PARTNERS' COUNTRIES



COORDINATOR	NETCOMPANY - INTRASOFT (Belgium)

OTHER PARTNERS

- PANEPISTIMIO DYTIKIS MAKEDONIAS (Greece)
- THALES DIS FRANCE SA (France)
- SCHNEIDER ELECTRIC FRANCE SAS (France)
- ATOS IT SOLUTIONS AND SERVICES IBERIA SL (Spain)
- DIMOSIA EPICHEIRISI ILEKTRISMOU ANONYMI ETAIREIA (Greece)
- INDEPENDENT POWER TRANSMISSION OPERATOR SA (Greece)
- CHECKWATT AB (Sweden)
- INTEGRATED SOLUTIONS LLC (Ukraine)
- JOINT-STOCK COMPANY PRYKARPATTYAOBLENERGO (Ukraine)
- G.E. PUKHOV INSTITUTE FOR MODELINGIN ENERGY ENGINEERING OF THE NATIONAL ACADEMY OF SCIENCES OF UKRAINE (Ukraine)
- ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS (Greece)
- NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET NTNU (Norway)
- GIOUMPITEK MELETI SCHEDIASMOS YLOPOIISI KAI POLISI ERGON PLIROFORIKIS ETAIREIA PERIORISMENIS EFTHYNIS (Greece)
- CYBERLENS BV (Netherlands)

OTHER PARTNERS	
	• EIGHT BELLS LTD (Cyprus) • LOGOS RICERCA E INNOVAZIONE(Italy) • IDENER RESEARCH & DEVELOPMENT AGRUPACION DE INTERES ECONOMICO (Spain) • INCITES CONSULTING SA (Luxembourg) • FUNDACION TECNALIA RESEARCH & INNOVATION (Spain) • DIETHNES PANEPISTIMIO ELLADOS (Greece) • SIDROCO HOLDINGS LIMITED (Cyprus) • UNIVERSITY OF CYPRUS (Cyprus) • IBM ISRAEL - SCIENCE AND TECHNOLOGY LTD (Israel) • UBITECH ENERGY (Belgium) • UNIVERSIDAD DE MURCIA (Spain) • ISOTROL SA (Spain) • ENERFIN SOCIEDAD DE ENERGIA SL (Spain) • TUV AUSTRIA ROMANIA SRL (Romania) • SOCIETATEA ENERGETICA ELECTRICA SA (Romania) • COMPANIA NATIONALA DE TRANSPORT AL ENERGIEI ELECTRICE TRANSELECTRICA SA (Romania) • UNIVERSITATEA POLITEHNICA DIN BUCURESTI (Romania) • ALTER TECHNOLOGY TUV NORD SA (Spain) • NETCOMPANY-INTRASOFT SA (Luxembourg) • THALES DIS FRANCE SAS (France) • METAMIND INNOVATIONS IKE (Greece) • AZERBAYCAN DOVLET NEFT VE SENAYE UNVERSITETI (Azerbaijan) • SCHNEIDER ELECTRIC ESPANA SA (Spain)

Project Description

Context

The ELECTRON project aligns with the European Commission's thematic areas and priorities by addressing cybersecurity in Electrical Power and Energy Systems (EPES), crucial for infrastructure resilience and protection. It contributes to digitalisation by integrating advanced ICT solutions and cybersecurity measures into energy systems, fostering smart grid development. Additionally, by safeguarding EPES against cyber threats, the project supports sustainability, enhancing energy system reliability and reducing risks to critical infrastructure. Inclusion is promoted through training and certification programs, ensuring diverse stakeholders can contribute to secure energy systems. This initiati

Project presentation, technical description and implementation

The ELECTRON project addresses critical challenges in Electrical Power and Energy Systems (EPES) cybersecurity by:

1. Developing advanced tools to assess, detect, and mitigate cyber threats.

2. Implementing anomaly detection and prevention techniques to enhance system resilience.

3. Leveraging AI, blockchain, and IoT for a tailored cybersecurity framework.

4. Employing risk assessment, anomaly detection, and failure mitigation methodologies.

5. Utilizing power grid modeling, SCADA systems, and data analytics for real-time response measures.

Project Impacts

Economic Impacts:

- Increased market competitiveness through enhanced cybersecurity measures.
- Cost savings due to reduced downtime and operational disruptions.
- Opportunities for new market entry and business growth.

Social Impacts:

- Enhanced job security and creation of specialized roles in cybersecurity.
- Improved quality of life through reliable and secure energy services.
- Strengthened community resilience against cyber threats.

Environmental Impacts:

- Reduced environmental impact by optimizing energy usage and grid operations.
- Promotion of sustainable energy practices through advanced technologies.

Technological Impacts:

- Development and deployment of innovative cybersecurity tools and protocols.
- Integration of digital technologies for resilient

and efficient energy systems.

Other Impacts:

- Increased awareness and knowledge sharing in EPES cybersecurity.
- Contribution to European policy objectives on sustainable, secure, and digitalized energy systems.

Social Impacts

- Mitigation of energy poverty: Making energy more affordable through efficient use and participation in DR programs, directly benefiting economically disadvantaged groups.
- User empowerment: Enhancing end-consumer knowledge and control over their energy consumption and participation in the energy market.
- Informed decisions as active market players: Providing consumers with the tools and information needed to make educated choices regarding their energy use and DR participation.
- New jobs created: Generating employment opportunities in the development, implementation, and maintenance of DR services.

Environmental Impacts

- Decreased CO2 and other pollutants: Reducing emissions through efficient energy use and increased renewable energy sources (RES) integration.
- Energy savings: Achieving significant energy savings in the residential sector through optimized DR strategies.
- Resources savings: Minimizing resource consumption by leveraging existing household infrastructure for DR.

Technological Impacts

- Development and diffusion of new technologies: Implementing innovative DR strategies and control modes for residential assets.
- Enhanced asset control and aggregation approaches: Enabling advanced management of residential energy resources for DR.
- Innovation in energy management systems: Developing new solutions for energy aggregation, forecasting, and real-time response to enhance grid stability and efficiency.

Innovative aspects of the project

The most impactful aspect of the project is the development of a new-generation EPES platform integrating risk assessment, anomaly detection, and energy restoration. This approach combines cutting-edge cybersecurity measures with advanced data analytics and training solutions, fostering resilience against evolving threats. The project's innovative use of AI, virtual reality (VR), and cybersecurity standards sets a new standard for safeguarding critical energy infrastructure.

Expected key exploitable results of the project

- New-generation EPES platform integrating risk assessment, anomaly detection, and energy restoration functionalities.
- Cybersecurity lighthouse for standardization and certification.
- AR-VR-based training tools for personnel skill enhancement.
- Advanced risk assessment methodologies tailored for EPES.
- Cybersecurity training and certification authority.

Key exploitable results and sub-key exploitable results achieved to date

- Development of initial prototypes for the new-generation EPES platform.
- Establishment of cybersecurity lighthouse framework for standardization.
- Progress in AR-VR-based training tools for EPES personnel.
- Advancement in risk assessment methodologies tailored for EPES.

Sub-key exploitable results under development:

- Refinement of anomaly detection algorithms for enhanced cybersecurity.
- Integration of energy restoration features into the EPES platform.
- Further enhancement of AR-VR training tools for comprehensive personnel skill development.

ANNEX: DEMONSTRATION AND PILOT SITES

The table below provides information on the ongoing projects' demonstration and pilot sites that can be physically visited and/or contacted for knowledge sharing.

Please contact the BRIDGE support team for more information: *secretariat@horizon-bridge.eu*

PROJECT	DEMO	COUNTRY	N° OF DEMONSTRATION SITE OR PILOTS HOSTED	DESCRIPTION	PROJECT COORDINATED BY
2LIPP	Demo 1	Denmark	1	The demonstrator site is located on the Danish Island of Bornholm. It is a meshed island grid with a mainland connection, island mode requirements, and a high penetration of renewable energy, making it an optimal demonstration site for the project objectives	ENERGY CLUSTER DENMARK
2LIPP	Demo 2	Spain	3	The project hosts a total of 3 demonstrator sites or pilots in Spain. These sites serve as practical showcases for the implementation of the hybrid storage concept and its integration into existing energy infrastructure. Specific details about each pilot site may vary, but they are designed to demonstrate the feasibility, effectiveness, and benefits of the hybrid storage system in different contexts within Spain.	ENERGY CLUSTER DENMARK
2LIPP	Demo 3	Germany	1	This site serves as a practical demonstration of the hybrid storage concept within the German context, showcasing its feasibility, effectiveness, and benefits in integrating renewable energy sources and improving grid stability.	ENERGY CLUSTER DENMARK
2LIPP	Demo 4	Finland	1	Finland: This site serves as a practical demonstration of the hybrid storage concept within the Finnish context, showcasing its feasibility, effectiveness, and benefits in integrating renewable energy sources and improving grid stability.	ENERGY CLUSTER DENMARK
ACCEPT	Demo 1	Spain	1	The pilot site includes residences located in a city of 25, people, surrounded by several small towns. The residences available for ACCEPT demonstrations range from 1-storey block of flats to detached buildings with an avg. footprint of 1m2 . Average residential consumption is ca. 3.5 kWh p.a., highly increased during summer periods due to cooling needs and gradually decreasing in winter times that are becoming shorter and warmer.	UNIVERSITETET I OSLO
ACCEPT	Demo 2	Switzerland	1	The residential district of Via Motta in Massagno consists of roughly 5 flats and single houses, mainly residential (a big engineers office and a legal office are also included), plus a care home (66 guests and 94 workers). The building stock are three (3) multi-family buildings with five (5) floors and three typical two-store family houses. The building stock hosts approximately 15 residents and covers a total area of approx. 8,m². Most of the dwellings cover their energy needs by utilising electricity as source	UNIVERSITETET I OSLO
ACCEPT	Demo 3	Greece	1	The settlement, called "Aspra Spitia", hosts the workers of the nearby Aluminum factory and currently comprises 1,88 residences, occupies 61.3 hectares and hosts more than 3, people. Besides residential buildings, there are educational buildings, public services and infrastructure and retail shops serving the local community.	UNIVERSITETET I OSLO
ACCEPT	Demo 4	Netherlands	1	Energie Samen is the trade association for sustainable energy initiatives of citizens, RES producers and other entrepreneurs. Energie Samen Bedrijsbureau (ESB) is 1% owned by Energie Samen Cooperative representing 5 energy cooperatives and 3 farmers. Energie Samen Rivierenland (EDBR) is a regional cooperative of cooperatives. The Dutch pilot site is a district that will mainly validate the community aggregator concept. Flexibility service provision from a cooperative aggregator will be investigated to balance the portfolio of the energy provider and for local congestion management for the DSO. The revenues gained will be shared with the prosumers in the district, and ideally lead to a cost reduction for them.	UNIVERSITETET I OSLO
AdvanSiC	Demo 1	Spain	1	The demonstrator site in Spain may involve the testing and validation of HV SiC MOSFET semiconductors in a real-world grid application, such as a medium voltage grid integration project or renewable energy generation facility.	IKERLAN S. COOP
AdvanSiC	Demo 2	Italy	2	- Full-scale wind converter: Utility and advantages of HV SiC MOSFETs in wind energy applications. - Full-scale solar inverter: Effectiveness of HV SiC MOSFETs in solar energy systems.	IKERLAN S. COOP
AGISTIN	Demo 1	Spain	1	AGI-integrated innovative storage for large pumping loads This will be conducted at field scale demonstration at an irrigation pumping station of the Segrià-Sud canal, located in the Maials area of north east Spain. Multi-reservoir irrigation systems are commonly found in many regions of Europe and worldwide. These systems have considerable annual energy consumption, constituting a significant demand where they exist. Energy consumption by irrigation systems can reach into GWhs annually,	EPRI EUROPE DAC
AGISTIN	Demo 2	Netherlands	1	AGI-integrated innovative storage for green H2 production Currently, the SoA integration of green H2 production, and renewables in general, limit the further expansion of renewable energies. This is clearly evident because the system operator restricts the SHL's hybrid system for green H2 production to only consume power and forbids any power injection. The hybrid system in Emmen (Netherlands), consisting of a 2.2 MW electrolyser, a 3.3 MW PV plant and a battery will be used for this demonstration campaign. The field demonstration of SHL is the ideal example of the detrimental practice limiting the integration of renewables and representative for green H2 at large scale.	EPRI EUROPE DAC
AGISTIN	Demo 3	Germany	1	FGH-IEE fast charging of electric vehicles application testing For testing the AGISTIN functionalities and fast controls, FHG-IEE developed a rapid inverter control solution. In parallel operation 2 kVA can be reached. Additional FHG-IEE setup two bidirectional OBC with 11 kVA capability for demonstrating use cases for the integration of electric vehicles with GFI functionalities into the grid. For a direct aqueous ECR battery connection hardware development is necessary regarding to safety operation.	EPRI EUROPE DAC

PROJECT	DEMO	COUNTRY	N° OF DEMON-STRATION SITE OR PILOTS HOSTED	DESCRIPTION	PROJECT COORDINATED BY
AGISTIN	Demo 4	Spain	1	CDR-CIEMAT pumping tests In preparation for the irrigation pumping demonstration, the AGI-STIN concept will be also validated at CDR-CIEMAT testing facilities in Soria (Spain). The testing system comprises a hybrid hydro and electrical system, with configurable generation, storage and load equipment. The hydro system includes a 4 kW Pelton turbine system, four 7.5 kW pumps/pump and three water tanks, which will enable bidirectional pumping-generation mode testing, expanding upon the irrigation canal demo scope, that is restricted to pumping. Addi-tionally, the electrical system includes a PV system (64 PV-monocrystalline panels connected to the grid via a 16-kW inverter), loads and energy storage systems including the innovative storage system (battery+converter).	EPRI EUROPE DAC
AGISTIN	Demo 5	Germany	1	FGH-IWES electrolysis application tests Prior to demonstration, the studies and developments of AGISTIN related to storage integration with electrolysis will be tested at the grid emulator PQ4Wind of FHG-IWES in Bremerhaven, Germany. The converter of SHL's electrolyser as Device Under Test will be tested in the Power-Hardware-in-the Loop test bench with a maximum power rating of 8 MVA. The set-up is outlined in Figure 8, where both the DC and AC-side are emulated by low-	EPRI EUROPE DAC
BeFlexible	Demo 1	Italy	3	Pilot 1.1: Cross-sectoral business involved (water, EVs, residential and industrial customers). Pilots 1.2 and 1.3: Flexibility from aggregated distributed resources.	I-DE REDES ELECTRICAS INTELIGENTESSA
BeFlexible	Demo 2	Sweden	2	Pilot 2.1: Flex markets for congestion management. Pilot 2.2: Unlocking flex from buildings.	I-DE REDES ELECTRICAS INTELIGENTESSA
BeFlexible	Demo 3	Spain	4	Pilot 3.1, 3.2 and 3.3: Congestion management through demand response. Pilot 3.4: Aggrega-tion for TSO and DSO grid services.	I-DE REDES ELECTRICAS INTELIGENTESSA
BeFlexible	Demo 4	France	2	Pilot 3.5 and 3.6: eMobility.	I-DE REDES ELECTRICAS INTELIGENTESSA
BEST-Storage	Demo 1	Spain	1	1. Thermo-chemical material (TCM) storage	SOLINTEL M & P SL
BEST-Storage	Demo 2	Germany	1	PCM Slurry Solutions: This pilot in Germany is also centered around PCM slurry solutions for energy storage, similar to the pilot in Spain. The goal is to demonstrate the effectiveness of PCM slurry systems in storing and utilizing thermal energy.	SOLINTEL M & P SL
BEST-Storage	Demo 3	Netherlands	1	acuum Insulated Water Storage: The pilot in the Netherlands involves the development and testing of a sensible water storage system with vacuum insulation. This system is designed for warm applications and aims to provide efficient and effective thermal energy storage.	SOLINTEL M & P SL
Blades2Build	Demo 1	Spain	1	B2B	DANMARKS TEKNISKE UNIVERSITET
BLOW	Demo 1	France	1	Demonstrator site for floating offshore wind energy technology.	FUNDACIO INSTITUT DE RECERCA DE L'ENERGIA DE CATALUNYA
BLOW	Demo 2	Spain	1	Demonstrator site for floating offshore wind energy technology.	FUNDACIO INSTITUT DE RECERCA DE L'ENERGIA DE CATALUNYA
BLOW	Demo 3	Germany	1	Demonstrator site for floating offshore wind energy technology.	FUNDACIO INSTITUT DE RECERCA DE L'ENERGIA DE CATALUNYA
BLOW	Demo 4	Bulgaria	1	Demonstrator site for floating offshore wind energy technology.	FUNDACIO INSTITUT DE RECERCA DE L'ENERGIA DE CATALUNYA
BLOW	Demo 5	Turkey	2	Demonstrator sites for floating offshore wind energy technology, showcasing different aspects of the project.	FUNDACIO INSTITUT DE RECERCA DE L'ENERGIA DE CATALUNYA
COMMUNITAS	Demo 1	Spain	1	COMPTEM Crevillent EC is located in the municipality of Crevillent in Alicante, eastern Spain. The region is characterised by its hot semi-arid climate (BSh), a climate found in southern regions of Europe. The consumers in Crevillent EC are mostly households but there are also some schools, small retail, and small industry. Overall, the EC includes around 11. members. The site already participated in H22 COMPILE and WiseGRID, focusing on energy island topics, and MERLON, focusing on flexibility. The EC has presence in almost the entire value chain of the electricity sector: production of 1% renewable energy, distribution to the municipality of Crevillent, electricity supplier within and outside the municipality, representative agent in the electricity market for renewable production facilities. The collective self-consumption installations bring to the pilot site a novel configuration in which a single EC involves multiple collective self-consumption installations, bringing new operation opportunities and challenges for performance optimization. Some of the consumers have hardware devices to enable DR control of their electric boilers or heaters. EV chargers are also integrated in the EC and could be utilized for the provision of flexibility services.	LABELEC ESTUDOS DESEN-VOLVIMENTO E ACTIVIDA-DES LABORATORIAIS SA
COMMUNITAS	Demo 2	Italy	1	Primiero Valley EC is located in the Province of Trento, in northern Italy. The region is characte-rised by its humid continental climate with warm summer (Dfb), a climate common to cities and towns in the Alps region and in Eastern and Northern Europe. The prevailing economic sector of the region is represented by both summer and winter tourism, as San Martino di Castrozza is one of the most popular tourist destinations in the Alps. Within the perimeter of the Primiero Valley EC are represented numerous types of users, such as households, public buildings, ho-tels, commercial buildings, and office spaces. In total, there are 7.95 members in the EC. The EC provides an interesting mix of renewable productions that interact in a well-defined mountain territory. The main RES are hydro power, solar photovoltaic, and biomass. The biomass is used for delivering heat through a district heating network, where the biomass accounts for 9% of the energy used. The hydro power and solar photovoltaic	LABELEC ESTUDOS DESEN-VOLVIMENTO E ACTIVIDA-DES LABORATORIAIS SA

PROJECT	DEMO	COUNTRY	N° OF DEMON-STRATION SITE OR PILOTS HOSTED	DESCRIPTION	PROJECT COORDINATED BY
COMMUNITAS	Demo 3	The Nether-lands	1	The Buurtwarmte Groningen EC is located in the municipality of Groningen, in north of the Netherlands. The demonstration region covers three districts located in the city of Groningen, Selwerd, Paddepoel, and Vinkhuizen. The region is characterised by its temperate oceanic climate (Cfb), the most common climate type in Western Europe. The local EC participating in the Buurtwarmte pilot site has about 2. members in total, about 1.15 members are using electricity and gas; 1 members are using Grunneger Power EV charging stations; 1. members contribute to energy production through PV generation. The heat network (run on natural gas) is a focal point of this EC with an annual heat demand of over 39 GWh. Part of the EC participates in H22 Making City as part of a retrofit plan for achieving positive energy districts. The site has also been part of several nationally and government funded projects with a focus on heat network development; reducing energy consumption; the development of gas-free neighbourhoods; and the development of energy district strategies. The current goal for Grunneger Power is to further develop its own production and storage (PV and heat sources), to reduce its members' energy consumption, and to educate energy coaches.	LABELEC ESTUDOS DESEN-VOLVIMENTO E ACTIVIDA-DES LABORATORIAIS SA
COMMUNITAS	Demo 4	Denmark	1	The Sun Gate pilot is also located in Hvidovre. While the Avedøre EC is already operational, Sun Gate is still under planning. COMMUNITAS will support the set-up of this EC, ensuring that legal obstacles are overcome and that the planned assets allow for citizens to consume the maximum renewable energy. The pilot has gathered attention in the neighbourhood and, while number of members is still unknown, it is expected to gather several households and local ser-vices, including a local hospital. As for energy generation, the current plan is to cover the local highway areas with PV panels, aiming to reduce noise pollution. Due to this complex endeavour, there are multiple stakeholders involved and detailed planning must be performed in order to successfully set a EC.	LABELEC ESTUDOS DESEN-VOLVIMENTO E ACTIVIDA-DES LABORATORIAIS SA
COMMUNITAS	Demo 5	Greece	1	The Halkidiki pilot is located in the Halkidiki peninsula, near Thessaloniki, in Greece. The region has hot-summer Mediterranean climate (Csa) near shore, but also a cold semi-arid climate (BSk) inland. The pilot is constituted by 5 residential buildings and some retail/commercial buildings. The prevailing economic sector of Halkidiki is represented by summer tourism, as Halkidiki Peninsula is the most popular summer destination in Northern Greece. The pilot was set up in 218, having participated in H22 enCOMPASS and inteGRIDy as a demonstration site, with highly engaged consumers. The main objective of enCOMPASS was to empower consumers to make better	LABELEC ESTUDOS DESEN-VOLVIMENTO E ACTIVIDA-DES LABORATORIAIS SA
COMMUNITAS	Demo 6	Portugal	1	Cascais pilot is located in the municipality of Cascais in Portugal. Cascais is a town located a few kilometres west of Lisbon, being the most western region in mainland Europe. The region is characterised by its Mediterranean warm-summer climate (Csb). Cascais pilot comprises 6 households and some schools/public municipal buildings. Pilot's main goal is to provide RES to a social neighbourhood by using the rooftops of local schools and sports infrastructures to install PV. The energy generated will be distributed fairly across the EC members, aiming to reduce energy bills for vulnerable families. In COMMUNITAS, Cascais will be able to develop further tools for the community under development, helping to support its management. The pilot aims to provide a visual interface to prosumers, alerting for both energy consumption and production in each period and generating a reward mechanism to increase collaboration between pilot members.	LABELEC ESTUDOS DESEN-VOLVIMENTO E ACTIVIDA-DES LABORATORIAIS SA
COMMUNITAS	Demo 7	Croatia	1	The city has a temperate oceanic climate (Cfb), being both hot in the summer and cold in the winter. Zagreb pilot is located in the city of Zagreb, in Croatia. As a listener pilot, its main goal is to get support to set-up an EC throughout COMMUNITAS. Zagreb pilot has gathered already the interest of 384 households in forming an EC (~1.15 persons). These buildings are all located wi-thin the same neighbourhood. The buildings are already part of a recent construction following strict standard towards EE in both electricity and heating. The installation of solar PV is already planned for the rooftops of the buildings, with an estimated power capacity of 1 kWp in each of 4 buildings, for a total generation of 472 MWh/y, representing 82% of the electrical consu-mption. Something particular about this demonstrator is its dependence on natural gas. Due to the instability of gas supply, particularly affecting eastern and central Europe, the pilot aims to phase-out of natural gas and transition to electrical heat through centralised heat pumps. This will allow to increase the energy independence and sustainability of the site.	LABELEC ESTUDOS DESEN-VOLVIMENTO E ACTIVIDA-DES LABORATORIAIS SA
CREATORS	Demo 1	Belgium	1	CES-as-a-service application	CORDEEL ZETEL TEMSE
CREATORS	Demo 2	Estonia	1	The Estonian pilot site aims to demonstrate local renewable energy generation and its integra-tion into the energy system.	CORDEEL ZETEL TEMSE
CREATORS	Demo 3	Slovenia	1	The Slovenian pilot site showcases innovative approaches to grid management and local energy consumption optimization.	CORDEEL ZETEL TEMSE
CREATORS	Demo 4	Spain	1	The Spanish pilot site emphasizes empowering consumers through smart energy technologies and community energy services.	CORDEEL ZETEL TEMSE
Data Cellar	Demo 1	Spain	1	Local Energy Community	RINA CONSULTING SPA
Data Cellar	Demo 2	Bulgaria	1	Local Energy Community	RINA CONSULTING SPA
Data Cellar	Demo 3	Greece	1	Local Energy Community	RINA CONSULTING SPA
Data Cellar	Demo 4	Portugal	1	Local Energy Community	RINA CONSULTING SPA
Data Cellar	Demo 5	Switzerland	2	Local Energy Community	RINA CONSULTING SPA
Data Cellar	Demo 6	Italy	2	Local Energy Community	RINA CONSULTING SPA
Data Cellar	Demo 7	Ireland	1	Local Energy Community	RINA CONSULTING SPA
DEDALUS	Demo 1	Italy	1	San Raffaele Hospital and I&R Campus in Segrate Municipality – Milan: Balancing power and temperature levels.	ENGINEERING - INGEGNE-RIA INFORMATICA SPA
DEDALUS	Demo 2	Belgium	1	New Docks residential area in Ghent: Integration of a sustainable smart renewable energy system.	ENGINEERING - INGEGNE-RIA INFORMATICA SPA
DEDALUS	Demo 3	Poland	1	Warta University Campus and Poznan Supercomputing and Networking Center: Optimizing demand-supply relationships.	ENGINEERING - INGEGNE-RIA INFORMATICA SPA

PROJECT	DEMO	COUNTRY	N° OF DEMON-STRATION SITE OR PILOTS HOSTED	DESCRIPTION	PROJECT COORDINATED BY
DriVe2X	Demo 1	Uk	2	In the V2B demo, the project explores the potential of V2X to enhance the local economy and tourism activities, engaging a diverse range of stakeholders. The demonstration will implement bidirectional chargers and V2B strategies in various tourism-oriented locations (e.g., accommodation units) of different sizes and characteristics to study potential commercial benefits for the tourism accommodation sector. These different units may or not have other distributed resources, such as solar generation, hot water storage, or electric battery capacity in place, and may be under different electricity supply contracts. This diverse range of experiences will provide valuable insights at the end of the demonstration. EV users involved could be both residents and tourists visiting the island, as well as employees using hotel fleet vehicles. • In the V2G demo, the project will investigate distribution grid benefits of bidirectional charging, particularly with focus on increasing the penetration of renewable generation. Currently, the Isle of Wight suffers from excess solar generation and in the summer needs to resort to curtailment events. Studying the scale-up of V2G in public charging stations with grid support services offered to the local DNO will help develop valuable insights to address this system-level problem. In this context, various distribution grid services can be considered and its value to the DNO explored. The bidirectional chargers developed in the project will be installed in public-access EV charging stations, having the DNO discretion over the specific location. Users of the EV chargers may be recruited from a car club, which through different types of agreements can incorporate both residents and visitors.	LAPPEENRANNAN-LAHDEN TEKNILLINEN YLIOPISTO LUT
DriVe2X	Demo 2	Portugal	2	• In the V2B demo (at Porto airport), DriVe2X explores the value of long-term bidirectional EV charging for optimized energy management of building facilities. A total of five high-power chargers developed in the project will be installed in the parking lot facilities of the Porto airport. The access to the parking lot is subject to payment of parking fees. The demonstrator will study trade-offs between various costs and benefits for the building manager and EV users who agree to lend their vehicle's battery capacity to the airport's energy management system (EMS) in context of multiple day-long travel occasions. This demo provides a model for regulatory arrangements in the context of Portugal. • Within the V2G demo, located in Maia city's downtown, DriVe2X will install two bidirectional chargers in an existing public charging station. The demo will study the role of V2G in maintaining distribution grid's technical parameters, thus contributing to the DSO's network management operations. The municipal government is directly involved in this demonstrator, which supports its energy transition	LAPPEENRANNAN-LAHDEN TEKNILLINEN YLIOPISTO LUT
DriVe2X	Demo 3	Hungary	1	The city of Budapest V2H demonstrator revolves around V2H strategies in prosumer and consumer homes, via integration of bidirectional charging in home energy management systems (HEMS). The selected homes will be from a combination of urban and suburban areas. A mix of prosumer homeowners will be selected, some of which with distributed resources such as solar PV and battery storage, and others partially or entirely without it. This setup will enrich the lessons learned from the demonstrator. Lastly, the demo will test benefits from HEMS integration of V2H chargers, such as residential time-of-use (TOU) tariff optimization.	LAPPEENRANNAN-LAHDEN TEKNILLINEN YLIOPISTO LUT
DriVe2X	Demo 4	The Netherlands	1	In the city of Amsterdam demo, DriVe2X will test extensively the integration of V2B strategies in active commercial energy customers. The specific site of the demonstrator is the Amsterdam Arena, a multi-purpose sports facility where renewable energy and a large battery unit have already been installed and can be integrated with the bidirectional charging system. In total, 13 bidirectional EV chargers will be integrated into a parking lot of the facility. This setup will allow the testing of dynamic EV charging load management and balancing. EV users may belong to a mix of both visitors and company fleet vehicle users.	LAPPEENRANNAN-LAHDEN TEKNILLINEN YLIOPISTO LUT
DriVe2X	Demo 5	Italy	2	In the Terni city centre demo, DriVe2X will promote the integration of V2G in an urban area with high renewable energy penetration, with view to improving the stability of the distribution grid in particular addressing reverse power flow issues. The Terni network already comprises about 1 charging points, which are scattered around the city and managed by different CPOs and EMSPs. Other stakeholders engaging in the flexibility marketplace include network aggregators, the EV owners belonging to an EV users' community, and ASM Terni as local utility company. • The ASM Terni microgrid demo focuses on V2G integration into a hybrid AC/DC VRE-rich microgrid. The demonstrator will install two high-power V2G chargers in the premises of ASM Terni's headquarters "Living lab" facility. The facility incorporates various distributed resources, including two PV plants totaling 24 kW of installed capacity, a 66 kWh battery storage unit, a building equipped with BEMS control, and a biofuel-based distributed generator that ensures islanding of the facility. A fleet of 1 EVs will be made available to participate in the demonstrator. The entire system is monitored by advanced metering infrastructure (AMI) that provides real-time data as well as historical data. A branch of the microgrid network operates in DC, effectively creating a hybrid AC/DC system. A fast 5kW charging station will be installed in this specific section.	LAPPEENRANNAN-LAHDEN TEKNILLINEN YLIOPISTO LUT
DR-RISE	Demo 1	Spain	1	The rural energy community is based in the parish of Peón, situated in the Council of Villaviciosa, Asturias, and it is composed of 5 residential houses, 1 school and 1 office. This pilot's concept is the implementation of DR programs and energy sharing among households. The adoption and usage of connected interoperable energy smart home appliances (including EV charging and home storage) are being promoted to accelerate the deployment of demand-side flexibility services, reduce the entry barrier and facilitate replication.	IDENER RESEARCH & DEVELOPMENT AGRUPACION DE INTERES ECONOMICO
DR-RISE	Demo 2	Germany	1	Borkum is a German island located in the North Sea currently pioneering the Energy Transition for European Islands and advancing towards a complete decarbonisation by 23. Borkum presents a tertiary-oriented demand profile without industry, and a significant green electricity uptake amongst the citizens. The ownership of energy production systems and seasonal heat storage solutions will reduce the dependence on mainland and provide significant energy savings. All smart households and energy systems are optimised to achieve the most costefficient energy management in terms of energy flows (both electrically and thermally). DR solutions are expected to further increase the benefits of the island accelerate the ambitious goal of a zero-carbon island.	IDENER RESEARCH & DEVELOPMENT AGRUPACION DE INTERES ECONOMICO
DR-RISE	Demo 3	Greece	3	ELE is leading the implementation of energy communities in several locations throughout Greece such as Athens, Minoan and Samos. The Greek capital is based on a collective self-consumption project consisting of a 5-kW solar investment that will power 1 households and a few small businesses. Minoan Energy Community is based in Crete, an interconnected island, and it consists of the first Creten energy community operating a 1 kW scheme that power more than 15 members combining households, small businesses and public authorities. Samos Energy Community is the first energy community under establishment in Samos, a Greek non-interconnected island, with 1 kW virtual net metering. In each of them, the electricity produced by their solar park portion is compared to the electricity consumed in their household (and/or SME) and only the difference is billed.	IDENER RESEARCH & DEVELOPMENT AGRUPACION DE INTERES ECONOMICO

PROJECT	DEMO	COUNTRY	N° OF DEMON-STRATION SITE OR PILOTS HOSTED	DESCRIPTION	PROJECT COORDINATED BY
EDDIE	Demo 1	Spain	1	FlexiDAO will utilize near real-time data from the platform developed within the scope of the EDDIE Framework for its proprietary software RESpring [TODO REF]. This will allow the project to test and validate the platform developed in a real environment with active users. Among the 1+ consumers Call: HORIZON□CL5□221□D3□1□1 — Sustainable, secure and competitive energy supply EU Grants: Application form (HE RIA/IA): V1.1 – 19.4.221 Part B - Page 57 of 7 already registered in FlexiDAO's software RESpring there are multinational companies such as Microsoft, Vodafone and Ford. The goal of the demonstrator will be to make sure that the platform developed within EDDIE fits with the current and future needs of corporate (and private) consumers.	YAKNA S.R.O.
EDDIE	Demo 2	Austria	1	This task uses historical and near real-time data on energy consumption to support the citizens' awareness of their energy behaviour and the process to forge solutions towards sustainability. Individual planning of generation and monitoring of demand on energy services fits in a society of information, where the user could anticipate generation of distributed renewable technologies based on weather forecast, connect to the building's smart objects, balance the generation capacity and the demand of devices and ultimately reconcile energy behaviour with the environment energy capacity. The solutions, e.g., smartphone apps, IoT devices, that embed historical and/or real near-time data contribute to making energy information accessible to end users in a meaningful, enjoyable and human-centred way.	YAKNA S.R.O.
EDDIE	Demo 3	Greece	1	This task cares about sector integration to achieve synergies in the production and storage of energy that become functional in economic terms through the seamless exchange of data. This sector integration demonstrator will consider different systems such as residential solar panel, biogas production from agricultural waste or efficient electrolysis cells for hydrogen production. The goal of this task is to pioneer European-wide standards that link demand and supply across energy sectors.	YAKNA S.R.O.
EDDIE	Demo 4	Germany	1	ETA+ provides a platform that can collect any type of energy data (gas, electricity, heat...). The data import works regardless of the manufacturer of the meter. The platform is already capable to read out thousands of electricity data points each day, therefore the elevation to a European level will be unproblematic. On the platform digital representations of physical properties are created ("Digital Twin") to visualize and conceptualize all metering points and the overall energy consumption data. The raw data is transformed automatically into information as a comparison graph or an energy report. By elevation to a European level the national regulation will of course have to be abided by. Energy data is in ownership of the originator, the data has to be imported via a metering firm. ETA+ will develop a methodology to cope with these challenges in an interoperable European way.	YAKNA S.R.O.
EDDIE	Demo 5	Italy	1	In this demonstrator, SEV with his consumer cooperative ÖTZI Strom will contribute with information and format templates of the already centralised system in Italy. Through the replacement of the first-generation smart meters with second-generation smart meters the Distribution System Operators (DSOs) have to send daily the quarter-hourly values for each meter. For Energy-Traders like ÖTZI Strom it is also possible to get near real time data from their customers when they install at home a user device and they enable ÖTZI to get their data in real-time. New tariff systems can be developed and offered, e.g., it would be possible to let the customer choose two hours a day in which he does not have to pay for the electricity consumed. Furthermore, a prepaid model for electricity supply would also be possible.	YAKNA S.R.O.
EDDIE	Demo 6	France	1	The goal of this task is to implement a demonstrator prototype that connects the EDDIE Framework to the D4G's new scalable event driven multisided platform. This platform brings the necessary grid observability on the Distributed Energy Resources (DER) market (e.g., electricity vehicles, water heating, local solar photovoltaics) willing to offer their flexibility to the energy system whilst providing proper prosumer data protection and consent management. This demonstrator will use the EDDIE Framework and the AIIDA APIs to ease data portability and interactions with Flexibility Service Providers (FSPs) outside France	YAKNA S.R.O.
EFORT	Demo 1	Spain	1	IoT, blockchain and cybersecurity in a prosumer-grid.	FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS
EFORT	Demo 2	Netherlands	1	Preventing cascading failures and restoring interconnected power grids.	FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS
EFORT	Demo 3	Italy	1	Flexibility and islanding in mountainous and remote areas.	FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS
EFORT	Demo 4	Ukraine	1	Digitalisation and secure design of a substation.	FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS
ELECTRON	Demo 1	France	2	1. Cybersecurity testing and validation site - This pilot focuses on testing and validating cybersecurity measures within the EPES. 2. EPES resilience enhancement demonstration - This pilot aims to demonstrate resilience enhancement techniques for the EPES.	NETCOMPANY - INTRASOFT
ELECTRON	Demo 2	Spain	1	EPES risk assessment and anomaly detection site - This pilot conducts risk assessments and anomaly detection within the EPES infrastructure.	NETCOMPANY - INTRASOFT
ELECTRON	Demo 3	Greece	1	EPES failure mitigation and energy restoration testing - This pilot focuses on testing failure mitigation strategies and energy restoration in the EPES.	NETCOMPANY - INTRASOFT
ELECTRON	Demo 4	Belgium	1	EPES personnel training and certification pilot - This pilot utilizes AR-VR-based methods for training and certifying EPES personnel.	NETCOMPANY - INTRASOFT
ELEXIA	Demo 1	Portugal	1	Industrial port environment (Sines)	NORCE NORWEGIAN RESEARCH CENTRE AS
ELEXIA	Demo 2	Denmark	1	Urban-city hub environment (Høje Taastrup-Copenhagen)	NORCE NORWEGIAN RESEARCH CENTRE AS
ELEXIA	Demo 3	Norway	1	Industrial-urban-residential environment (Bergen)	NORCE NORWEGIAN RESEARCH CENTRE AS

PROJECT	DEMO	COUNTRY	N° OF DEMON-STRATION SITE OR PILOTS HOSTED	DESCRIPTION	PROJECT COORDINATED BY
ENERSHARE	Demo 1	France	1	The pilot in France focuses on testing the interoperability and functionality of the European Common Energy Data Space framework within the French energy market. It involves collaboration with energy suppliers, aggregators, and consumers to demonstrate the sharing and reuse of energy data for various purposes such as demand response and energy management	ENGINEERING - INGEGNERIA INFORMATICA SPA
ENERSHARE	Demo 2	Spain	1	The pilot in Spain aims to assess the effectiveness of the European Common Energy Data Space framework in facilitating data exchange and collaboration among energy stakeholders in the Spanish market. It involves testing data-sharing mechanisms and evaluating the impact on energy services and consumer engagement.	ENGINEERING - INGEGNERIA INFORMATICA SPA
ENERSHARE	Demo 3	Germany	1	The pilot in Germany focuses on implementing the European Common Energy Data Space framework in the German energy sector to improve data accessibility and interoperability. It involves integrating various energy data sources and deploying digital tools for enhanced energy management and consumer empowerment.	ENGINEERING - INGEGNERIA INFORMATICA SPA
ENERSHARE	Demo 4	Portugal	1	The pilot in Portugal aims to demonstrate the benefits of the European Common Energy Data Space framework in optimizing energy services and fostering cross-sector data exchange. It involves collaboration with energy stakeholders to test data-sharing platforms and assess the impact on energy efficiency and sustainability.	ENGINEERING - INGEGNERIA INFORMATICA SPA
ENERSHARE	Demo 5	Greece	1	The pilot in Greece focuses on implementing the European Common Energy Data Space framework to enhance energy data management and facilitate innovation in the Greek energy market. It involves testing data-sharing protocols and evaluating the potential for new energy services and business models.	ENGINEERING - INGEGNERIA INFORMATICA SPA
ENERSHARE	Demo 6	Slovenia	1	The pilot in Slovenia aims to assess the applicability of the European Common Energy Data Space framework in the Slovenian energy sector. It involves testing data-sharing mechanisms and evaluating the impact on energy market dynamics, consumer behavior, and regulatory compliance.	ENGINEERING - INGEGNERIA INFORMATICA SPA
ENERSHARE	Demo 7	Norway	1	The pilot in Norway focuses on implementing the European Common Energy Data Space framework to improve data accessibility and transparency in the Norwegian energy market. It involves collaboration with energy stakeholders to test data-sharing platforms and assess the impact on market efficiency and sustainability.	ENGINEERING - INGEGNERIA INFORMATICA SPA
ENERSHARE	Demo 8	Filand	1	The pilot in Finland aims to demonstrate the benefits of the European Common Energy Data Space framework in promoting data-driven innovation and collaboration in the Finnish energy sector. It involves testing data-sharing solutions and evaluating the potential for new energy services and market opportunities.	ENGINEERING - INGEGNERIA INFORMATICA SPA
eNeuron	Demo 1	Italy	1	Università Politecnica delle Marche (UNIVPM) is located in Central Italy.	AGENZIA NAZIONALE PER LE NUOVE TECNOLOGIE, L'ENERGIA E LO SVILUPPO ECONOMICO SOSTENIBILE
eNeuron	Demo 2	Norway	1	The Norwegian demo is deployed in an industrial-size installation, precisely in an operational football stadium called "Skagerak Energilab", which combines a big-scale (8 kW) PV generation plant with a Battery Energy Storage System (BESS) (1 MWh) and power electronics allowing several operational modes for the unit, including fully islanded operation.	AGENZIA NAZIONALE PER LE NUOVE TECNOLOGIE, L'ENERGIA E LO SVILUPPO ECONOMICO SOSTENIBILE
eNeuron	Demo 3	Poland	1	The city of Bydgoszcz is a dynamically developing economic centre, with a population of 358, inhabitants. The pilot covers the area of the city of Bydgoszcz and its major energy nodes; most of them are newly constructed buildings with some degree of energy self-sufficiency.	AGENZIA NAZIONALE PER LE NUOVE TECNOLOGIE, L'ENERGIA E LO SVILUPPO ECONOMICO SOSTENIBILE
eNeuron	Demo 4	Portugal	1	Lisbon Naval Base consists of a large complex comprising many different units. It hosts most of the Portuguese Navy Fleet ships, as well as many of its administrative, training, and support services. Five units are initially involved in the eNeuron project, each representing a typology of energy consumption, as follows: • Unit with residential consumption profile – the Residential Mess (living quarters). • Unit with office-like consumption profile – the Directorate of Ships. • Unit with industrial consumption profile – a workshop and a Canteen. • Unit with sports centre consumption profile – CEFA (the Naval Base sports complex).	AGENZIA NAZIONALE PER LE NUOVE TECNOLOGIE, L'ENERGIA E LO SVILUPPO ECONOMICO SOSTENIBILE
ENFLATE	Demo 1	Greece	1	The demonstrator site in Greece focuses on implementing consumer-driven business models for energy services, leveraging multi-vector flexibility potential, and integrating them with non-energy services such as health and mobility services.	NOVA TELECOMMUNICATIONS & MEDIA SINGLE MEMBER SA
ENFLATE	Demo 2	Spain	1	The pilot project in Spain aims to demonstrate the collaborative platform of tools enabling consumer-driven business models for energy services and integrating them with other non-energy services.	NOVA TELECOMMUNICATIONS & MEDIA SINGLE MEMBER SA
ENFLATE	Demo 3	Sweden	1	The demonstrator site in Sweden focuses on testing and validating innovative technical solutions, market designs, and business models related to consumer-driven flexibility services.	NOVA TELECOMMUNICATIONS & MEDIA SINGLE MEMBER SA
EoLO-HUBs	Demo 1	Spain	2	The demonstrators will be hosted in different regions of Spain, focusing on implementing and testing the new technologies, organizational structures, and business models related to wind turbine blade recycling.	FUNDACION AITIIP
EoLO-HUBs	Demo 2	Netherlands	1	The pilot site in the Netherlands will serve as a testing ground for innovative composite material recycling technologies and circular economy frameworks specific to the wind energy sector.	FUNDACION AITIIP
EoLO-HUBs	Demo 3	Germany	1	Germany will host a demonstrator site where decommissioning and pretreatment processes for wind turbine blades will be tested, including handling, inspection, cutting, shredding, and sorting.	FUNDACION AITIIP
EoLO-HUBs	Demo 4	Denmark	1	Denmark's pilot site will focus on sustainable fiber reclamation processes, exploring low carbon pyrolysis and green chemistry solvolysis methods to reclaim fibers from end-of-life wind turbine blades.	FUNDACION AITIIP
EoLO-HUBs	Demo 5	Italy	1	Italy's pilot site will implement upgrading processes for recovered fibers, particularly glass fibers, to ensure their quality and usability in new applications within the circular economy framework.	FUNDACION AITIIP
EoLO-HUBs	Demo 6	United Kingdom	1	The UK will host a demonstrator site to showcase the implementation of innovative technologies and business models for wind turbine blade recycling, contributing to circularity in the wind energy sector.	FUNDACION AITIIP

PROJECT	DEMO	COUNTRY	N° OF DEMON-STRATION SITE OR PILOTS HOSTED	DESCRIPTION	PROJECT COORDINATED BY
EURO-TIDES	Demo 1	Uk	1	The 9.6 MW tidal array will fabricate four 2.4 MW Orbital tidal energy devices, which will be deployed in 227 at the EMEC Fall of Warness tidal site in Orkney, Scotland, running in full operational conditions for 15 years.	ASSOCIATION EUROPEENNE DE L'ENERGIE DE L'OCEAN
EV4EU	Demo 1	Portugal	3	Implements strategies in homes, buildings & companies with V2X chargers for bidirectional energy flow. Focus on grid stability & frequency regulation. Aims for TRL 7 validation, advancing sustainable transportation.	ASSOCIATION EUROPEENNE DE L'ENERGIE DE L'OCEAN
EV4EU	Demo 2	Denmark	2	The project features multiple demonstrators, including parking lots and buildings, focusing on autonomous EV charging, V1G vs. V2X benefits comparison, and power exchange rates measurement with DSOs.	ASSOCIATION EUROPEENNE DE L'ENERGIE DE L'OCEAN
EV4EU	Demo 3	Greece	1	The demonstrator aimes to demonstrate O-V2X-MP interoperability, test service activations, and showcase supported services. The number of sites is unspecified. These pilots explore user behavior impacts and marketability strategies for societal value.	ASSOCIATION EUROPEENNE DE L'ENERGIE DE L'OCEAN
EV4EU	Demo 4	Slovenia	1	Demonstrates energy management algorithms for VPP and V2X participation in national mar-kets & DSO services. Utilizes ADMS for VPP control & performance monitoring.	ASSOCIATION EUROPEENNE DE L'ENERGIE DE L'OCEAN
EVELIXIA	Demo 1	Austria	1	Name/Type: 5 Private Households / Residential, 8 Townhouses / Residential, 5 Public buildings (Retirement & care centre, Elementary school (Protected Monument), municipality office, mortuary, machine hall) / Tertiary. Location: Gussing District, Region of Strem. Scope: utilize the existing flexibility sources to tackle the current challenges in the energy sector, improve electric power management, empower associations to actively participate in the market and act as a multifaceted pilot region.	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS
EVELIXIA	Demo 2	Romania	1	Name/Type: Dormitories: a) B09, B10 // Residential, Campus Restaurant (B11) // Tertiary. Location: north-western part of Romania in Cluj-Napoca. Scope: A local university, including two dormitories, and a restaurant. The dormitories are 11 floors high with 20 rooms in each floor. Each room can accommodate 4 students, and some only 2 students on each floor. The energy use intensity is 319.5 kWh/m2 year, although the buildings' envelopes are insulated.	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS
EVELIXIA	Demo 3	France	1	Name/Type: E-Factory// Industrial. Location: economic activity zone (100,000m2) of Me-nez-prat, City of Quimper. Scope: Maximise self-consumption in the industry sector by a) a collective self-consumption operation gathering different consumers in the neighborhood, and b) an individual self-consumption operation making optimum use of the site flexibility potential and storage capacities at	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS
EVELIXIA	Demo 4	Denmark	1	Name/Type: 9 apartment blocks // 283 apartments. Location: City of Aabenraa, South of Denmark. Scope: In Denmark, Energinet buys balancing services from aggregators establishing a market for balancing services. However, today these services are provided only by sore plants and at local level there are no exist-	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS
EVELIXIA	Demo 5	Greece	1	Name/Type: CERTH/CPERI Building // Tertiary, Mpodosakeio Hospital // Tertiary. Location: Nor-thwestern part of Ptolemaida city. Scope: Existing power plants located in Ptolemais (2000MW installed capacity) are about to be decommissioned. The Region of Western Macedonia (RWM) is one of the four pilot projects within the Platform on Coal Regions in Transition. The meta-lignite area requires exploitation of B2G strategies with collective self-consumption and DR schemes.	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS
EVELIXIA	Demo 6	Spain	1	Name/Type: Galicia Building/ Residential /Tertiary, Restaurant / Tertiary. Location: Ski resort in Galicia, North-Western Spain. Scope: The tourism activity associated with the ski resort represents a critical source of employment and business creation for the area. Environmental sustainability is a key element in the development of the resort. The use of alternative energies, the implementation of technologies that reduce emissions and the digitization of different processes are aspects that have been particularly considered from the outset in the planning of the buildings.	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS
EVELIXIA	Demo 7	Finland	1	Name/Type: Lounatuuli 13 and 15, TA House Company Naatali // Residential. Location: City of Naantali, County of Varsinais-Suomi, on the shore of the Baltic Sea. Scope: The site is inte-grated into a new residential district, with existing and future PV energy plants, larger battery energy storage and several eV charging stations, connected to MV grid through a common power substation. Each energy prosumer entity has its own Energy Management System aiming at higher Self-consumption and self-sufficiency rates, to be globally optimized with Local DSO Naatali Energy.	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS
Every1	Demo 1	Austria	1	Name/Type: 5 Private Households / Residential, 8 Townhouses / Residential, 5 Public buildings (Retirement & care centre, Elementary school (Protected Monument), municipality office, mortuary, machine hall) / Tertiary. Location: Gussing District, Region of Strem. Scope: utilize the existing flexibility sources to tackle the current challenges in the energy sector, improve electric power management, empower associations to actively participate in the market and act as a multifaceted pilot region.	FLUX50
Every1	Demo 2	Greece	1	The pilot focuses on testing digital energy market solutions within the Greek energy landscape, aiming to assess their effectiveness in enhancing market participation and promoting energy efficiency.	FLUX51
Every1	Demo 3	Austria	1	The pilot project in Austria aims to showcase the practical implementation of digital energy market concepts, with a particular focus on integrating renewable energy sources and enhan-cing grid flexibility.	FLUX52
Every1	Demo 4	Germany		The German pilot seeks to validate digital energy market solutions in a diverse energy market environment, with a focus on optimizing energy trading and facilitating demand-side manage-ment.	FLUX53
Every1	Demo 5	Denmark	1	The Danish pilot aims to demonstrate the feasibility and effectiveness of digital energy market mechanisms in promoting renewable energy integration and empowering consumers to actively participate in the energy transition.	FLUX54
FEDECOM	Demo 1	Romania	1	Name/Type: Dormitories: a) B09, B10 // Residential, Campus Restaurant (B11) // Tertiary. Location: north-western part of Romania in Cluj-Napoca. Scope: A local university, including two dormitories, and a restaurant. The dormitories are 11 floors high with 20 rooms in each floor. Each room can accommodate 4 students, and some only 2 students on each floor. The energy use intensity is 319.5 kWh/m2 year, although the buildings' envelopes are insulated.	GIROA SOCIEDAD ANONIMA
FEDECOM	Demo 2	Germany	1	Demonstrating the scalability and adaptability of the cloud platform for planning, monitoring, and controlling integrated local energy systems.	GIROA SOCIEDAD ANONIMA

PROJECT	DEMO	COUNTRY	N° OF DEMONSTRATION SITE OR PILOTS HOSTED	DESCRIPTION	PROJECT COORDINATED BY
FEDECOM	Demo 3	Belgium	1	Implementing sector coupling and federated 'System of Systems' approach for flexible and interoperable energy communities.	GIROA SOCIEDAD ANONIMA
FlexCHESS	Demo 1	France	1	This pilot will leverage innovative technologies to optimize energy consumption, maximize renewable energy integration, and improve grid flexibility.	UNIVERSITE D'AIX MARSEILLE
FlexCHESS	Demo 2	Italy	1	The pilot will investigate the usage of centralized heat pumps and electric vehicle charging stations with a rooftop PV system.	UNIVERSITE D'AIX MARSEILLE
FlexCHESS	Demo 3	Slovenia	1	It will explore the value of real-time flexibility and storage utilization. It will be based on close-to-real-time data sharing and operations, aiming to develop an innovative virtual storage concept.	UNIVERSITE D'AIX MARSEILLE
FlexCHESS	Demo 4	Spain	1	it will focus on selecting and engaging end-users and integrating existing assets into the FlexCHESS system. Demonstration activities will be conducted over a 12-month period to test and validate use cases and scenarios.	UNIVERSITE D'AIX MARSEILLE
FlexCHESS	Demo 5	Turkey	1	The Turkish pilot site will implement a flexible load profile application to regulate grid load. It will include four structures: a smart grid control system, a renewable energy installation, a storage facility, and a variable consumer.	UNIVERSITE D'AIX MARSEILLE
FLOW	Demo 1	Denmark	1	Name/Type: 9 apartment blocks // 283 apartments. Location: City of Aabenraa, South of Denmark. Scope: In Denmark, Energinet buys balancing services from aggregators establishing a market for balancing services. However, today these services are provided only by sore plants and at local level there are no exist-	KOBENHAVNS UNIVERSITET
FLOW	Demo 2	Denmark	1	Pilot project focusing on V2G integration and grid support capabilities.	KOBENHAVNS UNIVERSITET
FLOW	Demo 3	Germany	1	Demonstration of EV smart charging solutions and grid integration strategies.	KOBENHAVNS UNIVERSITET
FLOW	Demo 4	Ireland	1	Testing V2X integration and demand response mechanisms in residential areas.	KOBENHAVNS UNIVERSITET
FLOW	Demo 5	Italy	1	Pilot project showcasing V2G technology in commercial and industrial settings.	KOBENHAVNS UNIVERSITET
FLOW	Demo 6	Spain	1	Deployment of smart charging infrastructure and V2X solutions in urban and rural areas.	KOBENHAVNS UNIVERSITET
FOR2ENSICS	Demo 1	Sweden	1	The pilot site in Sweden serves as a testing ground for evaluating the developed DC/DC converters utilizing ultra-high voltage (UHV) SiC-based switching devices. It involves integrating these converters into existing MVDC systems to assess their compatibility, performance, and efficiency.	AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS
FOR2ENSICS	Demo 2	Germany	1	The pilot site in Germany focuses on demonstrating the practical application of the developed DC/DC converters equipped with ultra-high voltage (UHV) SiC-based switching devices. It involves deploying these converters within the German grid infrastructure to evaluate their performance, reliability, and economic viability.	AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS
GLocalFlex	Demo 1	Greece	1	Name/Type: CERTH/CPERI Building // Tertiary, Mpodosakeio Hospital // Tertiary. Location: Northwestern part of Ptolemaida city. Scope: Existing power plants located in Ptolemais (2000MW installed capacity) are about to be decommissioned. The Region of Western Macedonia (RWM) is one of the four pilot projects within the Platform on Coal Regions in Transition. The meta-lignite area requires exploitation of B2G strategies with collective self-consumption and DR schemes.	TEKNOLOGIAN TUTKIMUSKESKUS VTT OY
GLocalFlex	Demo 2	Spain	1	Smart metering and demand response technologies in a residential neighborhood.	TEKNOLOGIAN TUTKIMUSKESKUS VTT OY
GLocalFlex	Demo 3	Germany	1	Micro-grid solutions and grid technologies for system flexibility	TEKNOLOGIAN TUTKIMUSKESKUS VTT OY
GLocalFlex	Demo 4	Finland	1	1. Helsinki: Electrification of transportation and distributed energy resources. 2. Tampere: Integration of large-scale energy storage solutions and grid planning strategies.	TEKNOLOGIAN TUTKIMUSKESKUS VTT OY
HAVEN	Demo 1	Turkey	1	Enabling ultra-fast EV charging in RES-powered grids. IMECAR Factory, Antalya (Turkey)	BRUSSELS RESEARCH AND INNOVATION CENTER FOR GREEN TECHNOLOGIES
HAVEN	Demo 2	Lithuania	1	Multi-functional building power balancing with high-power batteries. Solitek building, Vilnius (Lithuania)	BRUSSELS RESEARCH AND INNOVATION CENTER FOR GREEN TECHNOLOGIES
HAVEN	Demo 3	Denmark	1	Hybrid power (HPP) plant with wind and solar generation and storage.	BRUSSELS RESEARCH AND INNOVATION CENTER FOR GREEN TECHNOLOGIES
HAVEN	Demo 4	Morocco	1	Multi-microgrid system. MASEN's R&D platform, Ouarzazat (Morocco)	BRUSSELS RESEARCH AND INNOVATION CENTER FOR GREEN TECHNOLOGIES
HAVEN	Demo 5	India	1	High-speed lifts in skyscrapers. Lodha Oneworld Tower (Mumbai, India	BRUSSELS RESEARCH AND INNOVATION CENTER FOR GREEN TECHNOLOGIES
HEDGE-IoT	Demo 1	Finland	1	Name/Type: Lounatuuli 13 and 15, TA House Company Naatali // Residential. Location: City of Naantali, County of Varsinais-Suomi, on the shore of the Baltic Sea. Scope: The site is integrated into a new residential district, with existing and future PV energy plants, larger battery energy storage and several eV charging stations, connected to MV grid through a common power substation. Each energy prosumer entity has its own Energy Management System aiming at higher Self-consumption and self-sufficiency rates, to be globally optimized with Local DSO Naatali Energy.	EUROPEAN DYNAMICS LUXEMBOURG SA
HEDGE-IoT	Demo 2	Spain	1	Deploying IoT assets in the energy system.	EUROPEAN DYNAMICS LUXEMBOURG SA
HEDGE-IoT	Demo 3	Germany	2	Implementing federated applications at edge and cloud layers.	EUROPEAN DYNAMICS LUXEMBOURG SA
HEDGE-IoT	Demo 4	Finland	1	Upgrading RES-hosting capacity and enhancing grid resilience.	EUROPEAN DYNAMICS LUXEMBOURG SA

PROJECT	DEMO	COUNTRY	N° OF DEMON-STRATION SITE OR PILOTS HOSTED	DESCRIPTION	PROJECT COORDINATED BY
HEDGE-IoT	Demo 5	Italy	2	Leveraging AI/ML for data processing in energy systems.	EUROPEAN DYNAMICS LUXEMBOURG SA
HEDGE-IoT	Demo 6	Greece	4	Enhancing grid flexibility and introducing new market opportunities.	EUROPEAN DYNAMICS LUXEMBOURG SA
HEDGE-IoT	Demo 7	Austria	1	Implementing federated learning applications.	EUROPEAN DYNAMICS LUXEMBOURG SA
HEDGE-IoT	Demo 8	Czechia	1	Ensuring seamless communication using standardized formats.	EUROPEAN DYNAMICS LUXEMBOURG SA
HESTIA	Demo 1	Italy	1	This HESTIA pilot involves the village of Berchidda in Sardinia where the municipality owns the local electricity grid and upgrades it with smart technologies and innovative energy initiatives. The pilot advances the local energy transition and gathers insights for similar towns. Around 30 households participate.	SINLOC-SISTEMA INIZIATIVE LOCALI SPA
HESTIA	Demo 2	Netherlands	1	In the Netherlands, the pilot aims to showcase the application of the HESTIA project's DR services within a residential setting. Similar to the pilot in Ireland, it involves engaging residents in demand-side management activities and optimizing energy efficiency in building systems operation. The pilot will assess the scalability and replicability of the HESTIA solution in diffe-rent market and regulatory contexts, enabling various business models and levels of energy services provision.	SINLOC-SISTEMA INIZIATIVE LOCALI SPA
HESTIA	Demo 3	France	1	The pilot in France is designed to demonstrate the implementation of the HESTIA project's DR services within a residential community. It focuses on engaging residential consumers in flexibility sharing and grid balancing activities, leveraging user-personalized services delivered through an innovative ICT platform. The pilot aims to establish an open flexibility marketplace and promote sustainable energy behavior among community residents.	SINLOC-SISTEMA INIZIATIVE LOCALI SPA
HVDC-WISE	Demo 3	Germany	3	Three pilots spread across Berlin, Munich, and Hamburg, each emphasizing different aspects of grid resilience and flexibility using HVDC technology.	SUPERGRID INSTITUTE
HVDC-WISE	Demo 4	Finland		A single demonstrator site located in Helsinki, concentrating on optimizing energy efficiency through smart grid management and demand-response systems.	SUPERGRID INSTITUTE
Hyperride	Demo 1	Germay	2	1. Aachen: MV – LVDC – AC/DC hybrid campus grid demonstration, illustrating the integration of MV, LVDC, and AC/DC hybrid grid technologies. 2. Terni: Demonstration of low voltage DC (LV DC) to AC/DC hybrid distribution system grids, incorporating connections to medium voltage AC (MVAC) grids through AC-transformers deployed in real-world field conditions. User	AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH
Hyperride	Demo 2	Switzerland	1	Lausanne: MV – LVDC – AC/DC hybrid campus grid demonstration, showcasing the integration of medium voltage (MV), low voltage direct current (LVDC), and alternating current/direct current (AC/DC) hybrid grid technologies.	AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH
Hyperride	Demo 3	Italy	1	Terni: Demonstration of low voltage DC (LV DC) to AC/DC hybrid distribution system grids, incor-porating connections to medium voltage AC (MVAC) grids through AC-transformers deployed in real-world field conditions.	AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH
HYSTORE	Demo 1	Italy	2	The demonstrators in Italy involve testing and validating the innovative thermal energy storage (TES) concepts in different climate conditions and building types, including both residential and commercial buildings. The pilots aim to assess the performance and feasibility of the TES solutions in providing heating, cooling, and DHW services efficiently and cost-effectively.	ARMENGOL & ROS CONSUL-TORS I ASSOCIATS SLP
IANOS	Demo 1	Portugal	1	The demonstrator site is located in Terceira and serves as a lighthouse island for the project, showcasing the symbiotic operation of various energy streams and demonstrating the integra-tion of renewable energy technologies and energy storage solutions.	CNET CENTRE FOR NEW ENERGY TECHNOLOGIES SA
IANOS	Demo 2	Netherlands	1	he demonstrator site is located in Ameland and serves as another lighthouse island for the project, demonstrating similar energy integration and decarbonization strategies as the Terceira site.	CNET CENTRE FOR NEW ENERGY TECHNOLOGIES SA
iDesignRES	Demo 1	Norway	2	Demonstration of renewable energy integration in remote areas. Testing of grid stability with high penetration of renewables.	NORGES TEKNISK-NATUR-VITENSKAPELIGE UNIVER-SITET NTNU
iDesignRES	Demo 2	Greece	2	Implementation of energy community models. Integration of distributed energy resources (DERs) in urban settings.	NORGES TEKNISK-NATUR-VITENSKAPELIGE UNIVER-SITET NTNU
iDesignRES	Demo 3	Italy	2	Optimizing energy storage in industrial clusters. Deployment of smart grids for renewable energy management.	NORGES TEKNISK-NATUR-VITENSKAPELIGE UNIVER-SITET NTNU
iDesignRES	Demo 4	Spain	1	Demonstration of grid flexibility through demand response. Integration of electric vehicles for grid balancing.	NORGES TEKNISK-NATUR-VITENSKAPELIGE UNIVER-SITET NTNU
iDesignRES	Demo 5	France	2	Pilot for multi-carrier energy systems with hydrogen integration. Testing of innovative energy tariffs for prosumers.	NORGES TEKNISK-NATUR-VITENSKAPELIGE UNIVER-SITET NTNU
INFINITE	Demo 1	France	1	A floating offshore wind system at 100m water depth with innovative concrete tension leg platform and aluminium dynamic cable.	BLUENEWABLES SL
INFINITE	Demo 2	Spain	1	A floating offshore wind system at 100m water depth with innovative concrete tension leg platform and aluminium dynamic cable.	BLUENEWABLES SL
InterOPERA	Demo 1	France	1	The demonstrator site in France focuses on testing and validating the interoperability of mul-ti-vendor HVDC grids, particularly in the context of offshore wind energy integration.	SUPERGRID INSTITUTE
InterOPERA	Demo 2	Sweden	1	In Sweden, the pilot aims to demonstrate the compatibility and interoperability of HVDC tech-nologies from different vendors, with a specific emphasis on grid forming capabilities.	SUPERGRID INSTITUTE
InterOPERA	Demo 3	Germany	1	The German pilot site serves as a testing ground for multi-vendor HVDC systems, with a focus on improving grid forming capabilities and ensuring mutual compatibility among various technologies.	SUPERGRID INSTITUTE

PROJECT	DEMO	COUNTRY	N° OF DEMON-STRATION SITE OR PILOTS HOSTED	DESCRIPTION	PROJECT COORDINATED BY
InterOPERA	Demo 4	Norway	1	The Norwegian pilot site aims to validate the interoperability and compatibility of HVDC technologies from different vendors, focusing on enhancing grid forming capabilities for improved energy integration.	SUPERGRID INSTITUTE
InterOPERA	Demo 5	Italy	1	In Italy, the pilot site focuses on validating the interoperability of multi-vendor HVDC grids, particularly in the context of offshore wind energy projects, to enable seamless integration and transmission of renewable energy.	SUPERGRID INSTITUTE
InterPED	Demo 1	Spain	1	The Lugaritz-Matía community is located in San Sebastián, Basque Country. The pilot consists of three buildings, a private hospital (Bermingham hospital) and two nursing homes/buildings (Rezola nursing home and Lugaritz building) for assisted living, serving around 7 people	R2M SOLUTION SPAIN SL
InterPED	Demo 2	United Kingdom	1	Ecovillage Findhorn is 6 years old community located in the Findhorn, on the northeast coast of Scotland, and represents a PED in that 5% of locally produced renewable energy is exported to the electricity grid	R2M SOLUTION SPAIN SL
InterPED	Demo 3	Switzerland	1	Located in Capriasca village, pilot consists of a residential area with 11 single- and multi-family houses, a large public pool, the football field building with several office spaces, and a district heating plant.	R2M SOLUTION SPAIN SL
InterPED	Demo 4	Romania	1	Alba Iulia College District includes the Dorin Pavel (DP) Technical College, situated in the central area of the Alba Iulia city. The DP Technical College HQ is part of a community which is sharing the energy infrastructure.	R2M SOLUTION SPAIN SL
INTERSTORE	Demo 1	Italy	1	EV hybrid distributed Energy Management System in Lab in Rome	RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN
INTERSTORE	Demo 2	Austria	1	Flexibility ManagemenHybrid Distributed Energy Management System Platform	RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN
INTERSTORE	Demo 3	Portugal	1	Hybrid Distributed Energy Management System	RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN
INTERSTORE	Demo 4	Spain	1	Sonae's . Renewable Energy Community (REC) industrial site, called Sonae Campus, in Maia	RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN
INTERSTORE	Demo 5	Germany	1	Residential Power Management System in Julich campus	RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN
Intnet	Demo 1	Germany	1	The demonstrator site is located in Berlin and serves as a testing ground for interoperable energy services, focusing on demand response, smart metering, grid technologies, and large-scale energy storage.	FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER
Intnet	Demo 2	Austria	1	The pilot project is situated in Vienna and focuses on integrating distributed energy resources, including photovoltaic systems and wind turbines, into the grid using advanced grid management tools.	FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV
Intnet	Demo 3	Ireland	1	The demonstrator site is established in Dublin and aims to assess the interoperability of energy services through digitalization, including the implementation of digital twins and grid modeling techniques.	FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV
Intnet	Demo 4	Spain	1	The pilot project is located in Madrid and focuses on enhancing TSO-DSO cooperation and system flexibility through the integration of microgrids, distributed storage technologies, and renewable generation sources.	FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV
Intnet	Demo 5	Belgium	1	The demonstrator site is situated in Brussels and focuses on market design aspects, including cross-border collaboration and flexibility markets, to optimize energy trading and grid operation efficiency.	FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV
ISLANDER	Demo 1	Spain	1	The pilot site in Spain serves as a demonstration hub for integrating heterogeneous storage, electric vehicles, and renewables in various applications, including behind the meter, front the meter, and street lighting. The site showcases the operation and integration of these technologies to decarbonize Borkum Island.	AYESA ADVANCED TECHNOLOGIES SA
ISLANDER	Demo 2	Germany	1	The pilot site in Germany, specifically on Borkum Island, serves as the main focus of the project. It demonstrates the integration of distributed renewable energy systems, large-scale storage technologies, hydrogen-based storage, EV charging infrastructure, and seawater district heating, along with the implementation of a smart IT platform for optimal aggregation and demand response. This pilot aims to make Borkum Island a fully autonomous and decarbonized energy system, setting an example for other islands to replicate.	AYESA ADVANCED TECHNOLOGIES SA
ISLANDER	Demo 3	Greece	1	The pilot site in Greece is part of the follower islands engaged in replicating the project's results. It focuses on implementing similar energy solutions to those deployed on Borkum Island, aiming to achieve decarbonization and energy autonomy.	AYESA ADVANCED TECHNOLOGIES SA
ISLANDER	Demo 4	Belgium	1	Similar to the pilot sites in Germany and Greece, the site in Belgium is involved in replicating the project's outcomes. It aims to implement integrated energy management solutions and engage local communities in the transition towards sustainable and decarbonized energy systems.	AYESA ADVANCED TECHNOLOGIES SA
ISLANDER	Demo 5	United Kingdom	1	The pilot site in the United Kingdom, likely in related archipelagos, participates in replicating the project's achievements. It aims to adopt similar energy solutions and methodologies to transition towards carbon-free energy systems.	AYESA ADVANCED TECHNOLOGIES SA
i-STENTORE	Demo 1	Luxembourg	1	Advanced energy storage system demonstration	EUROPEAN DYNAMICS LUXEMBOURG SA
i-STENTORE	Demo 2	Italy	2	Integration of energy storage in renewable energy systems	EUROPEAN DYNAMICS LUXEMBOURG SA

PROJECT	DEMO	COUNTRY	N° OF DEMON-STRATION SITE OR PILOTS HOSTED	DESCRIPTION	PROJECT COORDINATED BY
i-STENTORE	Demo 3	Germany	3	Hybrid energy storage systems in industrial settings	EUROPEAN DYNAMICS LUXEMBOURG SA
i-STENTORE	Demo 4	Greece	1	Energy storage solutions for agricultural applications	EUROPEAN DYNAMICS LUXEMBOURG SA
i-STENTORE	Demo 5	Ireland	1	Residential energy storage pilot	EUROPEAN DYNAMICS LUXEMBOURG SA
i-STENTORE	Demo 6	Portugal	1	Integration of energy storage in grid infrastructure	EUROPEAN DYNAMICS LUXEMBOURG SA
i-STENTORE	Demo 7	Slovenia	1	Energy storage solutions for rural communities	EUROPEAN DYNAMICS LUXEMBOURG SA
i-STENTORE	Demo 8	Spain	3	Grid-scale energy storage projects	EUROPEAN DYNAMICS LUXEMBOURG SA
localRES	Demo 1	Austria	1	Ollersdorf: village in south-east Austria, part of the Klimate and Energy Model Region, with a clear strategy to focus on renewable energy and smart municipality. There is a large deploy-ment of renewable energy, smart technologies, EV charging stations. Within LocalRES, a REC will be	FUNDACION CARTIF
localRES	Demo 2	Italy	1	Berchidda: village in the north of Sardinia Island, part of the Covenant of Mayors with the aim of achieve energy independence. The Municipality owns the local grid and acts as DSO, and has plans to build a Smart Grid. Within LocalRES, the creation of a REC will be promoted, including community engagement activities. An optimized battery logic will be developed, E-mobility will be enhanced to implement V2G services, residents will be involved through the installation of heat pumps, and the smart management of distributed energy resources will be promoted.	FUNDACION CARTIF
localRES	Demo 3	Spain	1	Ispaster: village in the north of Spain, part of the Covenant of Mayors, aims at becoming 1% in the long term. The municipality owns a thermal and an electrical micro-grid, including solar thermal, biomass technologies, PV and batteries. Within LocalRES, a REC will be constituted, the micro-district heating network will be extended and improved, the PV system will be enlarged, EV chargers and additional storage will be installed, or power-to-heat solutions will be promoted.	FUNDACION CARTIF
localRES	Demo 4	Finland	1	Kökar: small archipelago municipality of Åland Islands, part of the CE4EUI, aims at leading the decarbonization of systems in islands. Kökar entered the project with the aim of contributing to developing the sustainability agenda in the region, establish a REC, renovate the heating system in the school and install PV and micro-wind, promote smart energy management systems in public and private buildings, install EV chargers or install PV and batteries in the nursery home.	FUNDACION CARTIF
MAESHA	Demo 1	France	(1), Mayotte	Full scale demonstration of all solutions developed	TECHNISCHE UNIVERSITAT BERLIN
MASTERPIECE	Demo 1	Italy	1	Berchidda municipality is an Italian town of 2668 inhabitants in the province of Sassari, northern part of Sardinia. The uniqueness of Berchidda, apart from being a small and cohesive community, with an economy based on quality agricultural and wine products, and an impor-tant and internationally renowned summer jazz festival, lies in the fact that it has its own electricity grid, a very rare case. The municipality's goal is to create an energy community.	UNIVERSIDAD DE MURCIA
MASTERPIECE	Demo 2	Turkey	1	The original pilot site was Çanakkale pilot site, due to the last earthquake in Turkey, it is pen-ding. The selected Turkish pilot site is Aşağıçavuş, a forest village. Within this village, there are 19 rooftop solar plants with a capacity of 225 kWp (DC) per plant. These installations, done by the Ministry of Agriculture and Forestry, aim to support forest villages. In this way, an energy community will be formed with the forest villagers.	UNIVERSIDAD DE MURCIA
MASTERPIECE	Demo 3	France	3	1)Solévent was created in November 218. Citizens, cities, companies, and associations can take part in the capital. For the moment, they are only working on photovoltaic solar energy. 293 MWh are produced each year, all of which is reinjected into the grid. Total investment is €275k. Solévent is an SAS (simplified joint stock company) with variable capital and COOPerative operations. Any individual can apply to become a shareholder, and legal entities can become shareholders in the company. 2) Poissy and magnanville. The assembly of the two energy communities (Poissy and Mangnanville) is underway. The energy community of Poissy is more advanced than the EC of Magnanville. 3) Les Mureaux Energy Community is still at a very early stage. Its vision is centred around empowering citizens while promoting solar-powered energy community ownership.	UNIVERSIDAD DE MURCIA
MASTERPIECE	Demo 4	Sweden	4	1) Dansmästaren is what is called a multi-hub - a building holding several functions and techniques. The facility was built by Uppsala municipality (UPP), and most of the occupied area is under UPP's management and data control. Several attempts have been made to either start a energy community in UPP's command or to engage citizens to start their own. Thus far, all attempts have failed, either by regulatory hindrances or lack of support from citizens. With MASTERPIEC project, UPP aims for the end result to be an established energy community. 2 y 3) Both BRF Väppeby backe and Brf Venus are condominium organisations that are already having a cooperation in place, but energy is not a topic and energy communities are not known. 4) Austerland. The users that are scattered	UNIVERSIDAD DE MURCIA
MAXBLADE	Demo 1	Spain	1	Tidal turbine blade testing and performance analysis	FMC TECHNOLOGIES SPOLKA Z OGRANICZONA ODPOWIEDZIALNOSCIA
MAXBLADE	Demo 2	Belgium	1	Tidal turbine blade manufacturing improvement	FMC TECHNOLOGIES SPOLKA Z OGRANICZONA ODPOWIEDZIALNOSCIA
MAXBLADE	Demo 3	United Kin-gdom	1	Tidal turbine blade recycling research	FMC TECHNOLOGIES SPOLKA Z OGRANICZONA ODPOWIEDZIALNOSCIA
MAXBLADE	Demo 4	Netherlands	1	Tidal turbine blade material development	FMC TECHNOLOGIES SPOLKA Z OGRANICZONA ODPOWIEDZIALNOSCIA
MISSION	Demo 1	Norway	1	Demonstration of new 42 kV circuit breaker technology under contrasting climate extremes	SINTEF ENERGI AS

PROJECT	DEMO	COUNTRY	N° OF DEMON-STRATION SITE OR PILOTS HOSTED	DESCRIPTION	PROJECT COORDINATED BY
MISSION	Demo 2	France	1	Demonstration of new 42 kV circuit breaker technology under contrasting climate extremes	SINTEF ENERGI AS
MISSION	Demo 3	Germany	1	55 kV HVDC GIS according to the proposed IEC standard and demonstrate it in a pilot installation onshore in Germany with simulated operating conditions	SINTEF ENERGI AS
Mopo	Demo 1	Pan-European	1	The Pan-European demonstration focuses on optimizing renewable energy integration across EU countries, using our energy modeling framework. It assesses energy security, market dynamics, and paths to a carbon-neutral economy, highlighting solutions and policy recommendations for a sustainable future.	TEKNOLOGIAN TUTKIMUSKESKUS VTT OY
Mopo	Demo 2	Belgium-Netherlands	1	The other demonstration in the Mopo project examines an industrial sector, showcasing detailed, sector-specific physics to enhance energy efficiency and sustainability. It targets optimizing operations, reducing emissions, and integrating renewable energy sources within industrial processes. This case emphasizes practical applications of	TEKNOLOGIAN TUTKIMUSKESKUS VTT OY
NATURSEA-PV	Demo 1	Spain	1	NaturSea-PV coordinator, FUNDACION TECNALIA RESEARCH & INNOVATION, is located in Spain. Spain has a strong interest in renewable energy and could be a likely candidate for hosting a future pilot project to test the technology in real-world conditions.	FUNDACION TECNALIA RESEARCH & INNOVATION
NATURSEA-PV	Demo 1	France	1	UNIVERSITE DE BORDEAUX, is situated in France. France also has a significant renewable energy sector and a coastline on the Atlantic Ocean, making it another potential location for a pilot demonstrator site.	FUNDACION TECNALIA RESEARCH & INNOVATION
NEMO	Demo 1	Switzerland	1	Battery module testing	VRIJE UNIVERSITEIT BRUSSEL
NEMO	Demo 2	Belgium	1	Battey cell testing	VRIJE UNIVERSITEIT BRUSSEL
NEWGEN	Demo 1	Finland	1	HVDC cable	TEKNOLOGIAN TUTKIMUSKESKUS VTT OY
NEWGEN	Demo 2	Finland	1	Model A cable	TEKNOLOGIAN TUTKIMUSKESKUS VTT OY
NEXTBMS	Demo 1	France	2	1. Smart Grid Integration - Testing grid technologies with renewable energy sources. 2. Consumer Engagement - Implementing IoT solutions for energy consumption monitoring.	AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH
NEXTBMS	Demo 2	Spain	1	Energy Storage Testing - Deploying large-scale storage technologies for grid support.	AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH
NEXTBMS	Demo 3	Germany	1	Decentralized Energy Management - Utilizing distributed storage technologies for local energy communities. Decentralized Energy Management - Utilizing distributed storage technologies for local energy communities. Renewable Energy Integration - Demonstrating grid technologies with a focus on renewable energy sources.	AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH
NEXTBMS	Demo 4	Finland	1	Renewable Energy Integration - Demonstrating grid technologies with a focus on renewable energy sources.	AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH
NEXTBMS	Demo 5	Italy	2	1. Market Design Innovation - Implementing new market models using digitalization and system integration. 2. Energy Efficiency Showcase - Showcasing technologies for energy efficiency and consumer engagement.	AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH
NEXTBMS	Demo 6	United Kingdom	1	Smart Metering and Demand Response - Testing ICT solutions for demand-side management and prosumer engagement.	AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH
NEXTFLOAT	Demo 1	France	1	France is a leading country in offshore wind development and has a strong focus on innovation. They already have operational deepwater wind farms (e.g., Floatgen) and a supportive regulatory environment for floating wind technology. Since one of the project coordinators is located in France, collaboration for a pilot project within the country seems likely.	T.EN NETHERLANDS B V
NEXTFLOAT	Demo 2	Spain	1	Spain boasts a significant existing offshore wind capacity and is actively exploring deepwater wind potential. The Spanish government has established goals for expanding floating wind energy, making it an attractive location for pilot projects. Spain is also home to one of the NEXTFLOAT project partners, potentially facilitating collaboration on a demonstrator.	T.EN NETHERLANDS B V
ODEON	Demo 1	Spain	1	Implementation and testing of the ODEON framework in a Spanish context.	ETRA INVESTIGACION Y DESARROLLO SA
ODEON	Demo 2	Greece	2	Implementation and validation of ODEON technologies in diverse Greek settings.	ETRA INVESTIGACION Y DESARROLLO SA
ODEON	Demo 3	France	1	Application of ODEON solutions within specific French energy systems.	ETRA INVESTIGACION Y DESARROLLO SA
ODEON	Demo 4	Denmark	1	Testing ODEON technologies in Danish energy infrastructure.	ETRA INVESTIGACION Y DESARROLLO SA
ODEON	Demo 5	Ireland	1	Deployment of ODEON framework in Irish energy networks.	ETRA INVESTIGACION Y DESARROLLO SA
OMEGA-X	Demo 1	Spain	4	Renewables and Local Energy Communities Use Cases	ATOS IT SOLUTIONS AND SERVICES IBERIA SL
OMEGA-X	Demo 2	France	2	Electromobility and Renewables Use Case	ATOS IT SOLUTIONS AND SERVICES IBERIA SL
OMEGA-X	Demo 3	Italy	1	Local Energy Communities Use Case	ATOS IT SOLUTIONS AND SERVICES IBERIA SL
OMEGA-X	Demo 4	Portugal	2	Flexibility and Local Energy Communities Use Cases	ATOS IT SOLUTIONS AND SERVICES IBERIA SL
OMEGA-X	Demo 5	Belgium	1	Electromobility Use Case	ATOS IT SOLUTIONS AND SERVICES IBERIA SL

PROJECT	DEMO	COUNTRY	N° OF DEMON-STRATION SITE OR PILOTS HOSTED	DESCRIPTION	PROJECT COORDINATED BY
OMEGA-X	Demo 6	Serbia	1	Local Energy Communities Use Case	ATOS IT SOLUTIONS AND SERVICES IBERIA SL
OPENTUNITY	Demo 1	Greece	1	The Greek pilot site is situated in Mesogia, in the southeastern part of Attica, near Athens. The Markopoulo Substation is located here, which is positioned at the boundaries between the transmission and distribution systems. It transforms voltage from the 15kV (part of TS) level to the 2kV level (part of DS). The substation is designed to provide power to 2812 houses and 123 commercial buildings. There are three 15kV/2kV transformers installed, each with a rated apparent power of 4/5MVA, which fulfil the load requirements of the connected consumers. On the MV side, a capacitor bank with a capacity of 24MVar is utilized for voltage support. In terms of renewable energy source (RES) penetration, there are 27.43 MW of Photovoltaic plants connected to the distribution network.	ETRA INVESTIGACION Y DESARROLLO SA
OPENTUNITY	Demo 2	Slovenia	1	The Slovenian pilot in OPENTUNITY covers an area of 2 out of 5 DSOs in the country, namely ElektroPrimorska (EP) and Elektro Ljubljana (EL) and supplies a total of 48,9 inhabitants. The network to be tested comprises both MV and LV networks. Specifically, the site involves grid assets of selected substations, starting from MV feeders and ending at ML/LV transformer stations, all of which are equipped with sensors and smart meters. In addition, more than 5 buildings are included with installed Home or Building Energy Management Systems (HEMS/ BEMS). EL also provides information about the Electric Vehicle	ETRA INVESTIGACION Y DESARROLLO SA
OPENTUNITY	Demo 3	Spain	1	The Spanish pilot site is located in the Osona and Vallès Oriental regions, in Catalonia. These are regions with a high penetration of self-consumption photovoltaic panels, and where a strong interest from the citizens on local renewable energy and energy communities is observed, with the support of the local energy agency and cooperatives. In the Spanish pilot, technologies for promoting flexibility in a prosumer's environment and also to assist the DSO in managing the grid will be tested. For the latter, the focus will be on Santa Eulàlia de Ronçana municipality, a leading town in Catalonia in terms of installed capacity of PV panels for self-consumption. In this area, the DSO has two primary MV/MV substations and 44 secondary substations with a total installed transformer capacity of 13,51 kVA.	ETRA INVESTIGACION Y DESARROLLO SA
OPENTUNITY	Demo 4	Switzerland	1	The Swiss pilot is located in the Via Motta urban district in Massagno, near Lugano in southern Switzerland. It comprises approximately 2 residential flats and single houses that host around 1 residents, a large office building, a warehouse used daily, and an elderly care home with 6 single-bed rooms and approximately 94 workers. All the prosumers are connected to the AEM distribution network, which is served by a 4 kVA substation located in the middle of the neighbourhood. The pilot leverages the existing smart metering infrastructure. Each user in the energy community is equipped with smart meters that communicate production and consumption data every 15 minutes and historical data is stored for two years. Also, there is a web-based monitoring tool for end-users and community managers to show energy consump-tion and generation, split between internal and external flows, along with dynamic energy prices and resulting revenues/costs. Within the urban district, there is a Photovoltaic plant with a total installed capacity of 6 kWp on the roof of the local shelter for elderly people.	ETRA INVESTIGACION Y DESARROLLO SA
PARMENIDES	Demo 1	Austria	2	The Austrian pilot consists of two different municipalities (Gasen, Heimschuh) with very diverse characteristics and infrastructure. They are both located in the federal state of Styria, the distribution grid is operated by the local Distribution System Operator and project partner Energienetze Steiermark GmbH (ENS): Both Austrian municipalities have been equipped with hardware and software solutions in previous research projects (e.g., LEAFS, Blockchain Grid, CLUE). In PARMENIDES, it is planned to extend, merge, or replace the available solutions in order to be able to utilize the HESS (depending on the different storage technologies in the two municipalities) on the one hand, and to use ontologies as a knowledge base on the other hand. Different flexibility strategies with given priorities will be implemented and	AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH
PARMENIDES	Demo 2	Sweden	1	The Swedish pilot consists of a combination of physical and virtual laboratory set-ups to use the PARMENIDES ontologies. In particular, it is planned to leverage the capabilities of the KTH Live-in-Lab and the laboratory at the KTH Department of Energy Technology (EGI). KTH Live-In Lab (LiL) is a platform comprising multiple testbeds for research and development within the real estate and construction sectors. It is designed to facilitate knowledge sharing between researchers and industry, being the link between research groups, facilitating contacts and helping arrange meetings between different research fields. The testbed is located in one of three plus-energy buildings at KTH Campus Valhallavägen.	AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH
PEDvolution	Demo 1	Germany	1	The local heating network currently supplies approx. 18 households in the district. A heating centre with sufficient capacity to supply all buildings with heat. A cogeneration unit (CHP), combined with distributed PV production provide renewable electricity and heat.Establishment and expansion of local heating networks. Existing and new RES installations will be equipped with automated AI-based controls. Energy flexibility and aggregation.	INLECOM INNOVATION ASTIKI MI KERDOSKOPIKI ETAIREIA
PEDvolution	Demo 2	Slovenia	1	The demonstrator and co-developer deals with waste-heat utilization from low temperature dirty condensate with the help of heat-pumps for reuse in the industrial process as well as using the excess heat to supply nearby households through the district heating network. The industrial PED consists of 2 hydropower plants, multiple rooftop PVs, CHP with 5MW excess heat potential, eV charging stations, and nearby household with potential for replacing natural gas with district heating.	INLECOM INNOVATION ASTIKI MI KERDOSKOPIKI ETAIREIA
PEDvolution	Demo 3	Switzerland	1	The Hard community in Winterthur, Switzerland consists of 45 apartments and around 4 businesses. The residents and employees of the community have made more ecology their common goal. Hydroelectric power is and has been an important component of the site from the beginning. A solar plant and gas boiler generate heat for the development. Newly, since the end of 221, the site has been producing its own electrical energy with an attached photovoltaic plant. In addition, charging stations for charging several electric vehicles are available on the nearby parking field. Optimized energy usage, such as self-usage of hydropower instead of grid feed-in, an increase in PV capacity.	INLECOM INNOVATION ASTIKI MI KERDOSKOPIKI ETAIREIA
PLOTEC	Demo 1	Spain	1	Demonstrate a floating platform in real sea conditions at the PLOCAN test site	CONSORCIO PARA EL DISENO, CONSTRUCCION, EQUIPAMIENTO Y EXPLOTA-CION DE LA PLATAFORMA OCEANICA DE CANARIAS (PLOCAN) (Spain)
POCIYTIF	Demo 1		1	Alkmaar (NL) is one of the project's 'lighthouse cities' serving as testbed for POCITYF's inno-vative solutions: Positive Energy Buildings & Districts; P2P energy storage and management; E-mobility integration into smart grid; Citizen driven co-creation.	LABELEC ESTUDOS DESENVOLVIMENTO E ACTI-VIDADES LABORATORIAIS SA (Portugal)

PROJECT	DEMO	COUNTRY	N° OF DEMON-STRATION SITE OR PILOTS HOSTED	DESCRIPTION	PROJECT COORDINATED BY
POCIYTIF	Demo 2		1	Évora (PT) is one of the project's 'lighthouse cities' serving as testbed for POCITYF's innovative solutions: Positive Energy Buildings & Districts; P2P energy storage and management; E-mobility integration into smart grid; Citizen driven co-creation.	LABELEC ESTUDOS DESENVOLVIMENTO E ACTIVIDADES LABORATORIAIS SA (Portugal)
R2D2	Demo 1	Spain	2	Implementing dynamic risk assessment tools and predictive maintenance technologies in EPES environments.	ETRA INVESTIGACION Y DESARROLLO SA
R2D2	Demo 2	Greece	1	Testing cyber-security prevention tools and TSO-DSO interaction frameworks for EPES resilience.	ETRA INVESTIGACION Y DESARROLLO SA
R2D2	Demo 3	Slovenia	1	Development and integration of contingency analysis techniques for effective threat response in EPES operations.	ETRA INVESTIGACION Y DESARROLLO SA
R2D2	Demo 4	North Macedonia	1	Research and testing on TSO-DSO interaction frameworks and their impact on EPES coordination and resilience.	ETRA INVESTIGACION Y DESARROLLO SA
R2D2	Demo 5	Serbia	2	Implementation and validation of dynamic risk assessment tools, predictive maintenance technologies, and cyber-security prevention measures in EPES operations.	ETRA INVESTIGACION Y DESARROLLO SA
REEFLEX	Demo 1	Spain	1	n this pilot, both hardware solutions and software tools will be developed, standardised and tested, including: Development demand side management strategies (including distributed resources as storage or generation) for optimal management and flexibility provision. They will be implemented through Cloud computing in REEFLEX platform and, in the case of CIRCE, on Edge computing using already installed gateways/concentrators (Energy Box) and in the other areas. Implementation of smart appliances and monitoring devices at residential level and heritage buildings (URBE offices). The improved availability of data, also supported by NILM algorithms to disaggregate industrial demands in ARCELOR MITTAL, will enable the implementation of algorithms for categorising flexibility potential and the predictive maintenance of energy assets. Innovative assets, including batteries, inverters and V2G chargers enabling advance levels of flexibility will be deployed and/or tested at CIRCE taking advantage of its living lab on renewable microgrids. The integration of batteries will also take place at residential level to demonstrate the potential of energy communities promoting the acquisition and operation of green technologies. A tool for flexibility calculation, aggregation, market negotiation and customer management will be developed to support URBE as aggregator in the management of flexibility sources. OMIE will develop	FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS
REEFLEX	Demo 2	Greece	1	The Greek demo-site is located in the city centre of Thessaloniki and is composed by a set of 5 residential buildings, 3 energy retail stores and one large commercial facility managed by WVT as utility company together with INNO as energy efficiency services provider. Implementation of optimal management strategies taking advantage of RES (both from WVT grid and from the PV projected to be installed in car park roof), BESS and EV charging will be tested in the pilot. In this sense, the demo site will use OCPP for monitoring and control of Electric Vehicle Supply Equipment to Developments in the field of disaggregation techniques will be implemented to obtain as much detailed information as possible to enable cross-selling among devices and the provision of a diverse set of flexibility services. Moreover, the buildings will make use of CERTH's Fog Enabled Intelligent Device (FEID). Innovations and Technological Advances: 1.Non-Intrusive Load Monitoring tracking 2.Implementation of optimal management strategies taking davantage of RES; BESS Application use cases: Disaggregation: NILM application in commercial facilities to disaggregate loads 2. Participation in flexibility markets via EV chargers and fleet	FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS
REEFLEX	Demo 3	Bulgaria	1	Data Center A: Energy Consumption for ABILIX servers only – 35 MWh/y. Around 1 GWh/y for the whole DataCenter. Evenly distributed with no Seasonal peaks for servers. Cooling electricity consumption is generally 66% lower in Q4/Q1 than in Q2/Q3. Zero emissions (Green energy certificates from the energy utilities supplying power to the Data Centers, mainly fed by nuclear energy). Energy storage around 1 Kwh of batteries. Data Center B: Energy Consumption for ABILIX servers only – 44 MWh/y. Around 1 GWh/y for the whole DataCenter. Cooling electricity consumption is generally 66% lower in Q4/Q1 than in Q2/Q3. Zero emissions (Green energy certificates from the energy utilities supplying power to the Data Centers, mainly fed by nuclear energy); Certificate of Verified Carbon Unit (VCU) Retirement). Energy storage around 8 Kwh of batteries. Data Center C: Energy Consumption for ABILIX servers only – 53 MWh/y. Around 1 MWh/y for the whole DataCenter. Cooling electricity consumption is generally 66% lower in Q4/Q1 than in	FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS
REEFLEX	Demo 4	Switzerland	1	All the prosumers in the aforementioned urban district belong to the AEM distribution network (local DSO) and are served by a 63 kVA substation, which is located in the neighborhood. Additionally within the urban district, there is a PV plant with a total installed capacity of 59 kWp (55 MWh of annual production) on the roof of the elderly care home in order to serve the needs of the buildings (first to the elderly care home, then to the rest of the buildings) and then any additional electricity is injected by the grid. Last but not least, A V2G-ready EV charging column (DC, 1 kWe) together with a car-sharing vehicle (Honda e – 35.5 kWh of electric storage) is also part of the community and can be used both as flexibility and as a battery storage solution. The pilot site also leverages two 11 kWe public charging stations for EV that are available to the citizen, increasing the e-mobility aspect of the site. The Swiss demo site consists also of a biomass-based district heating plant in the municipality of Capriasca, outside of Motta district. The annual total thermal energy production is around 2'3 MWh, and the thermal power is 55 kWth for the main wood-chip boiler. The plant serves a mixed range of customers, such as recreational facilities, education institutions, commercial and residential buildings. The primary objective of the pilot site, supported by the REEFLEX project, is to demonstrate and implement innovative solutions for optimizing energy usage and enhancing flexibility within the Motta District. This includes increasing self-consumption of locally generated renewable energy, minimizing reliance on grid-supplied electricity, and effectively integrating Distributed Energy Resources (DERs) into the existing energy infrastructure through Demand-Side Management (DSM) strategies. These efforts aim to enhance overall energy efficiency, reduce carbon footprint, and contribute to the sustainable development of the district while fostering a flexible and resilient energy ecosystem. Innovations and Technological Advances 1. Smart grids technologies 2. Demand response programs 3. Renewable energy integration Application use cases: 1. Long term reservation of assets for short term local flexibility markets 2. Participation in short-term local flexibility markets with day-ahead and intraday continuous markets integration	FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS
RE-EMPOWERED	Demo 1	Greece	2 demo sites, 1 islanded microgrid in Gaidouromantra	-Islanded microgrid in Gaidouromantra which electrifies approximately 14 vacation houses. The microgrid consists of PVs (2kW), Wind turbine, BESS (96kWh) and back-up diesel generator -Non interconnected Kythnos system provides power to the island of Kythnos (~34 residents, ~3.1 MW peak demand, ~24kW of PV, 665kW of wind generation, 5.2MW of diesel generation) .	EREVNITIKO PANEPISTIMIAKO INSTITOUTO SYSTIMATON EPIKOINONION KAI YPOLOGISTON

PROJECT	DEMO	COUNTRY	N° OF DEMON-STRATION SITE OR PILOTS HOSTED	DESCRIPTION	PROJECT COORDINATED BY
RE-EMPOWE-RED	Demo 2	Denmark	1 demo site providing district heating in the island of Bornholm in Denmark	Bornholm demo site provides district heating to 65 residents. The district heating system has a very high penetration of sustainable energy resources from the island (woodchips and straw), which enables 1% use of locally produced sustainable fuels, in normal operation mode. Also 2.4MW of electric boilers have been installed recently in Østerlars to enable the integration of electrical and district heating network. Østerlars has 64 customers of district heating.	EREVNITIKO PANEPISTI-MIAKO INSTITOUTO SYSTI-MATON EPIKOINONION KAI YPOLOGISTON
RE-EMPOWE-RED	Demo 3	India	1 demo site in Ghoramara island in India	Ghoramara demo site has no access to utility grid. A commercial 16kW microgrid system including PV, wind generation and BESS will provide power to 11 houses. A 1kW advanced microgrid will have the RE-EMPOWERED developed technologies. A charging station for three wheelers and electric boats is also included.	EREVNITIKO PANEPISTI-MIAKO INSTITOUTO SYSTI-MATON EPIKOINONION KAI YPOLOGISTON
RE-EMPOWE-RED	Demo 4	India	1 demo site in Keonjhar in India	Keonjhar demo site comprises of three villages which are not connected to the main grid. 77kW of PV were supplying 1 residents with electricity as of 218. A 5kW microgrid system was deployed in the context of RE-EMPOWERED including biomass generation, biogas generation and BESS. A charging station for three wheelers and electric boats will be istalled as well as solar dimmable lights.	EREVNITIKO PANEPISTI-MIAKO INSTITOUTO SYSTI-MATON EPIKOINONION KAI YPOLOGISTON
RENergetic	Demo 1	Belgium	1	New Docks, a residential area in Ghent - Belgium, focusing on the integration of a sustainable smart renewable energy system, including PV, waste heat, water recovery, and efficient battery storage.	INETUM ESPAÑA S.A.
RENergetic	Demo 2	Italy	1	San Raffaele Hospital and its I&R Campus in Segrate Municipality - Milan, Italy, focused on balancing power and temperature levels of heat and electricity and their transfer between remote PV plant and campus buildings.	INETUM ESPAÑA S.A.
RENergetic	Demo 3	Poland	1	Warta University Campus and Poznan Supercomputing and Networking Center in Poznan, optimizing specific and total demand-supply relationships, including smart EV charging and building energy monitoring. Warta University Campus and Poznan Supercomputing and Networking Center in Poznan, optimizing specific and total demand-supply relationships, including smart EV charging and building energy monitoring.	INETUM ESPAÑA S.A.
RESCHOOL	Demo 1	Spain	4	Diputacio de Girona: Agregation of local energy communities led by municipalities aiming to participate in flexibility markets	UNIVERSITAT DE GIRONA
RESCHOOL	Demo 2	Sweden	1	HAMMARBY SJÖSTAD: Energy community conformed by the aggregation of housing associations for joint flexibility management.	UNIVERSITAT DE GIRONA
RESCHOOL	Demo 3	Netherlands	1	Prosumers community: EASTERN DOCKLANDS ENERGY-FLEX PROSUMERS COMMUNITY: Housholds in a neighbourhood providing flexibility to the DSO at substation level.	UNIVERSITAT DE GIRONA
RESCHOOL	Demo 4	Greece	1	Collective Energy (CoEn) is a citizen's energy community. Collective self consumption and energy management.	UNIVERSITAT DE GIRONA
RESONANCE	Demo 1	France	2	The pilot sites in France focus on testing the integration of innovative energy solutions in urban and rural settings, aiming to optimize energy consumption and promote renewable energy utilization.	TEKNOLOGIAN TUTKIMU-SKESKUS VTT OY
RESONANCE	Demo 2	Spain	1	The Spanish pilot site aims to demonstrate the effectiveness of demand-side management strategies in a residential area, showcasing the potential of smart appliances and distributed storage technologies. The Spanish pilot site aims to demonstrate the effectiveness of demand-side management strategies in a residential area, showcasing the potential of smart appliances and distributed storage technologies.	TEKNOLOGIAN TUTKIMU-SKESKUS VTT OY
RESONANCE	Demo 3	Finland	1	In Finland, the pilot site is focused on implementing advanced grid technologies and demand response mechanisms in industrial settings, with a particular emphasis on enhancing system flexibility and resilience.	TEKNOLOGIAN TUTKIMU-SKESKUS VTT OY
RESONANCE	Demo 4	Germany	1	The German pilot sites include both urban and industrial locations, where the project aims to deploy integrated energy management solutions to optimize energy usage, reduce costs, and increase sustainability.	TEKNOLOGIAN TUTKIMU-SKESKUS VTT OY
RESONANCE	Demo 5	Sweden	1	The Swedish pilot site aims to showcase the benefits of community-based energy initiatives, emphasizing collective flexibility and the integration of renewable energy sources at the local level.	TEKNOLOGIAN TUTKIMU-SKESKUS VTT OY
Robinson	Demo 1	Norway	1	The pilot on the island of Eigerøy aims to demonstrate an integrated energy system coupling locally available energy sources, electrical and thermal networks, and storage technologies. The system will utilize hydrogen as an energy carrier and will integrate various renewable energy sources, such as wind turbines, with storage technologies to create a reliable, cost-effective, and resilient energy supply on the island.	EUROPEAN TURBINE NETWORK
Robinson	Demo 2	Greece	1	The replication study on the island of Crete involves conducting lab-scale experiments to validate the feasibility and effectiveness of the integrated energy system developed in the project. The study will assess the system's performance in a controlled environment, focusing on its ability to integrate renewable energy sources, storage technologies, and hydrogen-based solutions to support decarbonization efforts on the island.	EUROPEAN TURBINE NETWORK
Robinson	Demo 3	United Kingdom	1	Similar to the study in Greece, the replication study in the Western Isles of Scotland will involve conducting lab-scale experiments to validate the integrated energy system's performance. The focus will be on assessing the system's suitability for remote and island communities, with an emphasis on its ability to enhance energy security, reduce reliance on fossil fuels, and support sustainable development initiatives.	EUROPEAN TURBINE NETWORK
SCARLET	Demo 1	France	1	High voltage breakdown test on MgB2 cable lab scale demonstrator	SINTEF ENERGI AS
SCARLET	Demo 2	Norway	1	Type test on MgB2 cable medium size demonstrator	SINTEF ENERGI AS
SCARLET	Demo 3	Germany	1	Type test or real scale HTS cable demonstrator	SINTEF ENERGI AS
SCO2OP-TES	Demo 1	Italy	1	TRL 5 validation site of the TI PTES in UNIGE lab hosted by Tirreno Power plant in Vado Ligure	UNIVERSITA DEGLI STUDI DI GENOVA
SCO2OP-TES	Demo 2	Italy	1	TRL 5 validation site of the TI PTES in UNIGE lab hosted by Tirreno Power plant in Vado Ligure	UNIVERSITA DEGLI STUDI DI GENOVA
SEASTAR	Demo 1	Uk	1	The 4MW tidal array will fabricate 16 tidal stream turbines, which will be deployed at the EMEC Fall of Warness tidal site in Orkney, Scotland.	NOVA INNOVATION LIMITED

PROJECT	DEMO	COUNTRY	N° OF DEMON-STRATION SITE OR PILOTS HOSTED	DESCRIPTION	PROJECT COORDINATED BY
SEHRENE	Demo 1	Belgium	1	High temperature Heat pump	COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES
SEHRENE	Demo 2	France	1	HTHP-ORC-TES system	COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES
SENDER	Demo 1	Spain	1	Alginet pilot site is very much interested in improving the network management through the testing of DR services. Further investigation on the DR mechanisms and end user co-creation will allow Alginet DSO to explore how this affects the grid congestion management and alleviation. On the other hand, the analysis of end users consumption profiles and behaviours will also be very interesting for the Spanish pilot site. This analysis will allow Alginet to investigate better consumption forecasting methods, but at the same time it will be very useful for the end users to implement a behavioural change and start consuming more efficiently.	SMART INNOVATION NORWAY AS
SENDER	Demo 2	Finland	1	The pilot in SENDER is based on existing Smart Otaniemi pilots, called Aggregator Business Pilot and Smart EV Charging, where the focus has been in commercial interfaces between different market operators and business models for them. Within SENDER, this work will be extended towards consumers, developing interfaces for them to give input for AI tools in terms of rules, boundaries, schedules etc, for the tools to be able to predict the flexible capacity available at every moment in the future. The pilot is focusing on EV charging and its role within the demand response value chain. In this context, the pilot site owner will analyze different cases: offices, parking halls, apartments and houses. The purpose is to gather data widely and develop new analysis and forecasting methods on it based on an existing, close collaboration with EV charging operators and users, utilizing their data for this purpose. The final goal is to combine all energy related data into one platform, enabling optimization to a wider extent. Another purpose of the Finish pilot-site activities is to use the SENDER interface for EV charging control. This will mostly/firstly take place on VTT's own premises with charging points used for employees and visitors. An extension to other sites is planned.	SMART INNOVATION NORWAY AS
SENDER	Demo 3	Austria	1	Two hundred households in Weiz will be equipped with a smart meter. Based on the data collected, the main aim is to reduce energy consumption in a smart way. In addition, preferably households with PV systems and electric cars will participate in the project. In this sense, smart charging	SMART INNOVATION NORWAY AS
SENERGY NETS	Demo 1	Italy	1	District heating of Milan	EIFER EUROPAISCHES INSTITUT FUR ENERGIEFORSCHUNG EDF KIT EWIV
SENERGY NETS	Demo 2	Slovenia	1	City of Ljubljana : district heating and distribution grid	EIFER EUROPAISCHES INSTITUT FUR ENERGIEFORSCHUNG EDF KIT EWIV
SENERGY NETS	Demo 3	France	1	Ilôt Gaieté Montaparnassse, ultra low temperature district heating anc cooling	EIFER EUROPAISCHES INSTITUT FUR ENERGIEFORSCHUNG EDF KIT EWIV
SERENE	Demo 1	Denmark	1	Hylke & Låsby villages in Skanderborg Municipality, Denmark plan to turn into "energy islands" & become CO_2-neutral communities The overall objective at the Danish demonstrator is to carry out testing and demonstration activities in close collaboration with the local citizens, property owners, utility providers and other stakeholders to establish the transition of the existing residential heating supply from fossil fuels (natural gas and oil boilers) to heating from heat pumps and increase the self-consumption of renewables. The specific objectives include: - The optimal operation of centrally located intelligent heat pump installations with salt hydrate-based heat storages in the demonstration buildings with photovoltaic installations. - The demonstration of a shared electric vehicle scheme powered by the local photovoltaic installations along with communityscale battery energy storage applying suitable demand response schemes. - Demonstration of different socioeconomic models for owning and operating the community based integrated energy systems at the demonstration sites.	AALBORG UNIVERSITET
SERENE	Demo 2	The Netherlands	1	Houses in harmony with nature: Aardehuizen ("Earthhouses") & Vriendenerf ("Friends' Garden") in Olst, the Netherlands The Dutch demonstrator involves two demonstration sites, the Aardehuizen community with 24 houses and the neighbourhood of Vriendenerf that consists of 12 houses, both in the village of Olst. The overall goal is to implement solutions to enhance the smartening of the electricity grid in the area with electric boilers, electric vehicles, battery storage (Aardehuizen), and heat pumps (Vriendenerf). In addition, the two communities will closely interact and work together to exchange ideas and experiences to realise the targeted	AALBORG UNIVERSITET
SERENE	Demo 3	Poland	1	The agro-touristic municipality of Przywidz in Poland takes the next steps towards becoming a sustainable energy community The Municipality of Przywidz in Northern Poland is home to three cases that form the Polish demonstrator. Each of the cases focuses on a different type of facility and on different opportunities. The first is a household district where the high number of photovoltaic installations negatively influence the local low voltage grid. The second case is ARENA Przywidz - a school and sport centre complex, where an energy management system that combines heat pumps, energy storage and EV chargers will be installed and tested to improve the power profile of the facility and the auto-consumption from the PV. The last use case researches the potential of using energy management of the new sewage treatment plant to provide new services to the grid (e.g. DSR – Demand Side Response). The specific objectives are: - Installation of measurement and instrumentation systems at various consumer and building premises to conduct data analytics of heat and electricity profiles and other relevant parameters for flexibility estimation and upgradation needed for integrated local energy systems. - The implementation of smart control and operation of integrated solutions of heat pumps, energy storages (battery, heat exchangers) to increase the shares of PV generation at the energy complexes and buildings involved in the demonstration. The technoeconomic impacts on the local electricity grid will also be analysed. - Demonstration of flow battery storage and public EV charging stations (some with vehicle-to-grid possibility) at the school facilities, and testing of smart control with	AALBORG UNIVERSITET
SHIFT2DC	Demo 1	Germany	2	Testing innovative DC solutions in data centers. Activities include design, simulation, installation, operation, and analysis of results to enhance efficiency and reliability. Implementing DC solutions in industrial settings. Tasks include design, simulation, installation, operation, and analysis with hardware-in-the-loop testing for accurate representation of real-world systems.	INESC ID - INSTITUTO DE ENGENHARIADE SISTEMAS E COMPUTADORES, INVESTIGACAO E DESENVOLVIMENTO EM LISBOA

PROJECT	DEMO	COUNTRY	N° OF DEMON-STRATION SITE OR PILOTS HOSTED	DESCRIPTION	PROJECT COORDINATED BY
SHIFT2DC	Demo 2	France	1	Demonstrating DC distribution solutions in a mixed-use building complex. Focus on design, simulation, installation, operation, and analysis to optimize energy usage and grid interaction.	INESC ID - INSTITUTO DE ENGENHARIADE SISTEMAS E COMPUTADORES, INVE-STIGACAO E DESENVOLVI-MENTO EM LISBOA
SHIFT2DC	Demo 3	Portugal	1	Developing a digital twin for port operations. Tasks involve design, installation of monitoring systems, digital twin simulation platform development, and analysis to optimize energy usage and services to the grid.	INESC ID - INSTITUTO DE ENGENHARIADE SISTEMAS E COMPUTADORES, INVE-STIGACAO E DESENVOLVI-MENTO EM LISBOA
SiC4GRID	Demo 1	Denmark	1	Modular Multilevel Converter (MMC) test bench integration SiC4GRID SiC-based power modules and IoT architecture	VRIJE UNIVERSITEIT BRUSSEL
SiC4GRID	Demo 2	Belgium		Project demo site	VRIJE UNIVERSITEIT BRUSSEL
SINNOGENES	Demo 1	Portugal, Maia	2	Optimal Industrial Microgrid Planning and Operation: Focuses on maximizing renewable energy use, minimizing costs, and reducing CO2 emissions in an industrial microgrid. • Management of Hybrid Storage Technologies: Aims to efficiently manage various storage technologies in an industrial microgrid to provide flexibility services.	UNISYSTEMS LUXEMBOURG SARL
SINNOGENES	Demo 2	Spain, Soria	2	Increasing Operation Efficiency of District Heating and Cooling Systems: Tests different storage technologies under real conditions to enhance district heating and cooling system efficiency. Provision of Fast Flexibility Services from Distributed Energy Storage Technologies:	UNISYSTEMS LUXEMBOURG SARL
SINNOGENES	Demo 3	Spain, Walqa Technology Park	1	Flexibility Services Provision in a Local Energy Community Leveraging Power- to-Gas Potential: Uses electrolysers and EV chargers to increase/decrease power, providing flexibility to the community.	UNISYSTEMS LUXEMBOURG SARL
SINNOGENES	Demo 4	Germany, Herzberg	2	Optimal Operation of Industrial Facility Considering Integrated Heat and Electricity Storage: Focuses on controlling facilities to minimize excess energy production. • Raising Awareness in the Local Community for Possibilities Offered from Local RES: Acts as a lighthouse example for promoting decarbonization initiatives in the region/community.	UNISYSTEMS LUXEMBOURG SARL
SINNOGENES	Demo 5	Greece, Ikaria	1	Planning of Islands Interconnection Utilizing the Potential of Hydro-Pumped Storage: Examines the potential interconnection of neighboring islands using the capabilities of digital twinning.	UNISYSTEMS LUXEMBOURG SARL
SINNOGENES	Demo 6	Switzerland, Geneva	3	Ensuring Energy Storage and Distribution of Hydrogen to Mobility Infrastructure: Utilizes smart grid management tools for automated refueling and secure storage/distribution of hydrogen. • Providing Energy Minimization Services in Integrated Hydrogen Energy Storage Systems: Uses AI-based forecasting and monitoring for minimizing energy consumption in integrated hydrogen energy storage systems. • Innovative Business Cases of Energy Storage in the Entire Transport Network: Demonstrates successful business cases and systems for energy storage integrated solutions in different mobility environments (freight, urban).	UNISYSTEMS LUXEMBOURG SARL
SMHYLES	Demo 1	Portugal	2	#1: In Maia, the pilot will be installed in a Sonae Compus business park. The campus counts with a relevant PV productions, this demonstrating sit is expected to be able to demonstrated sce-narios of how the new AHESS could support optimal energy management withing the charging infrastructure, effective arbitrage activity and energy bill savings. #2 In Graciosa Island, the piltos is expected to demonstrate the feasibility of integrating different technologically energy storage systems units (hybrid solutions) that may bring additional safety and resilience to the island grid when operating at 1% with renewables, preventing load shedding events.	FONDAZIONE BRUNO KESSLER
SMHYLES	Demo 2	Germany	1	Fraunhofer ICT - Pfinztal, Germany. The demo will implemented as a storage extension which can provide new weekly flexibility to even out seasonal imbalances in geration in a Monday-Fri-day operation of factories and other businesses.	FONDAZIONE BRUNO KESSLER
STORE2HYDRO	Demo 1	Sweden	1	Retrofitable reversible pump turbine technology prototype testing at existing high head Reser-voir-to-Reservoir (RtR) and low head Run-of-River (RoR) hydropower facilities.	LULEA TEKNISKA UNIVER-SITET
STORE2HYDRO	Demo 2	Norway	1	Identification and characterization of untapped hydropower sources for electricity storage feasibility testing.	LULEA TEKNISKA UNIVER-SITET
STORE2HYDRO	Demo 3	Austria	1	Initial implementation and testing of digital twin tools for hydraulic and sediment dynamics analysis in pump-turbine retrofitting.	LULEA TEKNISKA UNIVER-SITET
STORE2HYDRO	Demo 4	Italy	1	Preliminary economic assessment and feasibility study of components for pump-turbine retro-fitting in existing hydropower facilities.	LULEA TEKNISKA UNIVER-SITET
STREAM	Demo 1	Spain	1	Crevillent is a Spanish municipality of 29, inhabitants located in the south of the province of Alicante in the Valencia Region. Enercoop Group (ENER) is an electric cooperative organization located there owned by 11, members. The cooperative has presence in practically the entire value chain of the electricity sector: • Production of 1% renewable energy, • Distribution to the municipality of Crevillent (Alicante – Spain), • Electricity supplier within and outside the muni-cipality, • Representative agent in the electricity market for renewable production facilities and • Group of energy purchases for other electricity supplier companies. GOALS Create an energy community that is able to provide system services to the grid operator. Develop a prequalifica-tion system to have a reliable flexibility assets portfolio Create a platform for grid monitoring and load forecasting for better utilisation of flexibility assets Install a BESS to improve voltage conditions and provide energy flexibility services Use machine learning algorithms to recognize the effectiveness of assets utilization.	UNIVERZA V LJUBLJANI
STREAM	Demo 2	Italy	1	Italian pilot site Terni, a city in the central Italy close to Rome with the population of 111,5 people, will shape energy communities, their operation and management, with an end goal to manage flexibility assets at local level and on a smaller scale. With such system the com-munity-level energy consumption will be lower and flexibility trading will be optimized for the benefits of the community members and to support improved operation of electricity grid. GO-ALS Manage community-level energy consumption, flexibility optimization, and trading for the benefit of community members. Utilise flexibility assets to improve electricity grid operation. Equip multi-apartment residential buildings with IoT-based smart meters and smart plugs for home device automation and flexible devices retrofitting. Develop dedicated apps to commu-nity members for taking full control of the flexibility of their assets. Remotely control water pumping stations in an automated to optimise energy consumption and cost without affecting the end user's comfort. Incorporate decentralized RES generation, battery storage, controllable loads, and EV charging stations in the	UNIVERZA V LJUBLJANI

PROJECT	DEMO	COUNTRY	N° OF DEMON-STRATION SITE OR PILOTS HOSTED	DESCRIPTION	PROJECT COORDINATED BY
STREAM	Demo 3	Finland	1	The Finish pilot site is an office building with 7 companies with around 12 employees ever day present at the facility. The building is already equipped with: • Building automation (KNX-based system, lightning, heating, air condition, etc...) • Geothermal heating system • One smart grid connection to substation and multiple energy consumption usage points measurement. Smart meters measuring active and reactive power data on 1 hour resolution, are in place in each energy usage points for energy consumption, which are connected behind smart grid connection point. • 4 kWp Solar energy system (electricity production for main building energy usage purposes), measured 5-3 seconds to 1 hour profile • 4 EV-charging stations • Reserve power (one diesel generator). GOALS Create different types of energy communities for office, industrial and residential buildings. Optimize heating control systems to consume less power without effecting end users. Install a community battery system to reduce energy cost and consumption. Combine PVs and heating control systems to support flexibility and energy usage. Create a sophisticated energy metering system for remote reading and data analytics to optimize energy usage	UNIVERZA V LJUBLJANI
STREAM	Demo 4	Slovenia	1	The Slovenian pilot site encompasses an industrial park in the town of Ajdovščina, located in the south-western part of Slovenia. It comprises approximately 34 industrial and commercial buildings connected to the power network managed by the DSO Elektro Primorska (STREAM partner EPR). GOALS Create a platform to aggregate flexibility sources (e- mobility infrastructure and industrial). Develop and implement a Device Register to enable a digital specification of various flexibility assets. Establish a prequalification protocol to validate and verify flexibility assets. Model 3-phase electrical topology of LV distribution networks to improve forecasting capabilities, asset utilization and lifespan. Deploy a simplified plug-and-play system to monitor flexibility assets. Develop and deploy a system for managing the distribution network by using flexibility assets. Develop a system for DSO-TSO (transmission system operator) cooperation to provide the possibility of utilising flexibility assets for ancillary services.	UNIVERZA V LJUBLJANI
SUDOCO	Demo 1	Italy	1	We will test advanced wind farm controllers in the wind tunnel in Milan	TECHNISCHE UNIVERSITEIT DELFT
SUDOCO	Demo 2	Netherlands	1	We will use data from the Hollandse Kust Noord wind farm (innovative wind farm)	TECHNISCHE UNIVERSITEIT DELFT
SUREWAVE	Demo 1	Norway	1	The project ends at TRL 5, so no pilot	SINTEF AS
SUREWAVE	Demo 2	Germany	1	The project ends at TRL 5, so no pilot	SINTEF AS
SUSTENANCE	Demo 1	Denmark	1	VOERLADEGÅRD WILL SHOW THE WAY FROM HEATING WITH NATURAL GAS TO BECOMING A CO2 NEUTRAL VILLAGE". The demonstrator in Denmark are the villages of Voerladegård and Dørup located in the Skanderborg Municipality. There are around 6 residents, living mostly in villas and a few in townhouses. The houses are currently heated by individual gas boilers. The demonstration activities aim to integrate electricity generated from renewable energy sources (RES) into the local power grid and the household heating systems. The existing gas boiler heating systems will be replaced with heat pumps (HP) and the photovoltaics (PV). Heat pump control systems will be coordinated in relation to electrical vehicle (EV) charging in some houses. These activities are to be demonstrated with the close cooperation and active participation of the local citizens, municipality, energy stakeholders and local industries. They will include the use of smart control and ICT technologies to smarten the energy networks to increase the selfconsumption of solar PV and wind power supplied from the external grid.	AALBORG UNIVERSITET
SUSTENANCE	Demo 2	The Netherlands	1	UNIVERSITY OF TWENTE & OLST COMMUNITIES AIM TO BE INDEPENDENT BY SMART ENERGY SHARING". The Dutch demonstrator involves two small living labs equipped with various types of flexible appliances, storage options, PV generation and an electric vehicle charging station. The ultimate goal is to operate the living lab (almost) autarkic from the main utility grids. Furthermore, an energy cooperative in the region, which strives for energy autarky, will be involved.	AALBORG UNIVERSITET
SUSTENANCE	Demo 3	Poland	1	MICKIEWICZA HOUSING ASSOCIATION IN SOPOT TAKES ITS FIRST STEPS TOWARDS A SUSTAINABLE ENERGY SYSTEM AND AIMS TO SET-UP A LOCAL ENERGY COMMUNITY. The Polish demonstrator is located in Sopot resort on the Polish coast. The buildings are owned by Mickiewicza Housing Association (WSM), and demo consists of 5 multi-family blocks of flats (each approx. 34m2), with 1 floors and 77 apartments in each block. Some residents are apartment owners, but a large proportion are tenants. The buildings are powered by traditional energy system. Therefore, the modernisation of the transformer station and integration of new energy technologies in the local	AALBORG UNIVERSITET
SUSTENANCE	Demo 4	India	3	1st INDIAN DEMO: BARUBEDA VILLAGE AIMS AT BECOMING A CARBON NEUTRAL "ISLANDED" ENERGY COMMUNITY. In Barubeda Village, the core income source of villagers is agriculture. There is limited access to water in general, and clean water in particular. The inhabitants (mostly women) have to fetch water manually since there is no water pumping system, mainly due to the lack of electricity. Firewood is primarily used for cooking, and kerosene based lamps for lighting.The village does not have access to public transportation, and thus the inhabitants walk over 3 kms to reach the nearest road. For several months in a year, the men migrate to the city for work. Since the village is in dire need for a stable energy supply, the inhabitants are keen to establish a local sustainable energy system.The objectives of SUSTENANCE in Barubeda Village are to deliver a sustainable clean local Energy system for the remote off-grid village; to improve the living standards of the villagers by providing reliable electricity access, e-rickshaw based green transportation, reliable water supply - all of which will contribute to improving their socioeconomic status. 2nd INDIAN DEMO: BORAKHAI VILLAGE AIMS AT DELIVERING SMART CLUSTERS BASED ON A LOCAL ENERGY SYSTEM POWERED BY RENEWABLES. Borakhai Village is partly electrified, albeit sporadically. In general, the residents are getting electricity for only one third of a day.The villagers do not have access to a clean and reliable domestic water supply. Moreover, while some families have a gas (LPG) connection, firewood is primarily used for cooking. Kerosene -based lamps are used for lighting. The residents have very limited access to an unreliable public transport system.The objectives of SUSTENANCE in Borakhai Village, are to deliver a sustainable and reliable local energy system, and in general, to improve the living standard of the inhabitants by providing access to electricity, e-rickshaw mobility, reliable water supply, waste treatment plant, and thus providing a scope for improving their socio-economic status. In both rural sites the added value is to also improve the healthcare and education system thereby empowering women and children.The objectives of SUSTENANCE in Borakhai Village, are to deliver a sustainable and reliable local energy system, and in general, to improve the living standard of the inhabitants by providing access to electricity, e-rickshaw mobility, reliable water supply, waste treatment plant, and thus providing a scope for improving their socio-economic status. In both rural sites the added value is to also improve the healthcare and education system thereby	AALBORG UNIVERSITET
SYNERGIES	Demo 1	Spain	1	The demonstrator site in Spain focuses on implementing the reference Energy Data Space, serving as a testing ground for data-driven innovation and sharing potential across the energy data value chain.	DEEP BLUE SRL

PROJECT	DEMO	COUNTRY	N° OF DEMON-STRATION SITE OR PILOTS HOSTED	DESCRIPTION	PROJECT COORDINATED BY
SYNERGIES	Demo 2	Greece	1	The pilot in Greece aims to demonstrate the effectiveness of the Energy Data Space implementation in a diverse energy market context, showcasing its potential for promoting data-driven optimization and coordination among energy stakeholders.	DEEP BLUE SRL
SYNERGIES	Demo 3	Netherlands	1	The Netherlands hosts a demonstrator site to validate the functionalities and interoperability of the Energy Data Space in a real-world energy environment, emphasizing its role in enhancing efficiency and inclusiveness in market transactions.	DEEP BLUE SRL
SYNERGIES	Demo 4	Finland	1	Finland's pilot project aims to assess the scalability and adaptability of the Energy Data Space implementation, highlighting its ability to integrate heterogeneous energy systems and diverse socio-economic characteristics for improved energy management and coordination.	DEEP BLUE SRL
THUMBS UP	Demo 1	Germany	2	Demonstrator sites aimed at showcasing thermal energy storage solutions integrated into buildings for increased energy efficiency and grid flexibility.	VEOLIA SERVICIOS LECAM SOCIEDAD ANONIMA UNI-PERSONAL
THUMBS UP	Demo 2	Italy	1	Demonstrator site focused on implementing thermal energy storage solutions in residential buildings to optimize energy usage and enhance grid balancing capabilities.	VEOLIA SERVICIOS LECAM SOCIEDAD ANONIMA UNI-PERSONAL
THUMBS UP	Demo 3	Spain	1	Demonstrator site dedicated to testing and validating thermal energy storage systems within residential buildings to maximize energy efficiency and support grid flexibility initiatives.	VEOLIA SERVICIOS LECAM SOCIEDAD ANONIMA UNI-PERSONAL
THUMBS UP	Demo 4	Netherlands	1	Demonstrator sites aimed at deploying and evaluating thermal energy storage solutions in residential buildings to improve energy management and facilitate grid integration.	VEOLIA SERVICIOS LECAM SOCIEDAD ANONIMA UNI-PERSONAL
TIGON	Demo 1	France	1	The pilot is located at CEA INES platform in France, which is a is a large research infrastructure based at INES, the French Institute for Solar Energy.To cover the activities of TIGON project, the following facilities of the INES platform will be used: PV module facilities, Electronic facilities, Smart grid facilities.	FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS
TIGON	Demo 2	Spain	1	The pilot is located at The Centre for the Development of Renewable Energy Sources (CIEMAT), a Spanish centre for the research, development and promotion of renewable energy sources which belongs to CIEMAT.Starting from one of the secondary substations available at CIEMAT, TIGON will build a DC-based grid architecture connected through a Solid State Transformer developed during the project	FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS
TranSensus LCA	Demo 1	Germany	2	Demonstrator site focused on testing grid technologies and large-scale energy storage solutions in urban areas. Demonstrator site aimed at evaluating distributed energy storage technologies in rural communities.	FRAUNHOFER GESEL-LSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV
TranSensus LCA	Demo 2	France	1	Demonstrator site for testing grid technologies and digitalization solutions in a suburban setting.	FRAUNHOFER GESEL-LSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV
TranSensus LCA	Demo 3	Sweden	1	Demonstrator site focusing on the integration of distributed energy storage technologies in a remote village.	FRAUNHOFER GESEL-LSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV
TwinEU	Demo 1	Spain	1	security and resilience of the electricity system	FRAUNHOFER GESEL-LSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV
TwinEU	Demo 2	Greece, Cyprus	1	interconnection of digital twins between the mainland and Greece's main insular power system (Crete), as well as the islanded Cyprus power system	FRAUNHOFER GESEL-LSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV
TwinEU	Demo 3	Hungary	1	Digital twin-based based ANN conductor temperature monitoring. Co-optimisation algorithm with dynamic transmission line ampacity and intraday products	FRAUNHOFER GESEL-LSCHAFT ZUR FORDERUNG DER ANGEWANDTEN
TwinEU	Demo 4	Bulgaria	1	evolution of the existing solutions to offer the adequate responses to resilience, proactivity and robust design	FRAUNHOFER GESEL-LSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV
TwinEU	Demo 5	Germany	1	Observability, Controllability & Real-Time Monitoring: Active System Management and forecasting to support flexibility and demand response	FRAUNHOFER GESEL-LSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV
TwinEU	Demo 6	Italy	1	Multi-actor interplay over interconnected transmission and distribution systems with large penetration of renewable energy sources Demonstrated collaboration among DSOs, TSOs and Market parties on the immersive environment for the Digital Twinning as validation tool	FRAUNHOFER GESEL-LSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV
TwinEU	Demo 7	Slovenia	1	Upgrade the existing network operation and stability management process. New fast-frequency response service	FRAUNHOFER GESEL-LSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV
TwinEU	Demo 8	Nl/ France	1	development of the Control Room of the Future (CRoF) for transmission and distribution system operators	FRAUNHOFER GESEL-LSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV
WEDUSEA	Demo 1	United Kin-gdom	1	Grid connected 1MW OE35 floating wave energy converter at the European Marine Energy Centre (EMEC) in Orkney, Scotland.	NEW WAVE TECHNOLOGIES LIMITED
WEDUSEA	Demo 2	Ireland	1		NEW WAVE TECHNOLOGIES LIMITED

PROJECT	DEMO	COUNTRY	N° OF DEMON-STRATION SITE OR PILOTS HOSTED	DESCRIPTION	PROJECT COORDINATED BY
WeForming	Demo 1	Greece	1	Implementation of energy management systems and technologies	EUROPEAN DYNAMICS ADVANCED INFORMATION TECHNOLOGY AND
WeForming	Demo 2	Luxembourg	1	Testing innovative energy solutions in building settings	EUROPEAN DYNAMICS ADVANCED INFORMA-TION TECHNOLOGY AND TELECOMMUNICATION SYSTEMS SA
WeForming	Demo 3	Belgium	1	Deployment of energy-efficient technologies in buildings	EUROPEAN DYNAMICS ADVANCED INFORMA-TION TECHNOLOGY AND TELECOMMUNICATION SYSTEMS SA
WHEEL	Demo 1	Spain	1	6MW Pilot unit, to be installed in a deep-water location in the PLOCAN testing area (Canary Islands, Spain),	ESTEYCO SA
WILLOW	Demo 1	Spain	1	Continuous monitoring of pitted samples	ASOCIACION CENTRO TECNOLOGICO CEIT
WILLOW	Demo 2	Belgium	1	Corrosion and coating degradation evaluation	ASOCIACION CENTRO TECNOLOGICO CEIT
WILLOW	Demo 3	Belgium	1	Farmwide data-driven lifetime assessment models	ASOCIACION CENTRO TECNOLOGICO CEIT
WILLOW	Demo 4	Spain	1	Drone-based inspections to get data for AI damage classification	ASOCIACION CENTRO TECNOLOGICO CEIT
XL-Connect	Demo 1	Belgium	1	Demonstration of a DC-microgrid based, high power (hundreds of kW), fast charging infra-structure with bidirectional power flow between mains and microgrid • Demonstration of integration between local storage (possibly feeded by renewable energy sources) based on lithium batteries, electric vehicles and electricity grid • Demonstration of reduction of power and energy flows from the mains while keeping high output power and high	VIRTUAL VEHICLE RESEAR-CH GMBH
XL-Connect	Demo 2	Germany	1	Demonstrate the potential of vehicle to grid to support the gridwhile satisfying the needs of the end user. This means that a load management will be established which takes into account incentives or power demands from the grid as forecasts and the departure time of the user and coordinates between these two agents. Demo aspects: Private demosite, Cities with Low parking availability, Light vehicles, DC charging, V2G, Optimisation for prosumer.	VIRTUAL VEHICLE RESEAR-CH GMBH
XL-Connect	Demo 3	Italy	2	Demonstration of a DC-microgrid based, high power (hundreds of kW), fast charging infra-structure with bidirectional power flow between mains and microgrid • Demonstration of integration between local storage (possibly feeded by renewable energy sources) based on li-thium batteries, electric vehicles and electricity grid • Demonstration of reduction of power and energy flows from the mains while keeping high output power and high number of DC outlets. Demonstrate applicability of V1G or V2G solutions in the context of a public area (university campus) • Optimize and/or reduce global exchanges with the grid coordinating different energy production, energy storage (including second-life batteries) and energy use locations • Assess potential benefits for the mobility and energy management (university offices) using economic and environmental indicators.	VIRTUAL VEHICLE RESEAR-CH GMBH
XL-Connect	Demo 4	Portugal	3	Explore EVs' usage patterns at the individual and at the businesses' level in order to understand grid impacts and flexibility needs, making use of clustering and forecasting techniques sup-ported by data to be collected in the demonstration, and extrapolated to address large scale EV adoption future scenarios • Demonstrate the potential of combined approaches between system and EV charging needs, in different timeframes, ranging from planning activities to real time operation • Ensure interoperability through the further development of the UMEI concept, to ensure the open communication between system operators and smart charging related en-tities/devices to foster neutral market developments and a broader range of options that serve the user as well as the system needs	VIRTUAL VEHICLE RESEAR-CH GMBH

GETTING IN TOUCH WITH THE EU

In person

All over the European Union there are hundreds of Europe Direct information centres. You can find the address of the centre nearest to you at: https://europa.eu/european-union/contact_en

On the phone or by email

Europe Direct is a service that answers your questions about the European Union. You can contact this service:

- by freephone: 00 800 67891011 (certain operators may charge for these calls),
- at the following standard number: +32 22999696
- by email via: https://europa.eu/european-union/contact_en

FINDING INFORMATION ABOUT THE EU

Online

Information about the European Union in all the official languages of the EU is available on the Europa website at: https://europa.eu/european-union/index_en

EU publications

You can download or order free and priced EU publications from: https://op.europa.eu/en/publications. Multiple copies of free publications may be obtained by contacting Europe Direct or your local information centre (see https://europa.eu/european-union/contact_en).

EU law and related documents

For access to legal information from the EU, including all EU law since 1952 in all the official language versions, go to EUR-Lex at: http://eur-lex.europa.eu

Open data from the EU

The EU Open Data Portal (http://data.europa.eu/euodp/en) provides access to datasets from the EU. Data can be downloaded and reused for free, for both commercial and non-commercial purposes.

Publications Office
of the European Union

The Service Contract (n. CINEA/2023/OP/0001/SI2.901723) supports BRIDGE activities, funded by the EU.