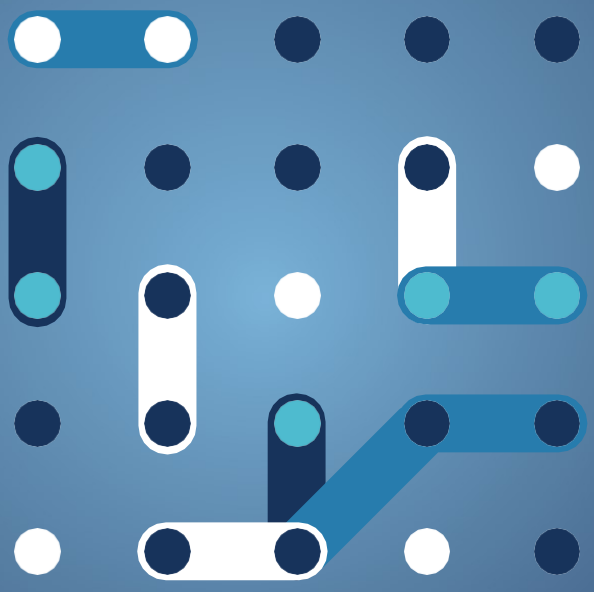
European Commission

bridge

2021 BROCHURE

The BRIDGE initiative and project fact sheets.



September - 2021

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BRIDGE

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

2021 BROCHURE

September 2021

LEGAL NOTICE

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1. Foreword

In July 2021, the Council's and the European Parliament's reached a political agreement setting into law the objective of a climate-neutral EU by 2050, and a collective, net greenhouse gas emissions reduction target of at least 55% by 2030 compared to 1990.

To reach these ambitious objectives, the European Commission has updated its climate and energy policy framework in the "fit-for-55" climate package. This package contains policy measures to reach the EU targets, including the revision of the Energy Efficiency and Renewable Energy Directives. Moreover, the European Commission proposed a Path to the Digital Decade, a concrete plan to achieve the digital transformation of our society and economy by 2030. This will pave the way for the ongoing twin digital and green transformation of the energy sector to benefit from state-of-the-art digital solutions with lower environmental footprint and higher energy and material efficiency, leading to a more resilient, efficient and greener energy system.

Translating these ambitions into reality and successfully completing the digitally enabled energy transition requires the engagement of all market actors and policy makers, including citizens. The EU Multiannual Financial Framework for the next 7 years and the new recovery instrument will provide an unprecedented opportunity to support them. A total EU budget of EUR 1.8 trillion has been agreed. This is the largest EU budget ever in the EU. It will help rebuilding a post-COVID Europe, which is greener, more digital and more resilient. At least 30% of the funds will be spent on fighting climate change, which represents the highest share ever.

The EU's increased ambition will spur sustainable economic growth, create jobs, deliver health and environmental benefits for EU citizens, and contribute to the long-term global competitiveness of the EU economy by promoting innovation in green and digital technologies.

It will not be possible to achieve the EU overarching ambitions without a smarter and digitalized energy system enabling dynamic and interlinked flows of energy, allowing for more diverse markets, and creating flexibility required for the integration of higher shares of renewables in an efficient way. Ensuring the integrity and resilience of the data infrastructure, networks, and communications as a basis for the European technological and data sovereignty and compliance to policies on data protection and data governance are also needed to reach the energy policy targets.

The BRIDGE initiative – that started with Horizon 2020 and continues now under Horizon Europe, the biggest Research and Innovation funding programme ever supported - unites R&I projects in the areas of smart grid, energy storage, islands, and digitalization to create a structured view of cross-cutting issues encountered in the demonstration projects. It aims to foster knowledge sharing among projects as well as a dialogue between innovation and market regulation, through different Working Groups. The goal is to increase the impact that projects have to speed up the energy transition.

The initiative was launched in 2015 and since then 90 projects, from which 58 are ongoing, have been actively involved. So far, these projects received around EUR 1 billion of EU support. Altogether, they involve close to 1000 organizations from 40 countries. The initiative also facilitated the drafting of dedicated policy and technical reports, policy feedback discussions, and webinars.

We welcome this brochure of BRIDGE projects, which provides a very good overview of the technologies and innovations, the projects' partners, and the geographical coverage. We look forward to welcoming new projects when they start, thus making it a living platform. Please also keep an eye on the website for the most up-to-date information. **Enjoy the reading!**

Vincent Berruto

Head of Unit for "Innovation, Research, Digitalisation, Competitiveness", Directorate General 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 "Energy Research and Innovation Fund", European Climate, Infrastructure and Environment Executive Agency, European Commission

1. Introduction to the BRIDGE initiative

1.1 Purpose of the initiative

BRIDGE is a cooperation group involving 90 projects (58 ongoing) in the areas of Smart Grid, Energy Storage, Islands, and Digitalisation funded under the Horizon 2020 program over the last 6 years (2014-2020). It aims at fostering the exchange of information, experience, knowledge, and best practices among its members.

BRIDGE wants to provide field experience, feedback and lessons learned from the participating projects to help overcome the barriers to effective innovation. It aims at gathering coordinated, balanced and coherent recommendations to strengthen the messages and maximize their impacts towards policy makers in view of removing barriers to innovation deployment.

1.2 BRIDGE Working Groups

This cooperation group involves four different types of activities (Working Groups) addressing cross-cutting issues enlisted as follows:

Data Management

- **Communication Infrastructure**, embracing the technical and non-technical aspects of the communication infrastructure 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

Regulatory aspects concerning integration and harmonisation aspects of market design:

- Harmonisation at the level of products and services, including the role of energy communities as service provider.
- Cross-border and regional cooperation.
- Integration of market -based and non-market-based flexibility mechanisms.
- Coordinated flexibility markets for system services.

Consumer and Citizen Engagement

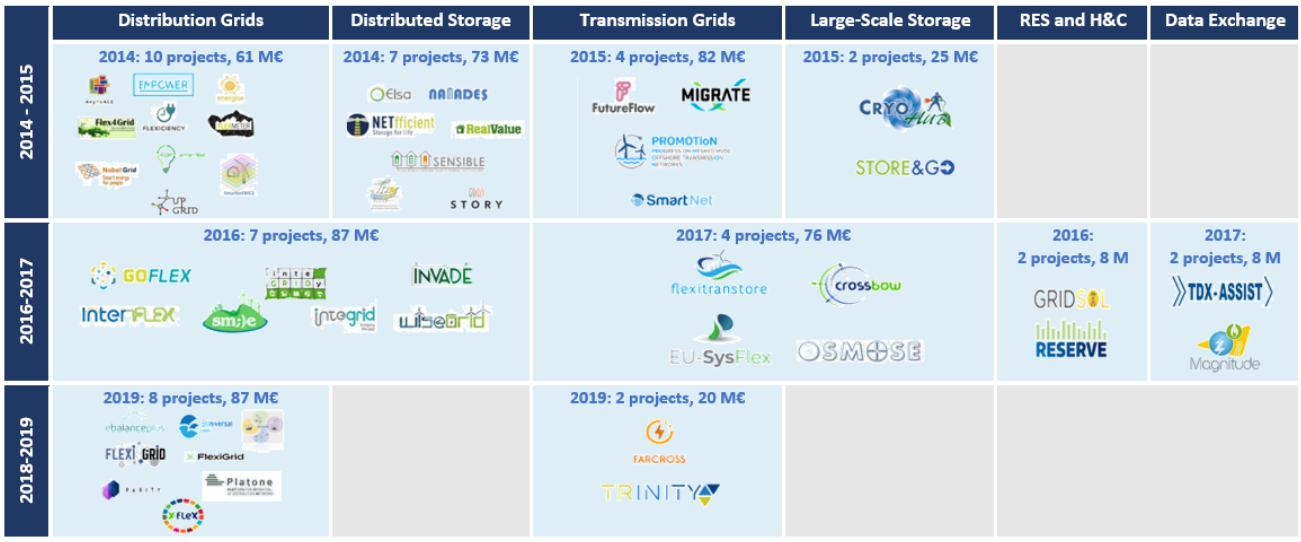
- Segmenting, analysis of cultural, geographical and social dimensions,
- Value systems - Understanding Consumers
- Drivers for Engagement
- Effectiveness of Engagement Activities
- Identification of what triggers behavioural changes (e.g., via incentives)
- The Regulatory Innovation to Empower Consumers

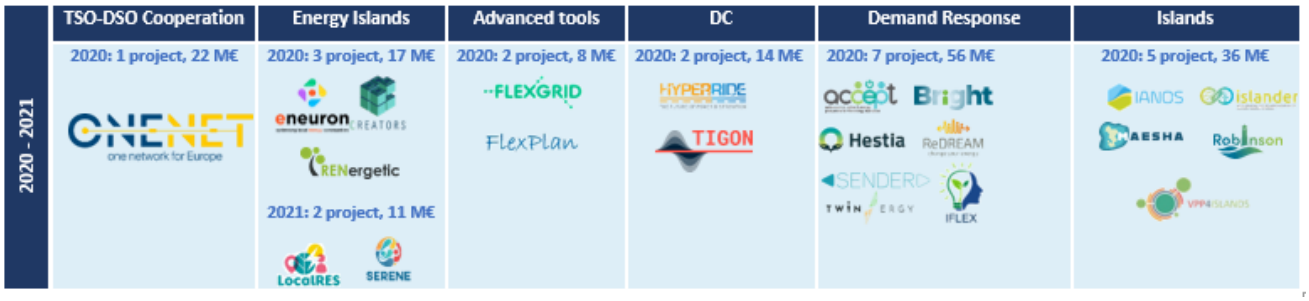
Business Models

- Defining common language and frameworks around **business model description and valuation**
- Identifying and evaluating **existing and new or innovative business models** from the project demonstrations or use cases

2. Overview of the BRIDGE projects

In April 2021, BRIDGE gathers a total of 88 projects, involving **1009 organisations** from 40 countries for a total **EC funding to all projects of 846 M€**.





2.1 Stakeholders involved in BRIDGE projects

Different types of stakeholders are participating in the BRIDGE initiative.

Consumers include residential, professional and industrial consumers, as well as cities acting as consumers in projects.

Regulated Operators are TSOs and DSOs as defined by the Electricity Directive.

Regulators are the National Regulatory Authorities as defined by the Electricity Directive.

Local Energy Communities are defined as associations, cooperatives, partnerships, non-profit organisations or other legal entities which are effectively controlled by local shareholders or members, generally value rather than profit-driven, involved in distributed generation and in performing activities of a distribution system operator, supplier or aggregator at local level, including across borders.

Power technology providers are hardware manufacturers for power transmission, distribution and generation technologies. **Storage providers** are considered in a separate category (all storage technologies are considered, including batteries from EVs and hot water tanks). **ICT providers** are software and telecommunication vendors.

Research & Innovation stakeholders include research centres, universities, think-tanks, consultants and other services.

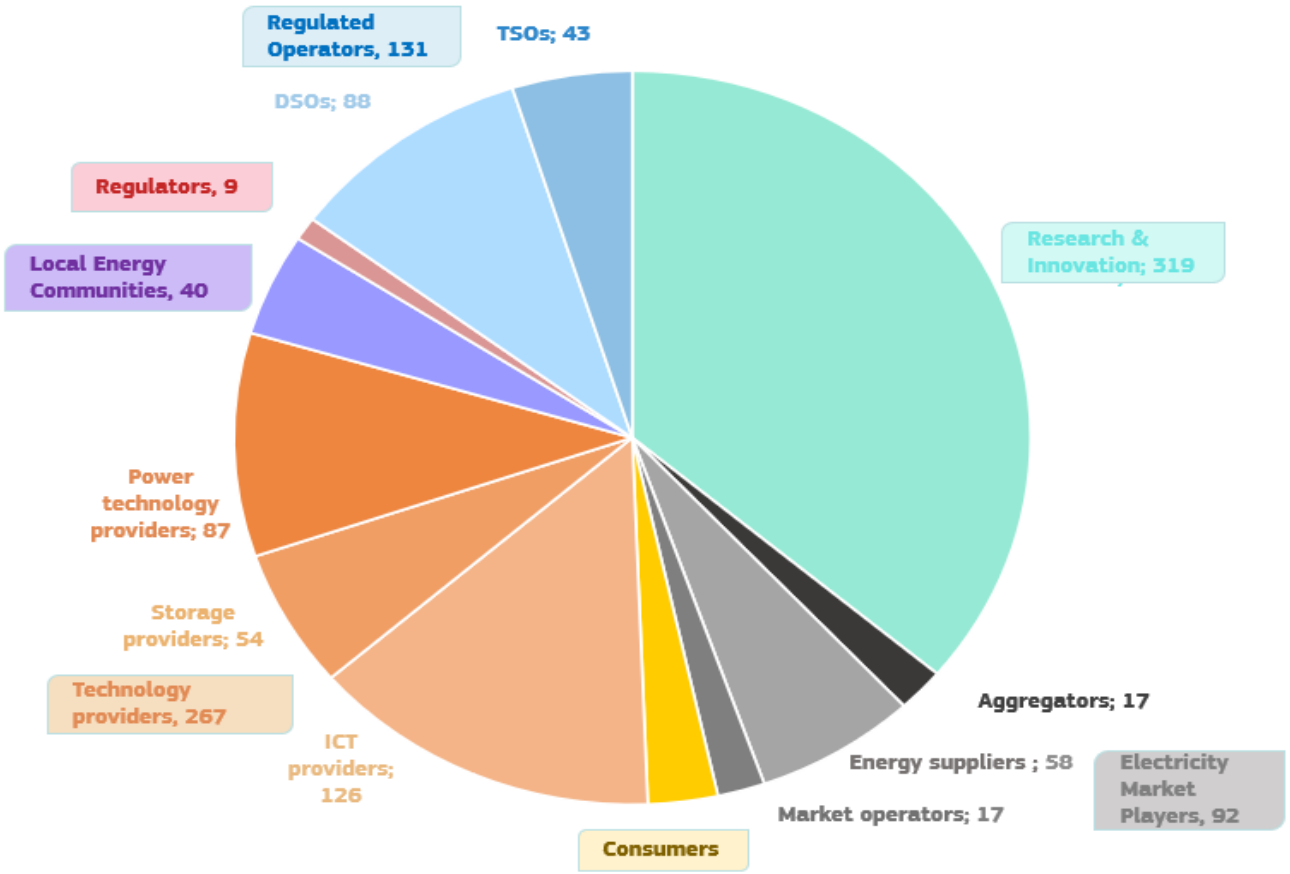
Energy Suppliers include power generators, retailers, energy service companies (ESCOs) acting in the competitive energy market. **Aggregators** are market participants that combine multiple customer loads or generated electricity for sale, for purchase or auction in any organised energy market. **Market operators** include power exchanges, brokers and traders on the energy markets.

Others is a category that covers stakeholders that do not fall in any of the above-defined categories such as international organisations, communication agencies, water supply operators...

Some stakeholders fall into several categories: electricity operators on islands for instance, act both as energy suppliers and DSOs; some power technology providers sell ICT tools and storage devices.

The following diagram categorises stakeholders according to their dominant role within the BRIDGE projects, as seen by the project coordinators:

- Around 66% of the regulated operators are DSOs and almost 34% are TSOs.
- Technology providers comprise 30% power technology providers, 23% storage providers and 47% ICT providers.
- Energy suppliers constitute the main electricity market players involved in BRIDGE projects followed by aggregators and market operators.
- Research and Innovation actors are the dominant category of stakeholders in BRIDGE projects.



2.2 Geographical distribution of BRIDGE projects

2.2.1 Geographical distribution of stakeholders

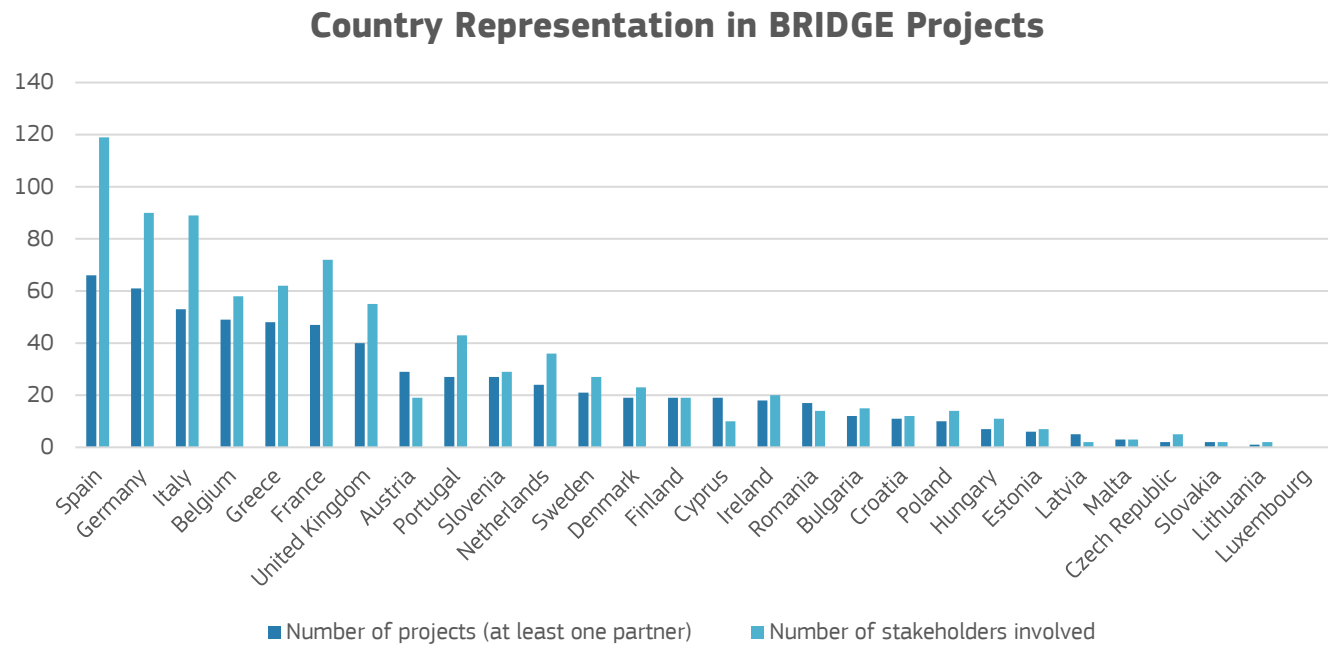
BRIDGE projects involve stakeholders from 40 countries as presented by the figure below.

- The number of projects per country is calculated based on the stakeholders involved in ended and ongoing projects.
- The number of stakeholders involved per country corresponds to the total number of partners from this country in all the BRIDGE projects.

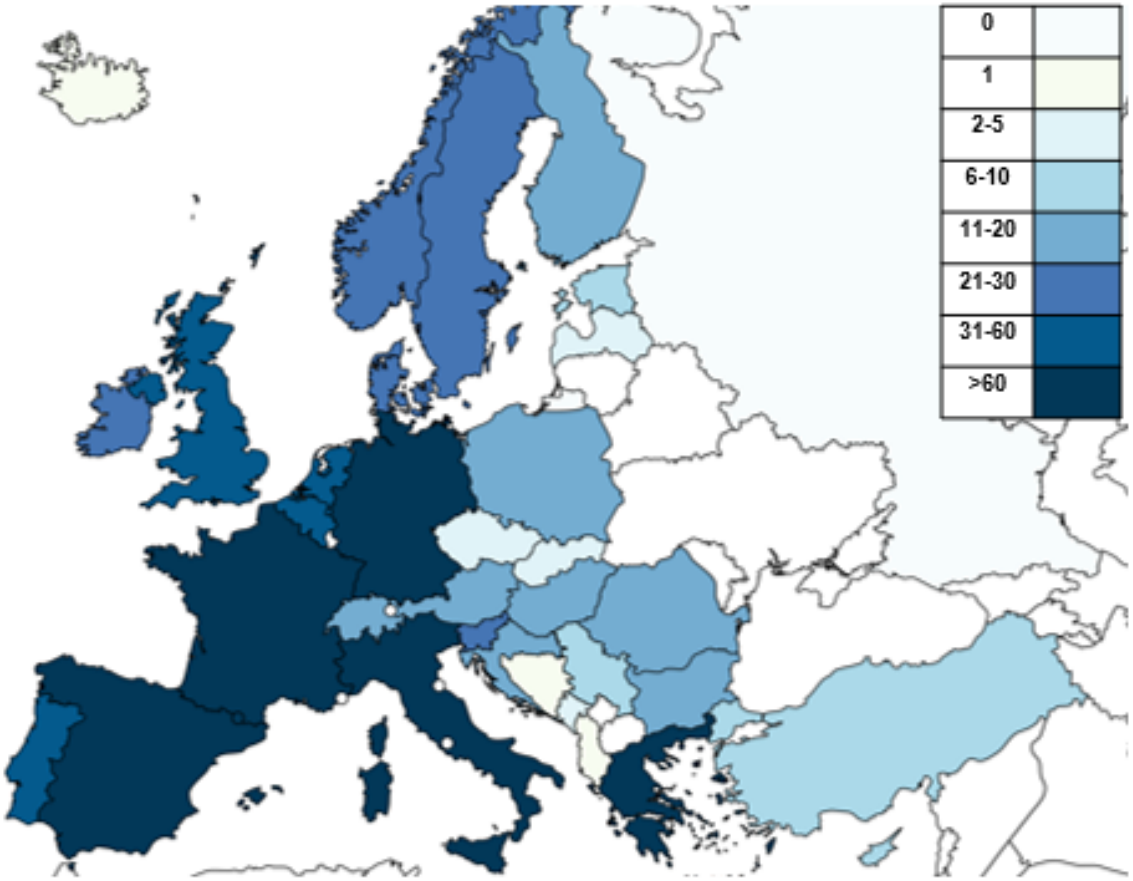
When the number of stakeholders involved per country is higher than the number of projects, it means that more than one partner from the same country is participating in each project.

In some cases, there are more projects than stakeholders involved for a given country, meaning that the same stakeholders participate in several projects (examples from Austria, Romania, Cyprus…).

Some stakeholders from outside the EU are participating in BRIDGE projects: Norway (28), Switzerland (18), Turkey (8), Iceland (1), Montenegro (2), Bosnia and Herzegovina (1), Albania (1), Serbia (9), UK (59), USA (1), China (1), India (1) and Israel (2).



Number of stakeholders involved per country



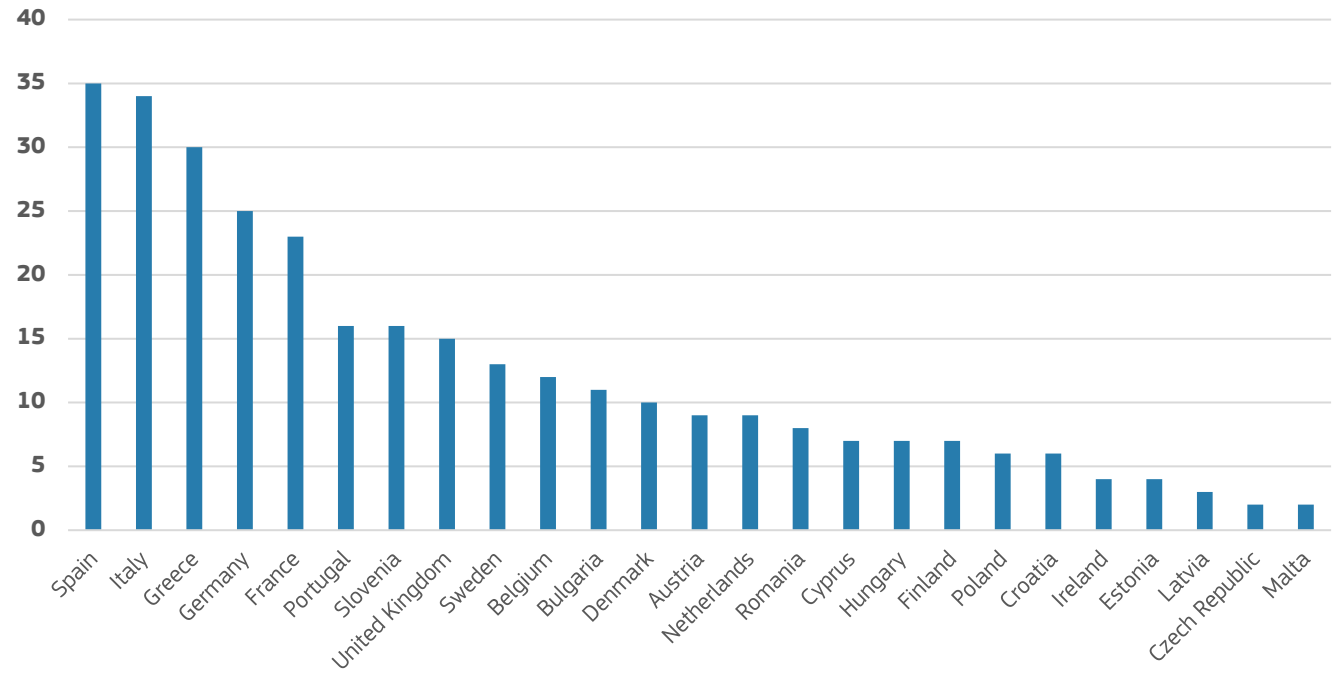
2.2.2 Geographical distribution of physical demonstrators and pilots

Most of the BRIDGE projects involve demonstrations or pilot tests of technologies and solutions.

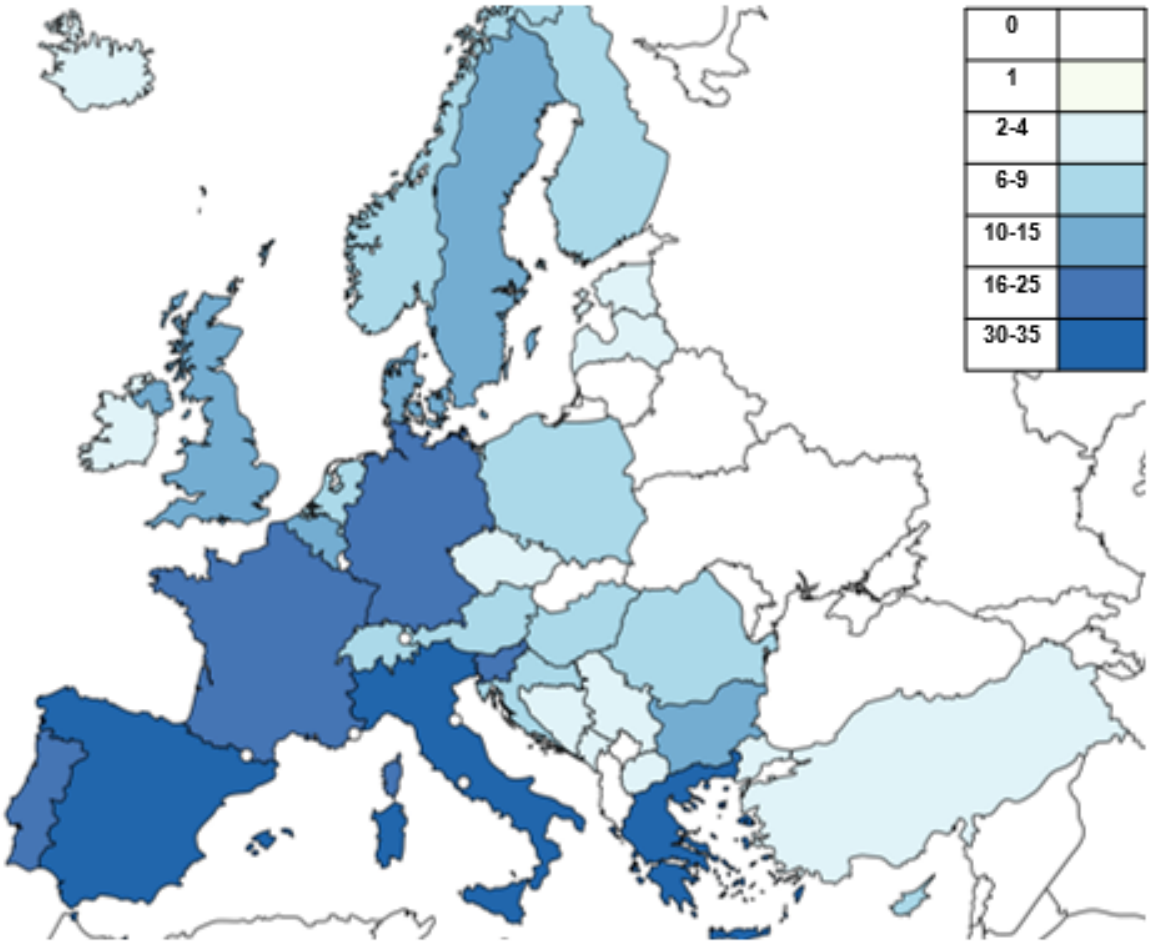
BRIDGE demos or pilots are hosted by 40 countries as indicated on the figure and the map below. Spain hosts the highest number of demo sites, followed by Italy, Greece, Germany, France, Portugal, Slovenia, and UK.

Some demos and pilots sites are hosted outside the EU, namely: Norway (9), Switzerland (7), Turkey (4), Iceland (2), Montenegro (3), Bosnia and Herzegovina (4), Macedonia (3), Serbia (4), UK (15), USA (1), China (1), India (4) and Israel (1).

Number of BRIDGE project demos or pilot sites per country



Number of demos or pilot sites per country



2.3 Technologies and services tackled by BRIDGE projects

A broad range of technologies and services are being tested by BRIDGE projects. Five main categories are considered here:

Technologies for Consumers: Demand response, smart appliances, and smart metering.

Grid technologies: HVDC, HVAC, protections, HVDC breaker, inertia, network management, monitoring and control tools[1], and micro-grid.

Large-scale storage technologies, in general connected at transmission level[2]: Power to Gas (P2G), Compressed Air Energy Storage (CAES) and hydro storage.

Small-scale storage technologies, in general connected at distribution level[3]: batteries (including from electric vehicles), thermal energy storage (including power to heat, heat pumps, hot water tanks, geothermal storage), and flywheels.

Generation technologies: wind turbines, photovoltaic (PV), solar thermal, biogas, tidal energy, and micro-generation.

[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 distribution level (in particular CAES).

[3] Batteries might also be connected at transmission level.

The next figure indicates the number of BRIDGE projects deploying the five main categories of technologies and services.

It appears that 88% of the BRIDGE projects (78 out of 88) are dealing with technologies for consumers.

Around 86% of the projects (76 out of 88 projects) are dealing with grid technologies.

On the other hand, generation technologies are addressed by 58 projects (65%).

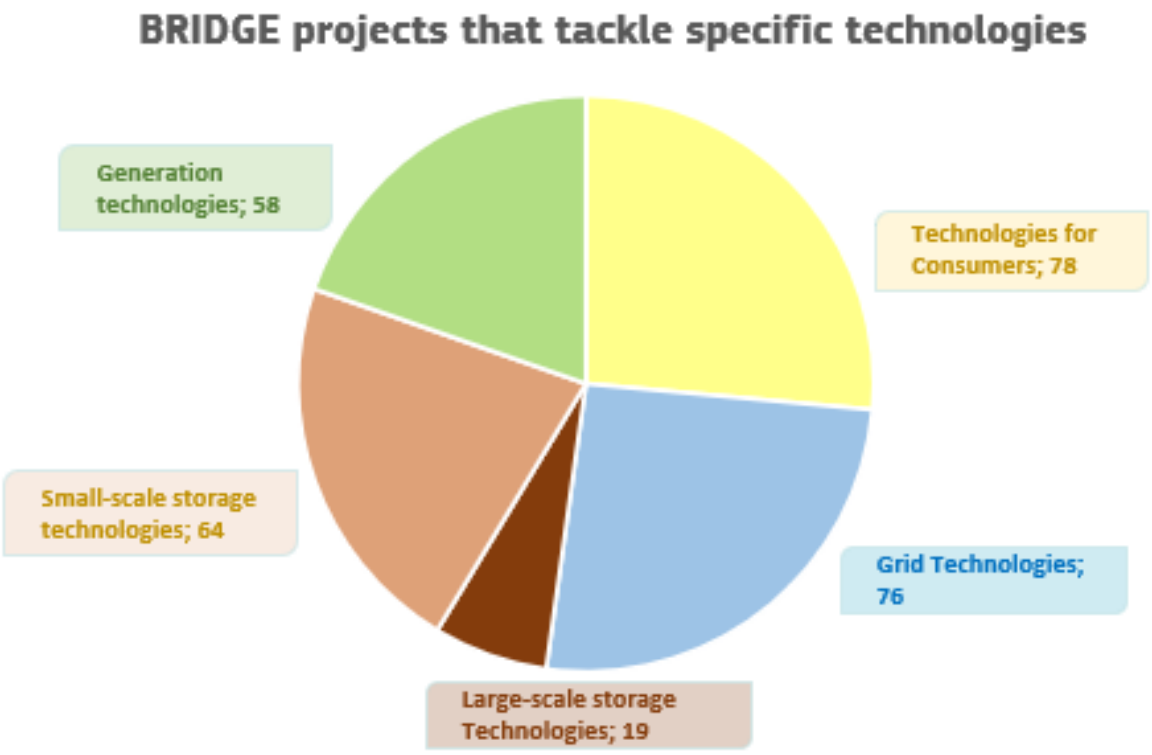
Storage aspects are mainly addressed at small-scale level by 64 projects (72%) while large-scale storage is addressed by only 21% of the BRIDGE members (19 projects).

DIGITALISATION

Digitalisation as enabling technology is used in almost all BRIDGE projects (92%) dealing with technologies for consumers such as demand response or smart appliances and operation and management of the grid.

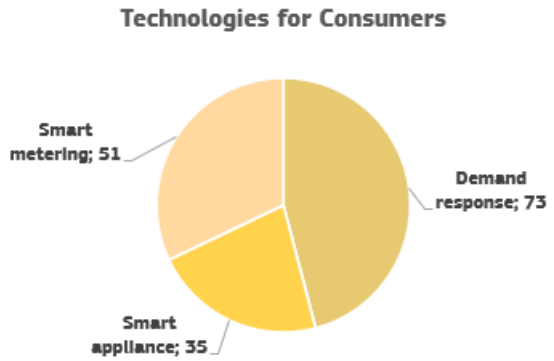
MARKET SERVICES

Many BRIDGE projects (85%) deal with electricity market services in terms of market aspects, electricity markets and ancillary services are almost equally addressed.

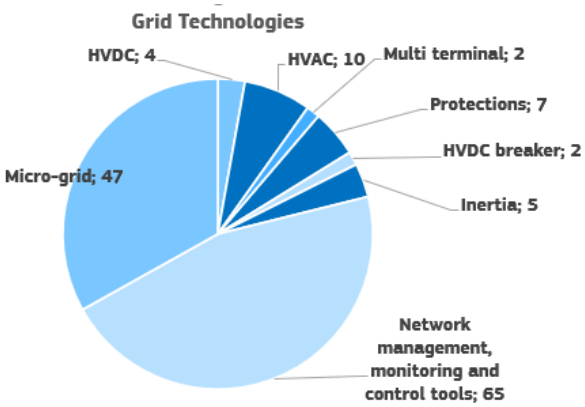


The next figures show more specifically the exact distribution of the BRIDGE projects for each category of technologies or services.

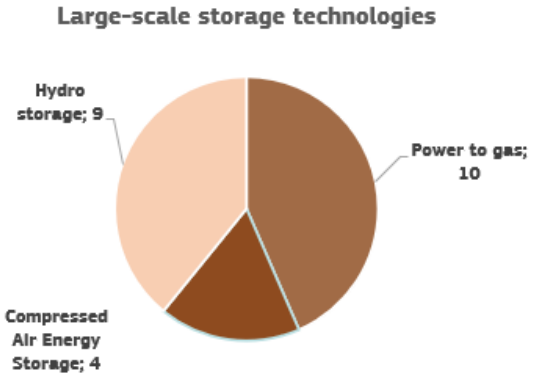
Technologies for consumers mainly address demand response and smart metering; 35 projects also deal with smart appliances to be deployed at consumer level.



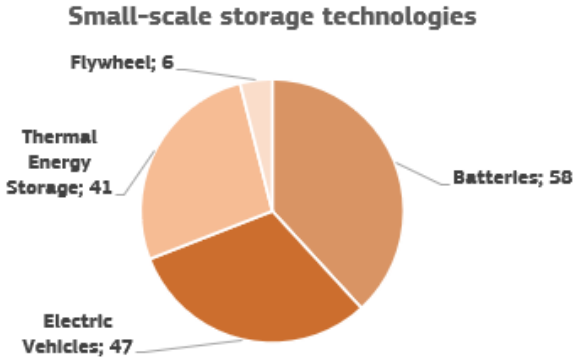
In terms of grid technologies, a high number of projects deal with network management, monitoring and control tools, as well as with micro-grids.



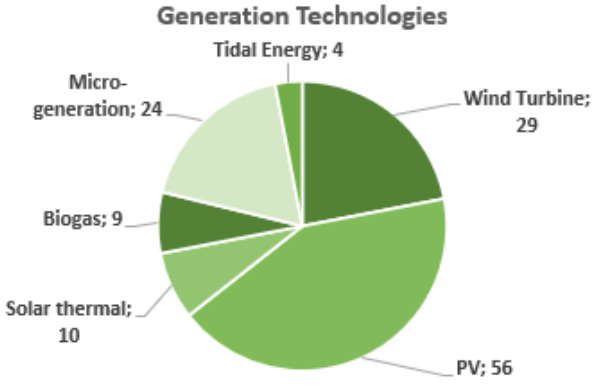
Regarding storage technologies, 10 projects work with power to gas, 4 projects with CAES and 9 projects involve hydro storage.



The most addressed small-scale storage technologies by the BRIDGE community are batteries (with more than a third of the projects working with electric vehicles). Last but not least, thermal energy storage and flywheels are being tested by 41 and 6 projects respectively.



With regards to generation technologies, PV, wind and micro-generation are the most commonly addressed.



3. Horizon 2020 calls and PROJECT FACT SHEETS

3.1 Project fact sheets

The current section describes each project participating in the BRIDGE initiative. Projects are presented by call – easily identifiable by a colour – and for each call by alphabetical order.

Each project is presented over two pages:

- On the first page, a brief summary of the project is given, as well as the project start and end years, the budget, the website, the technologies and services deployed, the project partners' countries, the name of the coordinating organisation and of the other partners;
- The second page presents the project in details, in terms of scope, technical description and expected impact.

3.2 Finished BRIDGE projects

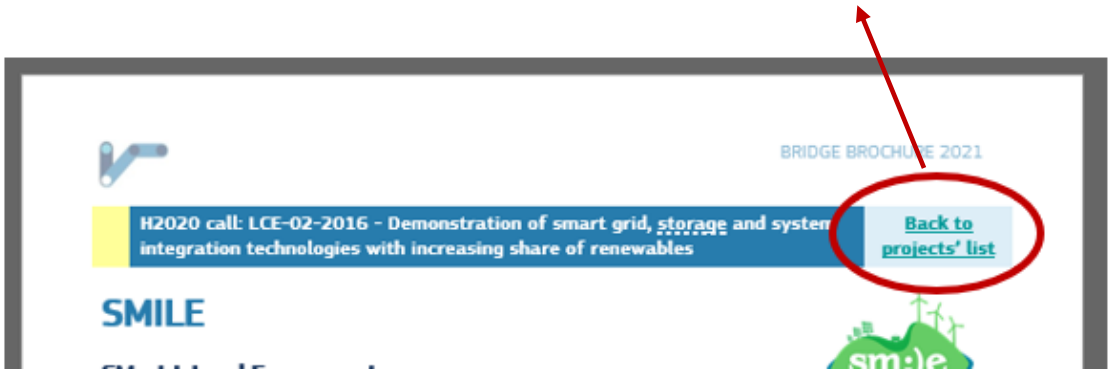
Check the former version of the BRIDGE Brochure to learn more about the 32 finished projects. These projects started between 2014-2016 and finished between 2017-2020.

Former BRIDGE Brochure: Brochure-of-BRIDGE-projects_2020_VF_web3.pdf (h2020-bridge.eu)

3.3 Ongoing BRIDGE projects

Click on the hyperlinks below to access the project fact-sheets!

Use this link in each Fact sheet to return to the project list



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

- SMILE: SMart IsLand Energy systems

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

- **MAGNITUDE**: Bringing flexibility provided by multi energy carrier integration to a new magnitude

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

- **CROSSBOW**: CROSS BOrder management of variable renewable energies and storage units enabling a transnational Wholesale market
- **EU-SysFlex**: Pan-European system with an efficient coordinated use of flexibilities for the integration of a large share of RES
- **FLEXITRANSTORE**: An Integrated Platform for Increased FLEXIbility in smart TRANSmission grids with STORage Entities and large penetration of Renewable Energy Sources
- **OSMOSE:** Optimal System-Mix Of flexibility Solutions for European electricity

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

- **COMPILE**: Integrating Community Power in Energy Islands
- **E-LAND:** Integrated multi-vector management system for Energy isLANDs
- **IElectrix**: Indian and European Local Energy CommuniTies for Renewable Integration and the Energy Transition
- **MERLON**: Integrated Modular Energy Systems and Local Flexibility Trading for Neural Energy Islands
- **MUSEGRIDS**: Multi Utilities Smart Energy GRIDS
- **RENAISSANCE**: RENewAble Integration and SuStainAbility iN energy CommunitiEs
- **SERENE**: Sustainable and Integrated Energy Systems in Local Communities of the energy systems
- **LocalRES**: Empowering local renewable energy communities for the decarbonisation of the energy systems

LC-SC3-ES-4-2018-2020 - Decarbonising energy systems of geographical Islands

- **GIFT**: Geographical Islands FlexibiliTy
- **INSULAE**: Maximizing the impact of innovative energy approaches in the EU islands
- **REACT**: Renewable energy for self-sustainable island communities

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**: Large scale campaigns to demonstrate how TSO-DSO shall act in a coordinated manner to procure grid services in the most reliable and efficient way
- **INTERRFACE**: TSO-DSO-Consumer INTERFACE architecture to Provide innovative Grid Services for an efficient power system

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

- **Energy Shield: I**ntegrated Cybersecurity Solution for the Vulnerability Assessment, Monitoring and Protection of Critical Energy Infrastructures
- **Phoenix**: Energy Shield: Integrated Cybersecurity Solution for the Vulnerability Assessment, Monitoring and Protection of Critical Energy Infrastructures
- **SDN-microSENSE**: SDN - microgrid reSilient Electrical eNergy SystEm

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

- **ebalance-plus:** Energy balancing and resilience solutions to unlock the flexibility and increase market options for distribution grid

- **EUniversal**: Market enabling interface to unlock flexibility solutions for cost-effective management of smarter distribution grids
- **FEVER**: Flexible Energy Production, Demand and Storage-based Virtual Power Plants for Electricity Markets and Resilient DSO Operation
- **FLEXIGRID (864048)**: Enabling FLEXIbility for future distribution GRIDs with high penetration of variable renewable generation
- **FLEXIGRID (864579):** Interoperable solutions for implementing holistic FLEXIbility services in the distribution GRID
- **PARITY**: Pro-sumer AwaRe, Transactive Markets for Valorization of Distributed flexibilITY enabled by Smart Energy Contracts
- **PLATONE**: PLATform for Operation of distribution Networks
- **X-FLEX**: Integrated energy solutions and new market mechanisms for an eXtended FLEXibility of the European grid

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

- **FARCROSS**: Facilitating Regional CROSS-border Electricity Transmission through Innovation
- **TRINITY**: TRansmission system enhancement of regIoNal borders by means of IntelligenT market technologY

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

- **NESOI**: New Energy Solutions Optimized for Islands

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

- **InterConnect**: Interoperable Solutions Connecting Smart Homes, Buildings and Grids

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

- **BD4OPEM**: Big Data for OPen innovation Energy Marketplace
- **PLATOON**: Digital PLAtform and analytic TOOls for eNergy
- **SYNERGY**: Big Energy Data Value Creation within Synergetic energy-as-a-service applications through trusted multi-party data sharing over an AI big data analytics marketplace
- **BD4NRG** Big Data for Next Generation Energy

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

- **ACCEPT**: ACtive Communities & Energy Prosumers for the energy Transition
- **BRIGHT**: Boosting DR through increased communIty-level consumer engaGement by combining Data-driven and blockcHain technology Tools with social science approaches and multi- value service design
- **HESTIA**: Holistic dEmand response Services for European residenTIAl communities
- **iFLEX**: Intelligent Assistants for Flexibility Management
- **REDREAM**: Real consumer engagement through a new user-centric ecosystem development for end-users' assets in a multi-market scenario
- **SENDER**: Sustainable Consumer Engagement and Demand Response
- **TwinERGY**: Intelligent interconnection of prosumers in positive energy communities with twins of things for digital energy markets

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

- **CREATORS**: CREATing cOmmunity eneRgy Systems

- **eNeuron**: GreeN Energy HUbs for Local IntegRated Energy COmmunities optimisatioN
- **RENergetic**:: Community-empowered Sustainable Multi-Vector Energy Islands

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

- **FLEXGRID (863876)**: A novel smart grid architecture that facilitates high-RES penetration through innovative markets towards efficient interaction between advanced electricity grid management and intelligent stakeholders.
- **FlexPlan**: Advanced methodology and tools taking advantage of storage and FLEXibility in transmission and distribution grid PLANning

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

- **HYPERRIDE**: Hybrid Provision of Energy based on Reliability and Resiliency by Integration of Dc Equipment
- **TIGON**: Towards Intelligent DC-based hybrid Grids Optimizing the network performance

LC-SC3-ES-4-2018-2020: Decarbonising energy systems of geographical Islands

- **IANOS** IntegrAted SolutioNs for DecarbOnisation and Smartification of Islands
- ***ISLANDER***: Accelerating the decarbonisation of islands' energy systems
- **MAESHA**: DeMonstration of smArt and flExible solutions for a decarboniSed energy future in Mayotte and otHer European islAnds
- **ROBINSON**: smart integRation Of local energy sources and innovative storage for flexiBle, secure and cost-efficIent eNergy Supply ON industrialized islands
- **VPP4ISLANDS**: Virtual Power Plant for Interoperable and Smart isLANDS

LC-SC3-ES-5-2020 - TSO-DSO cooperation

- **OneNet**: One Network for Europe

H2020 call: LCE-02-2016 - Demonstration of smart grid, storage and system integration technologies with increasing share of renewables

Back to projects' list

SMILE

SMart IsLand Energy systems

The SMILE project aims at demonstrating different innovative technological and non-technological solutions in large-scale smart grid demonstration projects in islands, paving the way for their introduction in the market in the near future.

From 2017	Project total cost	EU contribution	Website
To 2021	14.0 M€	12.1 M€	http://www.h2020smile.eu/

Technologies and services

Technologies for consumers	✓ Demand response ✓ Smart metering
Smart Grid technologies	✓ Micro-grid ✓ Network management and control tools
Large-scale storage technologies	✓ Hydro storage
Distributed storage technologies	✓ Batteries ✓ Electric Vehicles ✓ Thermal Energy Storage
Generation technologies	✓ Wind Turbine ✓ PV ✓ Solar Thermal ✓ Tidal Energy ✓ Micro-generation
Market	✓ Electricity market ✓ Ancillary services

Project partners' countries

Coordinator: RINA CONSULTING SPA (ITALY)

Other partners:

- COMMUNITY ENERGY SCOTLAND LIMITED (United Kingdom)
- VCHARGE UK LTD (United Kingdom)
- SUNAMP LIMITED (United Kingdom)
- ROUTE MONKEY LTD (United Kingdom)
- ASSOCIACAO COMERCIAL E INDUSTRIAL DO FUNCHAL - CAMARA DE COMERCIO E INDUSTRIA DA MADEIRA (Portugal)
- EEM EMPRESA DE ELECTRICIDADE DA MADEIRA SA (Portugal)
- MITI - MADEIRA INTERACTIVE TECHNOLOGIES INSTITUTE - ASSOCIACAO (Portugal)
- BRIGHT CURIOSITY, LDA (Portugal)
- AALBORG UNIVERSITET (Denmark)
- SAMSO KOMMUNE (Denmark)
- SAMSØ ENERGIAKADEMI (Denmark)
- SAMSO ELEKTRO APS (Denmark)
- TEKNOLOGISK INSTITUT (Denmark)
- LITHIUM BALANCE A/S (Denmark)
- STICHTING ENERGY VALLEY (Netherlands)
- ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXISCENTRE FOR RESEARCHAND TECHNOLOGY HELLAS CERTH EKETAANAPTYXIS (Greece)
- RIJKSUNIVERSITEIT GRONINGEN (Netherlands)
- DIKTYO AEIFORIKON NISON TOY AIGAIOU AE (Greece)

Project Description

Context. The SMILE project aims at demonstrating different innovative technological and non-technological solutions in large-scale smart grid demonstration projects in the Orkneys (Scotland), Samsø (Denmark) and Madeira (Portugal) islands (with different policies, regulations and energy markets), paving the way for their introduction in the market in the near future. SMILE pilots will demonstrate operation of the distribution grid under stable and secure conditions to implement solutions for demand response, intelligent control and automation of distribution networks; they have high shares of RES in the electricity grid or have planned increasing shares in the next years

Scope. The objective is to test solutions while establishing mutual learning processes and providing best practice guidance for replication in other regions. The three pilots will test different combinations of technological solutions according to local specificities and conditions and the existing infrastructure and will involve all value chain actors needed to efficiently implement projects system-wide. The sites are therefore effectively representative of the majority of the EU energy markets and offer excellent demonstration settings which will deliver maximum impact in terms of replicability. It is important to highlight that the Orkney Islands and Samsø are electrically connected to the mainland network and Madeira is the only case of a total energy island.

Technical description and implementation. The main technological solutions faced by the project vary from integration of battery technology, power to heat, power to fuel, pumped hydro, electric vehicles, electricity stored on board of boats, an aggregator approach to demand side management (DSM) and predictive algorithms. Within this framework and to maintain the replicability of procedures the following activities are to be implemented in each demo site:

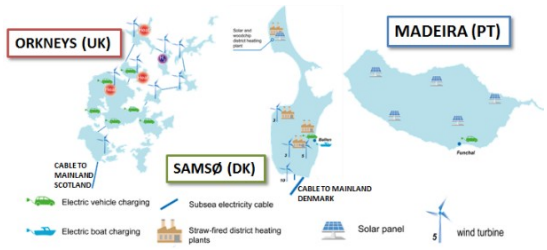
- Development of common frameworks and controls, demand response strategies and cyber security.
- Life Cycle Assessment/Costing (LCA/LCC), cost/benefit analyses, socio-economic studies, definition of financial mechanisms for incentivizing participation in smart grid operations, business modelling and business planning activities.
- Legal and regulatory analysis of smart energy supply concepts which are relevant for developing smart energy supply systems.
- Impact analyses, including energy system impacts, energy strategies and energy market design.
- Communication, dissemination and replication of results.

Impact. *Replicability:* As SMILE relies on plug-and-play scalable software, the proposed smart grid solutions will be modular and scalable.

Socio-economics: Establishing market opportunities for new smart grid products and services, thus stimulating companies' growth and the creation of job opportunities. Also, reduction of investments for increased generation capacity and grid reinforcement thanks to the exploitation of demand-side flexibility.

Environment: Reduction of the environmental impact and carbon footprint of the whole electricity supply system, alleviation of fuel poverty and promoting self-consumption.

Market Transformation and Policy: By facilitating the connection of distributed energy sources of all sizes/natures in the energy grid and by allowing consumers to play their part in optimizing the operation of the system through demand response schemes. Moreover, allowing consumers to play an active role in electricity retail, thus reaping the benefits and value added associated to energy markets. In addition, by demonstrating smart grid solutions in real-life settings, the project will strongly support ongoing policy developments in the field of the design of the internal electricity market. Real-life testing of DSM approaches will also contribute to the design of new rules for electricity trading.



H2020 call: LCE-05-2017 - Tools and technologies for coordination and integration of the European energy system

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MAGNITUDE

Bringing flexibility provided by multi energy carrier integration to a new MAGNITUDE

MAGNITUDE aims to develop business and market mechanisms as well as supporting coordination tools to provide flexibility to the European electricity system, by increasing and optimising synergies between electricity, gas, heat and cooling systems.

From 2017	Project total cost	EU contribution	Website
To 2021	4 M€	4 M€	www.magnitude-project.eu

Technologies and services deployed

Technologies for consumers	✓ Demand response
Grid technologies	
Large-scale storage technologies	
Distributed storage technologies	✓ Thermal energy storage
Generation technologies	✓ PV ✓ Biogas
Market	✓ Electricity market ✓ Ancillary services

Project partners' countries

Coordinator: ELECTRICITE DE FRANCE - EDF (FRANCE)

Other partners:

- CYBERGRID GMBH & CO KG (Austria)
- CARDIFF UNIVERSITY (United Kingdom)
- ENGINEERING - INGEGNERIA INFORMATICA SPA (Italy)
- REGENERA LEVANTE SL (Spain)
- VLAAMSE INSTELLING VOOR TECHNOLOGISCH ONDERZOEK N.V. (Belgium)
- RICERCA SUL SISTEMA ENERGETICO - RSE SPA (Italy)
- MAELARDALENS HOEGSKOLA (Sweden)
- DANMARKS TEKNISKE UNIVERSITET (Denmark)
- N-SIDE (Belgium)
- EIFER EUROPAISCHES INSTITUT FUR ENERGIEFORSCHUNG EDF KIT EWIV (Germany)
- EFFICACITY (France)
- ARTTIC (France)
- EMPRESA MUNICIPAL DE AGUAS Y SANEAMIENTO DE MURCIA SA (Spain)
- A2A CALORE & SERVIZI SRL (Italy)
- EUROHEAT & POWER (Belgium)

Project Description

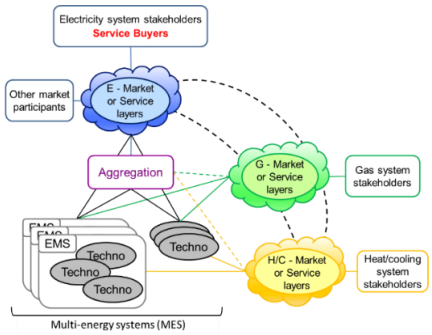
Context. With the increased share of renewable energy sources (RES), the electricity system is expected to be exposed to new or increased risks, for instance in terms of security of supply, congestion, system stability, curtailments, difficulty to meet the demand at some periods of time. To face this evolution, there is a growing need for more flexibility and more active involvement of all the stakeholders at all levels (from distribution to pan-European) to ensure an efficient and reliable operation of the electricity system. Enhanced synergies between different energy carriers appear now as one of the means to provide flexibility to the electricity system but also to drive efficiency and business innovation in the energy sector.

Scope. MAGNITUDE's goal is to identify flexibility options from enhanced synergies between electricity, heating, cooling and gas networks, to support the cost-effective integration of RES and enhance security of supply. MAGNITUDE brings under a common framework, technical solutions, market design and business models, to ensure that its results can be integrated in the overall ongoing policy discussion in the energy field.

Technical description and implementation. The project approach is based on the following main activities:

- Characterize the most relevant services that can be provided by multi-energy systems (MES) to the electricity system in order to increase the share of RES, enhance security of supply and increase trading between energy sectors.
- Study the actual flexibility options that cross-sector technologies and systems can provide to the electricity sector.
- Simulate and optimize control strategies to improve the operation of such technologies and MES to maximize flexibility provision.
- Quantify the benefits of pooling flexibilities from decentralized MES through an aggregation platform.
- Propose innovative market designs for synergies maximization at market level that are assessed on a market simulation platform.
- Assess business models for the MES stakeholders and the aggregator.
- Develop recommendations and policy strategy in a pan-European perspective – including technology, market, business models, and regulation.

The project results are validated on seven real life case studies of multi-energy systems of different sizes and technological features, located in Austria, Denmark, France, Italy, Spain, Sweden, and United Kingdom.



Impact. *Replicability:* Located in 7 different countries, the real-life case studies allow to cover different regulatory frameworks, sector-coupling technologies, stakeholders and business models, and to analyse the results in a pan-European perspective. A dedicated task further addresses the replicability of the studied MES in the 9 countries of consortium partners.

Socio-economics: the project will contribute to stimulate new economic and social benefits at different levels. In particular, it will contribute to the creation of business opportunities by enhancing the current roles and businesses of actors among multi energy systems.

Environment: MAGNITUDE will contribute to increase the share of RES while ensuring the security of supply in the electricity system. Increased flexibility and multi energy carrier integration will allow to smooth energy consumption, reduce peak load and offset the need for additional power generation. It will contribute to reducing the environmental footprint and the greenhouse gas emissions.

Market Transformation: MAGNITUDE will provide and assess market options, based on a transnational perspective, to enable multi energy systems participation in the markets. In particular, it will address the specific role of the aggregator in different national markets and will provide adapted software solutions.

Policy: Through its results and learnings, MAGNITUDE will identify the barriers to the participation of MES in the markets and will propose recommendations. MAGNITUDE will provide insights to the ongoing discussions to shape the European energy markets.

H2020 call: LCE-04-2017 Demonstration of system integration with smart transmission grid and storage technologies with increasing share of renewables

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CROSSBOW

CROSS BOrder management of variable renewable energies and storage units enabling a transnational Wholesale market

CROSSBOW proposes a shared use of resources to foster cross-border management of variable RES and storage units, enabling a higher clean energies penetration whilst reducing network operation costs and improving economic benefits of RES and storage units.

From 2017	Project total cost	EU contribution	Website
To 2021	22 M€	17 M€	http://crossbowproject.eu/

Technologies and services		
Technologies for consumers		
Grid technologies	✓	Network management and control tools
	✓	Demand response
Large-scale storage technologies	✓	Hydro storage
Distributed storage technologies	✓	Batteries
Generation technologies	✓	Wind Turbine PV
Market	✓	Electricity market
	✓	Ancillary services

Project partners' countries

Coordinator: ETRA INVESTIGACION Y DESARROLLO SA (SPAIN)

Other partners:

- Centrul Roman Al Energiei - Cre (Romania)
- Compania Nationala De Transport Alenergiei Electrice Transelectrica Sa (Romania)
- Institute of Communication and Computer Systems (Greece)
- Independent Power Transmission Operator Sa (Greece)
- Diacheiristis Ellinikou Diktyou Dianomis Elektrikis Energeias Ae (Greece)
- Public Power Corporation S.A. (Greece)
- Cobra Instalaciones Y Servicios S.A (Spain)
- Varta Storage Gmbh (Germany)
- Elektroenergien Sistemen Operator Ead (Bulgaria)
- Joint Stock Company Elektromreza Srbije Belgrade (Serbia)
- Centar Za Koordinaciju Sigurnosti Scc Doo Beograd-Vozdovac (Serbia)
- Nezavisni Operator Sistema U Bih (Bosnia And Herzegovina)
- The University Of Manchester (United Kingdom)
- Hrvatski Operator Prijenosnog Sustava Doo (Croatia)
- Koncar - Inzenjering Za Energetikui Transport Dd (Croatia)
- Sveuciliste U Zagrebu Fakultet Elektrotehnike I Racunarstva (Croatia)
- Univerza V Ljubljani (Slovenia)
- Elpros Elektronski In Programski Sistemi Doo (Slovenia)
- Crnogorski Elektroprenosni Sistem Ad Podgorica (Montenegro)
- Operator Na Elektroprenosniot Sistem Na Makedonija Akcionersko Drushtvo Za Prenos Na Elektrichna Energijai Upravuvanje So Elektroenergetski (Republic of North Macedonia)
- Ss. Cyril And Methodius University In Skopje (Republic of North Macedonia)
- State Owned Joint Stock Company For Production Of Electricity Power Plants Of Macedonia Skopje (Republic of North Macedonia)
- Cybergrid Gmbh & Co Kg (Austria)

Project Description

Context. The EU committed to reach a share of renewables of at least 27% by 2030. These targets aimed at helping the EU achieve a more competitive, secure and sustainable energy system and to meet its long-term 2050 greenhouse gas reductions target.

Indeed, the increasing share of fluctuating Renewable Energy Sources (RES) has become key to improve the carbon footprint of the European electricity system and achieve energy and climate change policy goals. This increase has been accompanied by an emerging decentralized and transnational RES ecosystem and the promotion of specific interconnection projects. With low penetration levels, the effects of renewable generation and distributed energy resources (DER) may be ignored; but as the penetration levels rise, a new approach is required to integrate and manage the vast amount of DER which is expected to drive the grid in the -not so distant- future.

In the case of the South Eastern Europe (SEE), even if all its MSs are on track to achieve their RES penetration targets, **the region still has a huge potential to become a clean energy hub for Europe,** reducing the 53% of imported energy at a cost of 400 billion.

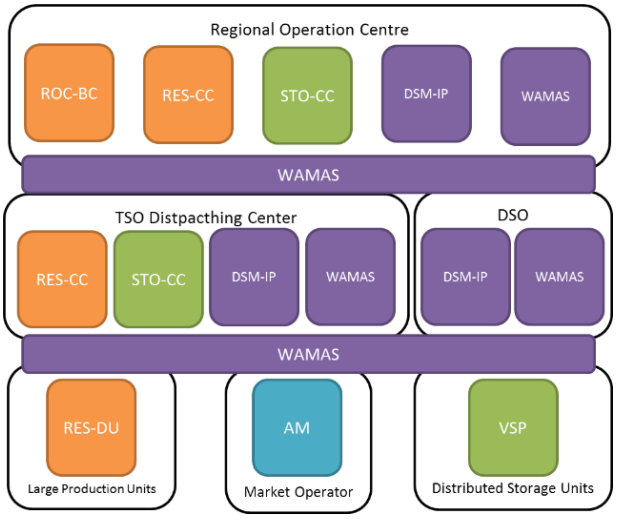
Scope. CROSSBOW is a TSO driven project with the goal to successfully deploy a set of technological solutions which enable increasing the **shared use of resources to foster transmission networks cross-border management of variable renewable energies and storage units**, making possible a higher penetration of clean energies whilst reducing network operational costs and improving economic benefits of RES and storage units.

CROSSBOW results will be evaluated during 18 months by one of the European RSC and 8 TSOs in SEE, demonstrating how CROSSBOW tackles the regional challenges faced by these TSOs.

Technical description and implementation.

The project technological solutions will be packaged in the form of 9 different products/results:

- CROSSBOW Regional Operation Centre Balancing Cockpit (**ROC-BC**)
- CROSSBOW RES Regional Coordination Centre (**RES-CC**)
- CROSSBOW Hybrid RES Dispatchable Unit (**RES-DU**)
- CROSSBOW Regional Storage Coordination Centre (**STO-CC**)
- CROSSBOW Virtual Storage Plants (**VSP**)
- CROSSBOW **WAMAS** (Wide Area Monitoring and Awareness System)
- CROSSBOW Regional DSM integration platform (**DSM-IP**)
- CROSSBOW Wholesale and Ancillary Market toolset (**AM**)
- CROSSBOW Cooperative ownership of flexibility assets (**CFP**)



Impact. *Replicability:* The project involves all relevant actors in SEE to guarantee not only replicability, but also scalability beyond the context of CROSSBOW.

Socio-economics: The project will have a significant impact in the commercial operation and innovation activities of the consortium - with a planned ROI for the partners of less than 36 months after full deployment and commercialisation of CROSSBOW products and services starts- and the European sector at large, contributing to the creation of jobs and the access to better quality energy services for EU citizens and businesses.

Environment: The project will trigger a saving of 3 MTons of GHG, and the increase of 10% in the share of RES (15,2 TWh).

Market Transformation: One of the main mechanisms that the project will propose to achieve higher penetration of RES, is the evolution towards a Regional flexibility market.

Policy: CROSSBOW not only counts with the participation of 8 TSOs in SEE, but also with the active support in the User Group of 5 National Regulatory Authorities (NRA) of the region and the Energy Community Secretariat.

H2020 call: LCE-04-2017 - Demonstration of system integration with smart transmission grid and storage technologies with increasing share of renewables

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EU-SysFlex

Pan-European system with an efficient coordinated use of flexibilities for the integration of a large share of RES

EU-SysFlex will ensure that an efficient and sufficient level of system services are provided to help facilitate world leading levels of RES-E while maintaining the level of resilience that consumers and society expect from the European electricity system.

From 2017	Project total cost	EU contribution	Website
To 2021	26.5 M€	20.3 M€	www.eu-sysflex.com

Technologies and services		Project partners' countries
Technologies for consumers	✓ Demand response ✓ Smart metering	
Grid technologies	✓ Inertia Micro-grid ✓ Network management and control tools	
Large-scale storage technologies	✓ Hydro storage	
Distributed storage technologies	✓ Batteries Electric Vehicles ✓ Thermal energy storage ✓ Flywheel	
Generation technologies	✓ Wind Turbine PV ✓ Solar thermal Biogas ✓ Micro-generation	
Market	✓ Electricity market Ancillary services	

Coordinator: EirGrid, Plc (Ireland)

Other partners:

- Soni, Limited (UK–North Ireland)
- University College Dublin (Ireland)
- Imperial College London (UK)
- Upside Energy, Limited (UK)
- Pöyry Sweden AB (Sweden)
- Electricité de France (France)
- AKKA Informatique et Systèmes (France)
- Polskie Sieci Elektroenergetyczne operator SA (Poland)
- Narodowe Centrum Badan Jadrowych (Poland)
- Elering AS (Estonia)
- Guardtime AS (Estonia)
- Tartu Ulikool (Estonia)
- AS Augstsprieguma Tikls (Latvia)
- innogy SE (Germany)
- ENERCON GmbH (Germany)
- Fraunhofer – IWES (Gremany)
- Universität Kassel (Germany
- Teknologian tutkimuskeskus VTT Oy (Finland)
- EDP Distribuiçao Energia SA (Portugal)
- CNET – Centre for New Energy Technologies SA (Portugal)
- Instituto de Engenharia de Sistemas e Computadores, Tecnologia e Ciencia (Portugal)
- Siemens AG (Germany)
- e-distribuzione SpA (Italy)
- Ricerca sul Sistema Energetico SpA (Italy)
- Vlaamse Instelling voor Technologisch Onderzoek NV (Belgium)
- Katholieke Universiteit Leuven (Belgium)
- Zabala Innovation Consulting SA (Spain)
- I-Europa SRO (Slovakia)
- Enoco AS (Norway)
- Cybernetica AS (Estonia)
- Elektrilevi OÜ (Estonia)
- Fundación ESADE (Spain)
- Helen Oy (Finland)

Project Description

Context. European policy makers have set ambitious targets for the decarbonisation of the energy system, demanding increased levels of energy efficiency and world leading levels of renewable energy technologies (RES).

Scope. EU-SysFlex will make an important contribution in meeting the European Union (EU) world leading RES objectives. The results and later impacts of the project will be decisive for the cost-effective transformation of the electricity system, by enhancing the flexibility required, while maintaining the level of resilience that consumers and society expect from the European electricity system.

A key characteristic of the transformation of the electrical system is that existing conventional plant and the flexible services they provide will be increasingly displaced by new RES and technologies including wind, solar and battery storage. This raises two issues: 1/ the conventional plant are today's service providers and their displacement leads to shortfalls in flexibility and needed services, 2/ the nature of the power system is transformed requiring a range of new or different technical shortfalls to be addressed. Failing to meet the required long term flexibility and system services will undermine Europe's ability to enable the cost-effective transformation of the electrical system, and the additional costs which will be borne by consumers.

Technical description and implementation. Firstly, the technical needs of the pan-European system will be defined for scenarios with more than 50% RES. This requires advanced simulation of the technical performance of the future system from load generation balancing including different aspects of flexibility to electromechanical and electromagnetic issues. Secondly, the electricity market design and regulation need to be enhanced to efficiently and effectively procure the appropriate combination of flexibility and system services. Thirdly, implicit and explicit barriers to competitive forces being applied need to be removed. The project will develop and demonstrate innovative approaches to utilise, dispatch and schedule a range of new technologies to meet the flexibility and system services required to facilitate meeting European long term policy objectives.

Impact. *Replicability:* EU-SYSFLEX will provide a product range of solutions that will be demonstrated or simulated during the project. A validation of scalability approaches, based on the models developed within the project, will be undertaken to check that technical issues are being solved and considered appropriately. Replicability of all the solutions will be assured.

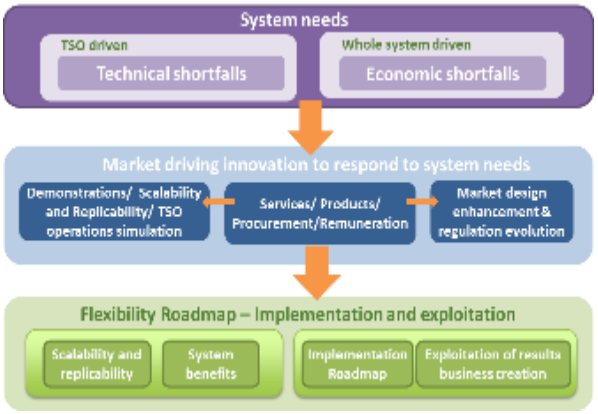
Socio-economics: Some solutions will derive in the creation of start-ups which will commercialise them and further develop them, creating highly skilled and value adding jobs and thus strengthening Europe's smart SMEs ecosystem: it will contribute to achieve a resilient and secure European power system, with citizens at its core taking ownership of the energy transition, benefitting from new technologies to reduce their bills, participating actively in the market, and where vulnerable consumers are protected.

Environment: EU-SysFlex will make an important contribution to meeting European world leading RES objectives. Meeting these objectives will represent an opportunity for society from both the perspective of climate change mitigation and a driver for innovation, competitiveness of our industries and job creation.

Market Transformation: The EU-SysFlex project will impact several critical areas of the European energy sector such as:

- Transnational problems, namely cross-border and cross sectoral issues.
- Market design and regulatory options for innovative services, as well as business models and Pan-European market integration.

Policy: The project will develop a flexibility roadmap to remove and overcome the technical, regulatory, communication and system operator issues that limit the full benefit of each of the solutions developed and demonstrated, thus presenting a potential for tangible benefits to the pan-European cost-effective system by reducing system costs and CO_2 emissions.



H2020 call: LCE-04-2017 - Demonstration of system integration with smart transmission grid and storage technologies with increasing share of renewables

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FLEXITRANSTORE

An Integrated Platform for Increased FLEXIbility in smart TRANSmission grids with STORage Entities and large penetration of Renewable Energy Sources

FLEXITRANSTORE project will develop the next generation Flexible Energy Grid (FEG), which will provide the technical basis supporting the valorisation of flexibility services and enhancing the existing European Internal Energy Market (IEM).

From 2017	Project total cost	EU contribution	Website
To 2021	21.7 M€	17 M€	www.flexitranstore.eu

Technologies and services		
Technologies for consumers	✓ Demand Response	
Grid technologies	✓ Network management and control tools	
Large-scale storage technologies	✓ Battery	
Distributed storage technologies		
Generation technologies	✓ PV üWind turbine	
Market	✓ Electricity Market ✓ Ancillary Services	

Project partners' countries

Coordinator: European Dynamics Belgium S.A. (Belgium)

Other partners:

- Institute of Communication and Computer Systems/ National Technical University of Athens (Greece)
- Technical University of Sofia (Bulgaria)
- University of Cyprus (Cyprus)
- Budapest University of Technology and Economics (Hungary)
- Loyola University Andalusia (Spain)
- EMAX (Belgium)
- WING Computer Group SRL
- Abengoa Innovación S.A. (Spain)
- JEMA Energy S.A. (Spain)
- GE Energy Products France SNC (France)
- Schneider Electric España SA (Spain)
- Smart Wires Europe (Ireland)
- C&G d.o.o. Ljubljana (Slovenia)
- Studio elektronike Rijeka d.o.o. (Croatia)
- Software Company Ltd. (Bulgaria)
- Independent Power transmission Operator (Greece)
- Elektroenergien Sistemen Operator EAD (Bulgaria)
- Transmission Systyem Operator – Cyprus (Cyprus)
- Centro de Investigação em Energia REN - State Grid, S. A., (R&D NESTER) (Portugal)
- Operatori Sistemit Transmetimit OST (Albania)
- CEZ Distribution Bulgaria AD (Bulgaria)
- Elektro Ljubljana, d.d. (Slovenia)
- Electricity Authority of Cyprus (Cyprus)
- Independent Bulgarian Energy Exchange EAD (Bulgaria)
- VPP Energy Zrt (Hungary)
- Cyprus Energy Regulator Authority (Cyprus)

Project Description

Context. Renewable energy is gaining a continuously increasing share in the production mix throughout the world. System decarbonization, long-term energy security and expansion of energy access in developing countries, due to the distributed nature of renewable sources are only a few of the benefits they introduce. However, the further integration of renewables remains a challenge. Their intermittent production and unpredictability, combined with the need for large-scale storage integration and the lack of valorisation of the services that they offer by the energy market pose as barriers against their establishment.

The FLEXITRANSTORE project identifies the need for flexibility integration in the European power system as the main driver to overcome the aforementioned barriers and reaching higher RES penetration. At a technical level, novel smart grid technologies, control and storage methods will be introduced into the existing power system. At a market level, new business plans, players and market rules will facilitate the valorisation of flexibility services offered by renewables and enable increased cross-border flows.

Scope. The FLEXITRANSTORE project will assist the evolution towards a pan-European transmission network with high flexibility and interconnection levels. The Flexible Energy Grid proposed includes adaptation and integration of technologies to ensure that their management demonstrates flexible resource applications that mitigate the effects of RES variability on the network. The project will, thus, work towards the advancement of the Internal European Market, focusing on technologies that facilitate the networking of cross-border players and further enabling energy trading. Within this context the strategic objectives of the project have been defined as follows:

- To enhance and accelerate the integration of renewables into the European energy systems.
- To increase cross-border electricity flows across Europe.

Technical description and implementation. A range of state-of-the-art ICT technologies and control improvements will be exploited to enhance the flexibility of the energy grid by integrating storage and demand response management. The FEG components and the market infrastructure will be deployed in 8 Demonstrations installed in 6 countries. Key technologies that will be introduced include:

- Power System Stabilizers for conventional generation and Battery Energy Storage Systems (BESS) integration at TSO/DSO border substations, at wind farms
  substation and at synchronous GT plants to increase flexibility in the power system.
- Power Flow Controllers and Dynamic Line Rating sensors and algorithms to relieve congestion and to mitigate weather effects.
- A representative grid model which predicts the dynamic behaviour of the grid following big disturbances, thus improving the grid's observability and stability.
- An integrated market platform based on an enhanced EUPHEMIA market model, which valorises flexibility services.

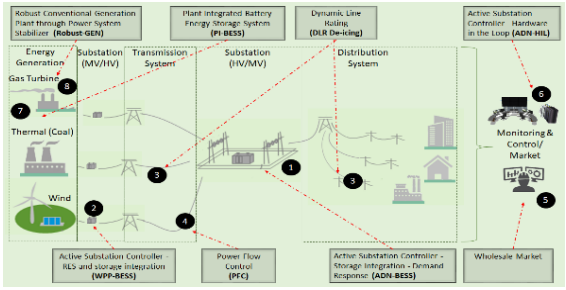
Impact. *Replicability:* Work is ongoing at the moment to develop a liberalized energy market in Cyprus. FLEXITRANSTORE can feed into this project. Once the approach succeeds in the Cypriot system it can be seen as a starting point for scaling the approach on a regional and finally pan-European level towards the development of a single European IEM.

Socio-economics: The new market approach will include consumer participation in the market and the novel technologies will facilitate the improved utilization of the available energy, thus reducing operational and capacity costs. The project will ensure that the EU electricity network operates within a wholesale market, providing consumers with competitive prices and integrating renewable sources.

Environment: By enabling higher RES penetration, FLEXITRANSTORE will contribute towards the reduction of CO_2 and other greenhouse gases emissions.

Market Transformation: FLEXITRANSTORE is in line with the ETIP SNET 10 Year R&I Roadmap and the ENTSO-E R&I Roadmap 2017-2026 and will impact both new and existing market participants.

Policy: FLEXITRANSTORE will provide policy recommendations to TSOs, DSOs, Market Regulators, Power Plant owners and other actors of the energy value chain.



H2020 call: LCE-04-2017 Demonstration of system integration with smart transmission grid and storage technologies with increasing share of renewables

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OSMOSE

Optimal System-Mix Of flexibility Solutions for European electricity

OSMOSE addresses flexibility for the integration of renewable energy sources, through a holistic approach in order to capture "silo-breaking" synergies across needs and sources flexibilities.

From 2018	Project total cost	EU contribution	Website
To 2022	28.3 M€	21.9 M€	http://www.osmose-h2020.eu

Technologies and services deployed		
Technologies for consumers	✓	Demand response
Grid technologies	✓	Network management and control tools
Large-scale storage technologies	✓	Hydro storage
Distributed storage technologies	✓	Batteries & Flywheel
Generation technologies	✓	Wind power & PV
Market	✓	Electricity market
	✓	Ancillary services

Project partners' countries

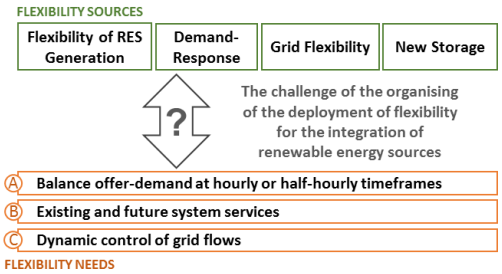
Coordinator: RTE RESEAU DE TRANSPORT D'ELECTRICITE SA (RTE)

Other partners:

- RED ELÉCTRICA DE ESPAÑA (Spain)
- TERNA S.p.A.(Italy)
- REN (Portugal)
- SISTEMSKI OPERATER PRENOSNEGA ELEKTROENGETSKEGA OMREZJA (Slovenia)
- ELIA (Belgium)
- Edison (Italy)
- HOLDING SLOVENSKE ELEKTRARNE D.O.O. (Slovenia)
- SAFT (France)
- GREENPOWER TECHNOLOGIES (Spain)
- ASEA BROWN BOVERI (Italy)
- IBM (Italy)
- EFACEC (Portugal)
- ENEL (Italy)
- COMPENDIA (Italy)
- COMMISSARIAT À L'ENERGIE ATOMIQUE (France)
- ECOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE (Switzerland)
- UNIVERSITÉ PARIS DAUPHINE (France)
- UNIVERSITÄT DUISBURG ESSEN (Germany)
- TECHNISCHE UNIVERSITÄT BERLIN (Germany)
- RICERCA SISTEMA ENERGETICO (Italy)
- ENERGIA E SISTEMI ELETTRICI (Italy)
- UNIVERSIDAD DE LAS PALMAS GRAN CANARIAS (Spain)
- CENTRO NACIONAL DE ENERGÍAS RENOVABLES (Spain)
- IT4POWER (Switzerland)
- ELEKTROENERGETSKI KOORDINACIONI CENTAR D.O.O. (Serbia)
- R&D NESTER (Portugal)
- ENGINEERING (Italy)
- E2I ENERGIE SPECIALI (Italy)
- INGETEAM (Spain)
- HYDRO DOLOMITI ENERGIA S.R.L. (Italy)
- SCHNEIDER ELECTRIC FRANCE SAS (France)
- FUNDAZIONE BRUNO KESSLER (Italy)

Project Description

Context. Six TSOs, eleven research partners, together with sixteen industries (manufacturers, solution providers) and market (producers, ESCo) players address, through a holistic approach, the identification and development of flexibilities required to enable the Energy Transition to high share of renewables. This approach captures synergies across needs (energy markets, system services, grid flow control) and sources of flexibilities (renewable generation, demand response, grid, storage), such as multiple services from one source, or hybridizing sources, thus resulting in a cost-efficient power system.



Scope. OSMOSE proposes four TSO-led demonstrations (RTE, REE, TERNA and ELES) aiming at increasing the techno-economic potential of a wide range of flexibility solutions and covering several applications, i.e.: synchronisation of large power systems by multiservice hybrid storage; multiple services provided by the coordinated control of different storage and FACTS devices; multiple services provided by grid devices, large demand-response and RES generation coordinated in a smart management system; cross-border sharing of flexibility sources through a near real-time cross-border energy market.

The demonstrations are coordinated with and supported by simulation-based studies which aim (i) to forecast the economically optimal mix of flexibility solutions in long-term energy scenarios (2030 and 2050) and (ii) to build recommendations for improvements of the existing market mechanisms and regulatory frameworks, thus enabling the reliable and sustainable development of flexibility assets by market players in coordination with regulated players.

Interoperability and improved TSO/DSO interactions are addressed so as to ease the scaling up and replication of the flexibility solutions. A database is built for the sharing of real-life techno-economic performances of electrochemical storage devices.

Technical description and implementation. For the integration of high-shares of non-dispatchable renewables, to foster the cost-efficient roll-out of flexibility solutions required for energy markets, for existing and future system services and for the dynamic control of grid flows:

- by demonstrating flexibility solutions enabling synergies across flexibility sources and applications, thus assessing and increasing their techno-economic feasibility;
- by increasing the techno-economic scalability of these solutions;
- by forecasting the economically optimal mix of flexibilities for the European power system, taking into account these synergies, for the best social welfare;
- by proposing evolutions of market designs & regulations leading to this mix and capturing these synergies, in order to achieve this social welfare.

Impact. *Replicability:* The demonstrations have a large coverage of the needs for flexibility, three of them focussing on the coordinated use of flexibility solutions mostly based on proven technologies (in stand-alone applications). Dedicated tasks will address the scaling-up and replicability issues, together with interoperability.

Socio-economics: the pan-European roll-out of flexibility solutions and (new) associated services will be beneficial for the industrial partners of the project by creating new market opportunities supporting this deployment.

Environment: The project, by facilitating the integration of very high shares of RES generation, improves the overall GHG emissions reduction of the pan-European power system.

Market Transformation: A real-time "FlexEnergy" dispatching market platform operating simultaneously at the national and cross-border levels, providing a supply-demand matching of bids maximising social welfare in a given time interval will be operated based on calculation of cross-border flexibility exchange capability close to real time.

Policy: The OSMOSE project will provide recommendations on market designs and regulations to ensure sufficient and cost-efficient provision of flexibilities and will also make a critical assessment of the current framework.

H2020 call: LC-SC3-ES-3-2018-2020 Integrated local energy systems (Energy islands)

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COMPILE

Integrating Community Power in Energy Islands

The main aim of COMPILE is to show the opportunities of energy islands for decarbonisation of energy supply, community building and creating environmental and socio-economic benefits.

From 2018	Project total cost	EU contribution	Website
To 2022	6.9 M€	5.4 M€	www.compile-project.eu

Technologies and services deployed		Project partners' countries
Technologies for consumers	✓ Demand response ✓ Smart appliance ü Smart metering	
Grid technologies	✓ Network management and control tools ✓ Micro-grid	
Large-scale storage technologies	✓	
Distributed storage technologies	✓ Batteries , Electric Vehicles ✓ Thermal Energy storage	
Generation technologies	✓ PV ✓ Microgeneration	
Market	✓ Electricity market ✓ Ancillary services	

Coordinator: UNIVERSITY OF LJUBLJANA (SLOVENIA)

Other partners:

- ETRA INVESTIGACION Y DESARROLLO SA (Spain)
- JOANNEUM RESEARCH FORSCHUNGSGESELLSCHAFT MBH (Austria)
- INSTITUTE OF COMMUNICATION AND COMPUTER SYSTEMS (Greece)
- PETROL SLOVENSKA ENERGETSKA DRUZBA DD LJUBLJANA (Slovenia)
- ETREL SVETOVANJE IN DRUGE STORITVE DOO (Slovenia)
- RESCOOP EU ASBL (Belgium)
- DISTRIBUIDORA ELECTRICA DE CREVILLENT S.L.U (Spain)
- IDEAZ STORITVE DOO (Slovenia)
- COOPERNICO - COOPERATIVA DE DESENVOLVIMENTO SUSTENTAVEL CRL (Portugal)
- DIMOS RAFINAS-PIKERMIOU (Greece)
- ZELENA ENERGETSKA ZADRUGA ZA USLUGE (Croatia)

Project Description

Context. Development in RES and IT technologies together supported by social activity creates new opportunities for setting up Energy Community (EnC). The main aim of COMPILE is to show the opportunities of energy islands for decarbonisation of energy supply, community building and creating environmental and socio-economic benefits.

Scope. COMPILE objectives are:

- Empowering Local Energy Systems (transition from a centralized system into a flexible but secure decentralized network);
- Optimal integration and control of all the energy vectors, storage and electromobility options to maximize decarbonisation and energy savings;
- Foster the creation of energy communities taking into account positive effects on the local economy and user acceptance considering vulnerable groups;
- Create new ways to stimulate actors in the value chain to cooperate and maximize the social benefit, to foster the adoption of the technological solutions and enable a large-scale replication of the developed technological solutions and business models.

Technical description and implementation. In order to reach the objectives of the project, 4 technical tools and 2 EnC creation/support tools will be developed/enhanced and tested at 5 pilot site locations in 5 different countries. The pilot sites vary in organizational maturity from starters Rafina municipality (Greece) to mature EnC in Crevillent (Spain). Pilot sites also vary in size from individual multi apartment building in Lisbon (Portugal) to small city of Crevillent (Spain) in order to test the replicability and scalability potential of developed tools.

Impact. *Replicability:* Replicability of COMPILE results are ensured by understanding the roles, opportunities and limitation of the actors, as well as their interplay. The COMPILE tools are validated and tailored to the needs of different actors, improving their replicability.

Socio-economics: COMPILE aims to understand what are the factors that are relevant for community building, for behaviour changes and for the uptake of new technologies by citizens. These factors are included in the community building activities in the pilot sites.

Environment: The methods of COMPILE include also life cycle analysis (LCA), so that the environmental impact of all the results is understood. LCA also guides the optimization of Local Energy Communities and contributes to the overall aim of the decarbonization of the economy.

Market Transformation: To successfully contribute to market transformation, we need to understand new value chains, the roles of different actors and their revenue streams. COMPILE covers all stages of an innovation system, from knowledge generation through demonstration to market formation. It investigates and even shapes the enabling framework, the "innovation ecosystem" in which the COMPILE solutions can be deployed. COMPILE solutions enable different actors to pursue new business models and use the knowledge gathered in the project to arrive at positive business cases.

Policy: COMPILE is one of 4 sister projects under the LC-SC-3 call. The demonstrations cover pilot sites in more than 12 EU countries. This way, the policy recommendations can be shared and harmonized via BRIDGE and direct cooperation among sister projects. Insight and learnings can be better generalized, guaranteeing robust conclusions for national and EU legislation.

International dimension: COMPILE also shares the results with goal of increasing the replicability of solutions through cooperation with 2 international partners: Institute of Rural Management Anand (IRMA) from India and China University of Mining and Technology-Beijing from China.

H2020 call: LC-SC3-ES-3-2018-2020 Integrated local energy systems (Energy islands)

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E-LAND

Novel solutions for decarbonised energy islands

E-LAND develops a toolbox for Multi-Energy Islands including tools and methods for addressing business, society and technology challenges.

From 2018	Project total cost	EU contribution	Website
To 2022	5.9 M€	5.3 M€	http://www.elandh2020.eu

Technologies and services deployed		Project partners' countries
Technologies for consumers	✓ Demand response Smart Metering	
Grid technologies	✓ HVAC , Network management and control tools and Micro-Grid	
Large-scale storage technologies	✓ Power to gas	
Distributed storage technologies	✓ Batteries ✓ Electric Vehicles ✓ Thermal energy storage	
Generation technologies	✓ Wind Power, PV Solar thermal, Micro-generation	
Market	✓ Electricity market ✓ Ancillary services	

Coordinator: UNIVERSITAT DE GIRONA (Spain)

Other partners:

- Schneider Electric Norge AS (Norway)
- BORG HAVN IKS (Norway)
- INSTITUTT FOR ENERGITEKNIKK (Norway)
- GECO GLOBAL IVS (Denmark)
- SMART INNOVATION NORWAY AS (Norway)
- INTRACOM SA TELECOM SOLUTIONS (Greece)
- REINER LEMOINE INSTITUT GGMBH (Germany)
- UNIVERSITATEA VALAHIA TARGOVISTE (Romania)
- ASOCIATIA CENTRUL DE RESURSE PENTRU EFICIENTA ENERGETICA (Romania)
- UNIVERSITAET ST. GALLEN (Switzerland)
- INSTRUMENTACION Y COMPONENTES SA (Spain)

Project Description

Context. In the era of urgency to tackle the climate change, synergies between multiple energy vectors can support decarbonization of local energy islands and, at the same time, relieve constraints from the electricity grid. Multi-vector energy systems offer flexibility to integrate variable and economic local energy generation. However, the implementation and operation of multi-vector energy systems face technical, societal and business-related challenges.

Scope. E-LAND addresses previously identified challenges by developing and implementing the E-LAND Toolbox for Multi-Energy Islands. Technologically, E-LAND bridges the communication and information flow between different local energy systems to create and implement an integrated solution. Socially, E-LAND incorporates citizens and other local community members as part of the solution development team to facilitate bottom-up solution development. Involving citizens to co-create solutions ensures better acceptance of novel technologies and facilitates changes in behaviour, which together strengthen energy reliability and increase the self-sufficiency of communities. In the business field, E-LAND develops tools, which will support market players to innovate their business model to cope with energy-transition and rapid implementation of renewable energies, storage facilities and data-analytic tools.

Technical description and implementation. The final product will be a powerful toolbox consisting of tools to build decarbonised, multi-vector Energy Islands on a foundation of advanced ICT and data analytics technologies, strong community engagement tools and solid business models. To meet the goals of the project, a co-creative process has been designed which involves active participation of end-users together with technology developers. The toolbox will be modular and customizable to specific local requirements, expandable to incorporate new tools and interoperable with standards-based legacy systems. The tools will be implemented and validated at three pilot locations in Europe (Spain, Norway & Romania) and two simulated pilots in India.

Impact. *Replicability:* E-LAND ensures the potential for wide rollout of the Toolbox by validating the replicability of the tools with different locations in terms of geography, demography, sociography and maturity.

Socio-economics: The E-LAND project seeks to develop, pilot and validate new and innovative solutions suitable for the European market as well as the global market. The project involves many stakeholders, each seeking to gain different benefits and link many energy topics. It strengthens the foundation of multiple industry sectors, and for each of these sectors the project opens additional employment opportunities and new business ventures.

Environment: Through the 3 European pilots implemented in the project, E-LAND will demonstrate a reduction of CO_2 emissions, an increase in renewables utilisation and self-sufficiency. E-LAND tools have potential to simultaneously decarbonise electricity sector, transport sector and gas sector. In countries like India where rural areas are still dependent on the burning of fossil fuels E-LAND will make implementation of renewable-based microgrid affordable.

Market Transformation: As a general goal for sustainable business creation, E-LAND aims for financially self-sustainable pilots after the project execution. The new business models developed for energy islands will support communities to run their own energy system in a self-sustaining and profitable way. E-LAND will develop a business model innovator tool which can be readily used by broader market players to design new business models or to improvise on existing ones under changing energy paradigm.

Policy: The project will expose existing regulatory barriers in general and specific barriers existing in the pilot countries. Results of the work will lead to the identification of current regulatory barriers, including risk preparedness regulations and regulations on crisis management.

H2020 Call: LC-SC3-ES-3-2018-2020 - Integrated local energy systems (Energy islands)

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IElectrix

Indian and European Local Energy CommuniTies for Renewable Integration and the Energy Transition

IElectrix contributes to the European ambition through Citizens Energy Communities. This project accelerates the integration of Renewable Energy Sources into the distribution networks and the decarbonization of the energy system.

From 2019	Project total cost	EU contribution	Website
To 2022	10.7 M€	7.9 M€	www.ielectrix-h2020.eu

Technologies and services deployed		Project partners' countries
Technologies for consumers	✓ Demand response ✓ Smart metering	
Grid technologies	✓ Micro-grid ✓ Network management and control tools	
Distributed storage technologies	✓ Batteries ✓ Electric Vehicles	
Generation technologies	✓ PV ✓ Wind Turbine ✓ Bio-gas plant	
Market	✓ Electricity market	

Coordinator: Enedis (France)

Other partners:

- ENERGIE GUSSING GMBH (Austria)
- E.DIS NETZ GMBH (Germany)
- E.ON ESZAK-DUNANTULI ARAMHALOZATI ZARTKORUEN MUKODO RT (Hungary)
- DIACHEIRISTIS ELLINIKOU DIKTYOU DIANOMIS ELEKTRIKIS ENERGEIAS AE (Greece)
- EUROPAISCHES ZENTRUM FUR ERNEUERBARE ENERGIE GUSSING GMBH (Austria)
- ATOS SPAIN SA (Spain)
- SCHNEIDER ELECTRIC INDUSTRIES SAS (France
- HYPERTECH (CHAIPERTEK) ANONYMOS VIOMICHANIKI EMPORIKI ETAIREIA PLIROFORIKIS KAI NEON TECHNOLOGION (Greece)
- Odit-e (France)
- Geco Global IVS (Denmark)
- MERIT CONSULTING HOUSE (Belgium)
- FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS (Spain)
- UNIVERSIDAD PONTIFICIA COMILLAS (Spain)
- RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (Germany)

Project Description

Context. The objective of IElectrix is to develop innovative technical solutions and economical business models to facilitate the implementation of Citizen Energy Communities (CEC). This is also a way to speed up the integration of Renewable Energy Sources in Smart Grids and to take part in the decarbonisation of the energy system. In this context, Distribution System Operators need to ensure an appropriate connection of CEC within the grid.

Scope. The IElectrix project gathers European and Indian partners towards the achievement of a common technical and economical goal. It consists in implementing different Smart Grids demonstrators to test a set of functionalities required to keep up with the current energy sector transformation: renewable intermittent energies, digitization, decentralization, and consumer's implication. To reach such goals, IElectrix project brings forward innovative technical solutions:

- Mobile storage systems and digital substations
- Implementation of demand-side management schemes
- Microgrid and islanding solutions
- Low voltage grid digitalization

Technical description and implementation. The 5 demonstration pilots are based on different regulatory and ecosystem contexts: one is located in India, two in Hungary, one in Germany and one in Austria:

The Indian demonstration pilot anticipates the large amount of photovoltaic panels (PV) which will be connected at the low voltage level in the coming years following recent governmental plans.

The Hungarian demonstration pilots address issues that are located at an early stage of renewable deployment in two distinct regions.

The German demonstration pilot is carried out in a region with a high amount of Renewable Energy Sources (RES) already integrated in the grid. Within the demonstration, a mobile storage system is used in order to both postpone costly network reinforcements and integrate more RES in a faster way.

The Austrian demonstration pilot involves an existing energy community in the Güssing District where RES investments have already been made.

Impact. *Replicability:* The scalability and replicability analysis of the use cases aims at learning from the solutions tested in the demonstrators and evaluating the impacts of their implementation at a larger scale within a similar or a different energy background. In parallel, a coordination with similar EU-funded projects is implemented to address four policy relevant issues: regulatory framework, business models, data management, and customer engagement, in support of the deployment studies.

Socio-economics: The project aims at stimulating the pan-European and Indian roll-out of flexibility solutions and associated services: this will be beneficial for the industrial partners of the project by creating new market opportunities supporting this deployment. The systemic technical and market optimisation proposed by the consortium partners should also help optimise social welfare and guarantee adequate signals for investors and competitive electricity prices for end users.

Environment: The project facilitates the integration of very high shares of RES generation, and thus improves the overall GHG emissions reduction of the pan-European power system.

Policy: The present project aims at providing recommendations on market designs and regulations to ensure sufficient and cost-efficient provision of flexibilities at DSO level, while making a critical assessment of the current frameworks. The costs supporting these recommendations is first studied with a regional focus (Germany, France, Hungary) and next extrapolated at pan European level. These outputs, based on the results from the demonstrations and replication studies, support the Clean Energy for all Europeans package in general.

H2020 Call: LC-SC3-ES-3-2018-2020 - Integrated local energy systems (Energy islands)

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MERLON

Integrated Modular Energy Systems and Local Flexibility Trading for Neural Energy Islands

MERLON introduces an Integrated Modular Local Energy Management Framework for the Holistic Operational Optimization of Local Energy Systems in presence of high shares of volatile distributed RES.

From 2019	Project total cost	EU contribution	Website
To 2022	7.6 M€	5.7 M€	https://www.merlon-project.eu/

Technologies and services deployed

Technologies for consumers
- ✓ Demand response
- ✓ Smart appliance
- ✓ Smart metering

Grid technologies
- ✓ Micro-grid

Distributed storage technologies
- ✓ Batteries
- ✓ Electric Vehicles
- ✓ Thermal energy storage

Generation technologies
- ✓ PV

Market
- ✓ Electricity market
- ✓ Ancillary services

Project partners' countries

Coordinator: HYPERTECH (CHAIPERTEK) ANONYMOS VIOMICHANIKI EMPORIKI ETAIREIA PLIROFORIKIS KAI NEON TECHNOLOGION (Greece)

Other partners:

- ATOS SPAIN SA (Spain)
- IMPERIAL COLLEGE OF SCIENCE TECHNOLOGY AND MEDICINE (United Kingdom)
- COBRA INSTALACIONES Y SERVICIOS S.A (Spain)
- SUITE5 DATA INTELLIGENCE SOLUTIONS LIMITED (Cyprus)
- ENERGIE GUSSING GMBH (Austria)
- SOREA SOCIETE DES REGIES DE L'ARC (France)
- EUROPAISCHES ZENTRUM FUR ERNEUERBARE ENERGIE GUSSING GMBH (Austria)
- MERIT CONSULTING HOUSE (Belgium)
- XOROTEXNIKI ANONYMO TEXNIKO ETAIREIA (Greece)
- UNIVERSITY OF NEWCASTLE UPON TYNE (United Kingdom)
- UNIVERSITY OF PELOPONNESE (Greece)
- INDIA SMART GRID FORUM (India)

Project Description

Context. MERLON spans local generation output, energy demand, storage flexibility and options offered by EVs, and interconnection among different energy vectors to facilitate RES integration into the grid, curtailment avoidance and satisfaction of balancing/ancillary grid needs. This is achieved through integration of innovative technologies for local energy system integration, human-centric demand response, optimised energy storage, Grid-to-Vehicle (G2V), Virtual Thermal Energy Storage and coordination with local CHP plants as well as their operational optimisation.

Scope. The key objectives of MERLON are:

- To introduce and integrate Smart Inverter technology combined with Battery Energy Storage Systems connected at key network locations of the Integrated Local Energy Systems;
- To facilitate maximum RES integration, self-consumption and satisfaction of balancing/ ancillary grid needs through holistic integration and optimal coordination of local flexibility resources (generation, demand, storage, EVs);
- To contribute to the establishment of local energy communities with their local flexibility markets;
- To introduce innovative technologies able to automatically modify demand profiles, without violating prosumer preferences/ schedules;
- To democratise energy flexibility markets via corresponding business models accompanied by clearly defined and transparent rules, standardised contracts and appropriate technological tools for local energy markets.

Technical description and implementation.

MERLON brings together a wide range of mature and proven technologies and integrates them in a holistic and interoperable framework, comprising in a fully-fledged suite of tools and applications for all major stakeholders involved in the Optimisation of Local Energy Management Systems. The backbone of the MERLON solution consists in a modular and extendable Smart Inverter system connected at substation level, which is responsible for the Battery Energy Storage Systems (BESS) integration and its operation orchestration while enabling temporal intentional islanding and grid forming when required to ensure security of supply and power quality.

Impact. *Replicability:* The diversity of the selected MERLON pilot sites ensures a sound validation process and a high replication potential around EU. The scale of the prominent pilots, the diversity of involved stakeholders and the population size actively involved, establish the necessary critical mass upon which the large-scale promotion and uptake of project results is pursued.

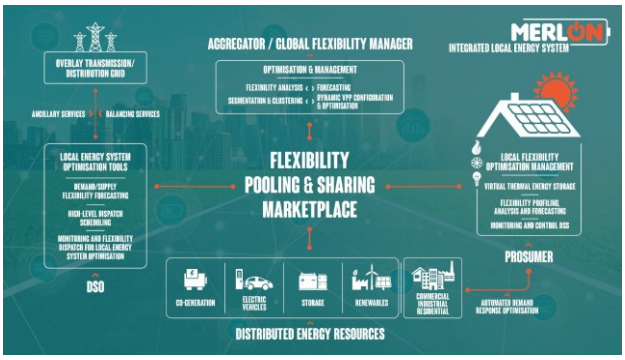
Socio-economics: Based on an assumption that, for every conventional GWh reduction, around 0.17-0.6 jobs are created in the EU, 40,000-150,000 jobs can be created until 2050 only by avoiding the curtailment.

MERLON will contribute to tackling the energy poverty problem around EU directly through the pilot sites.

Environment: The avoidance of extra conventional generation capacity will lead to significant reduction of CO_2 emissions. MERLON will also support the self-consumption model. Self-consumption can make an important contribution to finance the energy transition. Commercial consumers can reach high rates of renewable energy self-consumption (e.g. 50%-80%).

Market Transformation: MERLON solution will be validated in two local energy systems/pilot sites in Austria and France, enabling the extraction of conclusions, policy recommendations and market reform requirements addressing diverse political, market/ business, demographic and cultural contexts.

Policy: MERLON adopts and establishes a user-driven innovative environment that accelerates collaborative knowledge, technology customisation, validation against real market and end-user needs as well as end-product definition and go-to-market strategy creation. MERLON brings together all the value-chain stakeholders in an effort to leverage their multi-disciplinary expertise towards setting the basis for the efficient co-creation of market-ready, cutting-edge, innovative solutions.



H2020 Call: LC-SC3-ES-3-2018-2020 - Integrated local energy systems (Energy islands)

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MUSE Grids

Multi Utilities Smart Energy GRIDS

MUSE Grids aims to be a lighthouse inspiration project for the EU. It will demonstrate in two inspiring demosites a set of both technological and non-technological solutions towards local energy independency via the promotion of a smart energy system.

From 2018	Project total cost	EU contribution	Website
To 2022	7.4 M€	5.9 M€	http://www.muse-grids.eu/

Technologies and services deployed

Technologies for consumers	✓ Demand response ✓ Smart appliance ✓ Smart metering
Grid technologies	✓ Network management and control tools Micro-grid
Distributed storage technologies	✓ Batteries ✓ Electric Vehicles ✓ Thermal energy storage
Generation technologies	✓ Wind power ✓ PV
Market	✓ Electricity market

Project partners' countries

Coordinator: RINA CONSULTING SPA (Italy)

Other partners:

- FUNDACION CARTIF (Spain)
- AALBORG UNIVERSITET (Denmark)
- UNIVERSITA POLITECNICA DELLE MARCHE (Italy)
- ASTEA SPA (Italy)
- TH!NK E (Belgium)
- SIEMENS GAMESA RENEWABLE ENERGY INNOVATION & TECHNOLOGY S.L. (Spain)
- TECHNISCHE UNIVERSITEIT EINDHOVEN (Netherlands)
- ENERGETICA S COOP (Spain)
- BELGISCH LABORATORIUM VAN DE ELEKTRICITEITSINDUSTRIE (Belgium)
- GALU LIMITED (Ireland)
- DUFERCO ENERGIA SPA (Italy)
- EUROPEAN ASSOCIATION FOR STORAGE OF ENERGY (Belgium)
- GLEN DIMPLEX HEATING & VENTILATION IRELAND UNLIMITED COMPANY (Ireland)
- Eptisa Servicios de Ingeniería S.L. (Spain)
- MUNICIPALITY OF EILAT (Israel)
- ABB OF ASEA BROWN BOVERI (Belgium)
- SCAME PARRE SPA (Italy)

Project Description

Context. MUSE Grids aims to demonstrate, in two weakly connected areas (a town on a top of a hill and a rural neighbourhood), a set of both technological and non-technological solutions targeting the interaction of local energy grids (electricity grids, district heating and cooling networks, water networks, gas grids, electromobility etc.). This would enable maximization of local energy independency through optimized management of the production via end user-driven control strategies, smart grid functionality, storage, CHP and RES integration.

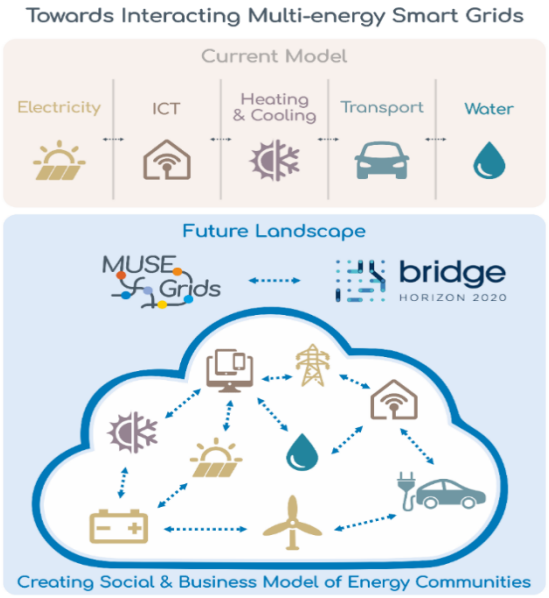
Scope. MUSE Grids promotes two concepts – Smart Energy System and Local Energy Community – not only in physical pilot sites, but also in virtual demo sites in India, Israel and Spain. Social and environmental aspects of the smart multi-energy system transition will be investigated, and citizens in the physical pilot sites will be directly involved. The project involves leading EU companies and energy utilities, and will inspire dedicated policy redaction by also providing insights to the BRIDGE initiative.

Technical description and implementation.

The two MUSE Grids physical demo sites help in understanding the energy system and defining baseline scenarios for the main challenges faced by EU local energy systems with weak connections to the main grid:

- Belgian demo: the rural district of Oud-Heverlee (part of a municipality with around 10,800 inhabitants, in the province of Flemish Brabant) brings into MUSE Grid a street on a weak grid from transformer to end of line. Voltage swings measured show values of below 200V and up to over 260V. Additionally, a severe imbalance between the phases can be observed, leading to unacceptable deviations, mainly on the third harmonic. These two phenomena cause damage to electronics and have a negative impact on the lifetime of electrical devices;
- Italian demo: the town of Osimo (an old city with around 35,000 inhabitants, in the province of Ancona in the Marche region) has a challenging single line connection to the main electricity grid. Due to the high penetration of renewable energy generation (mostly PV), the municipal microgrid witnesses a huge variance in the netload exchange with national grid throughout the year, swinging from 30MW of peak absorption, when the renewable generation is not sufficient to cover for the local energy demand, down to 20MW of peak injection towards the national grid, when the local generation exceeds the total loads (mainly during summer weekends).

These demos are complemented with four virtual demonstration cases, located in Spain, Israel, India, representing a significant variety of urban / rural contexts.



Impact. *Replicability:* MUSE Grids focuses on technology demonstration, as well as on the market viability and the replicability of the MUSE Grids technologies and the targeted subcomponents (products and services).

Socio-economics: MUSE Grids empowers citizens to consume energy more responsibly, contributes to energy savings and help grids become more flexible so they can operate more efficiently and qualitatively.

Environment: MUSE Grids aims to increase the perception and the importance of interconnecting grids towards a more robust and RES based energy scenario.

Market Transformation & Policy: MUSE Grids is committed to making a major contribution to the BRIDGE initiative and in doing so, to ongoing policy developments in areas of internal electricity market design, retail market design and ongoing discussions on self-consumption. MUSE Grids is also already supported by EERA and will provide insights to ETIP SNET and SCI.

H2020 call: LC-SC3-ES-3-2018-2020 - Integrated local energy systems (Energy islands)

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RENAISSANCE

RENewAble Integration and SuStainAbility iN energy CommunitiEs

RENAISSANCE aims at demonstrating highly replicable design and management approaches for integrated local energy systems, that achieve high participation of local consumers (15-20%), exceed at local level EU targets for renewable energy sources (37-80%) while decreasing the energy price for community members (10-15% below current market prices). The methodology and each of the pilots (Belgium, Greece, Spain and the Netherlands) will cover key energy vectors (electricity, heat, transport), involve different actors (households, SMEs, institutions), and valorise flexibility services within and between communities, and with DSOs.

From 2019	Project total cost	EU contribution	Website
To 2022	6.7 M€	5.95 M€	https://www.renaissance-h2020.eu/

Technologies and services deployed		Project partners' countries
Technologies for consumers	✓ Demand response ✓ Smart metering	
Grid technologies	✓ Protections ✓ Network management and control tools ✓ Micro-grid	
Distributed storage technologies	✓ Batteries ✓ Electric Vehicles ✓ Thermal Energy Storage	
Generation technologies	✓ PV ✓ Solar thermal	
Market	✓ Electricity market ✓ Ancillary services	

Coordinator: VRIJE UNIVERSITEIT BRUSSEL (Belgium)

Other partners:

- IKERLAN S COOP (Spain)
- ATOS SPAIN SA (Spain)
- DEEP BLUE SRL (Italy)
- EVERIS ENERGIA Y MEDIOAMBIENTE SL (Spain)
- ESTACION DE INVIERNO MANZANEDA SA (Spain)
- FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS (Spain)
- DIMOKREITIO PANEPISTIMIO THRAKIS (Greece)
- ETHNIKO KENTRO EREVNAS KAI TECHNOLOGI ANAPTYXIS (Greece)
- BAX INNOVATION CONSULTING SL (Spain)
- SDM-PROJECTS (Belgium)
- NARODOWA AGENCJA POSZANOWANIA ENEI SA (Poland)
- ABB OF ASEA BROWN BOVERI (Belgium)
- SUNAMP LIMITED (United Kingdom)
- GEMEENTE EEMNES (Netherlands)

Project Description

Context. Energy is mainly generated outside the community where it is consumed. This layout is a consequence of a distribution grid designed and built for centralised production in large power plants: energy is transported to the consumer placed kilometres far from the production site. Such a grid results in both contributing significantly to GHG emissions and in being inherently inefficient and costly in energy transmission and distribution.

LECs could allow for energy trading within and among communities, increasing the amount of locally produced energy and the share of renewable energy in the whole picture. While underlying technology solutions for LESs have already been mostly developed, and new business models emerge – especially where legislative changes enable it – there is a lack of consumer-centric solutions.

Scope. The operational scope of RENAISSANCE is the low-voltage network, mostly at the level of one or several sub-stations level. To compare; a single substation typically has a capacity of up to 10MW, covering buildings (residential, commercial and small-scale industrial), renewable generation and storage, and other assets such as e-vehicles. Socially, such systems serve up to 10,000 people or 10 medium sized business (offices or light industrial). Financially, the consumer end price of energy is €1 to €5M per year. For Demand Response and trading purposes, RENAISSANCE will virtually connect several LECs.

Technical description and implementation. RENAISSANCE will mature its approach through 3 tiers of demonstrators, which will bring its TRL from 6 to 9. The base is the site of the Vrije Universiteit Brussel, where advanced generation, storage and management hardware is installed, and highly detailed data is made open source. RENAISSANCE will be demonstrated in 3 sites with different settings; a publicly controlled urban community (GR), an end-user driven urban community (NL) an and-user driven remote community (ES). Finally, the integrated approach will be presented to sites in India, USA, Poland, UK to be ´localised´ and tested against market conditions.

Impact. *Replicability:* The RENAISSANCE project aims to activate the high potential of replicability of smart grid solutions provided by the RENAISSANCE consortium. The approach is a breakthrough in reaching widely applicable and replicable pathways for local energy systems, in particular relevant for small to medium sized communities. To maximise the expected impact, RENAISSANCE has set up an approach for in-project demonstration, replication and wide validation for key markets within Europe and at global level.

Socio-economics: Consumer activation will be explored in two ways; where possible, the percentage of consumers in a defined catchment area voluntarily switching to RENAISSANCE energy communities, and as secondary indicator, the percentage of consumer in a defined catchment actively using supporting applications.

Environment: The EC maintains as 2030 target for RES share in Gross Final Energy Consumption of 27%. While there are ambitions to localising, there are no targets for local RES. As baseline, RENAISSANCE therefore aims to demonstrate the commercial feasibility of achieving the 2030 target of 27% of energy production at local level. By offsetting non-RES with RES, the annual CO2 emissions savings - measured against CO2 loads for national energy mixes – for the project are 565 tonnes per year.

Market Transformation: The RENAISSANCE project could potentially have a major impact on the overall average costs and environmental impact of energy consumption in Europe once replicated at large scale – across all low voltage energy nodes of Europe. Assumptions; other energy islands have a similar local RES capacity as the demonstrators, and the strategic value of oversized DSO/TSO connections is not taken into account.

Policy: Policy recommendations towards local authorities and the EC that can foster the development of smart clusters will be developed. Also, policy measures to foster the roll-out and replication of the energy island will be formulated.

H2020 call: LC-SC3-ES-3-2018-2020 - Integrated local energy systems (Energy islands)

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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 2021	Project total cost	EU contribution	Website
To 2025	5.7 M€	5.1 M€	Not yet available

Technologies and services deployed

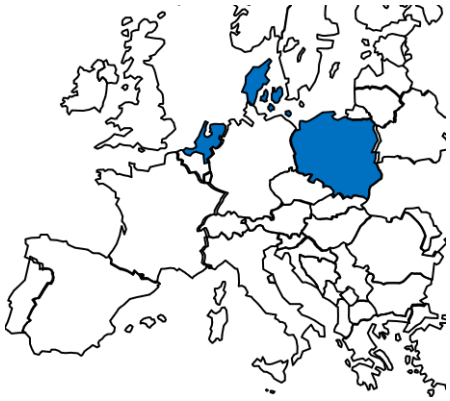
Technologies for consumers
- ✓ Demand Response
- ✓ Smart appliance
- ✓ Smart metering

Grid technologies
- ✓ HVAC
- ✓ Micro-grid
- ✓ Monitoring and control units

Distributed storage technologies
- ✓ Batteries
- ✓ Electric vehicles
- ✓ Thermal energy storage

Generation technologies
- ✓ wind turbines
- ✓ PV
- ✓ Micro-cogeneration
- ✓ Solar Thermal
- ✓ Biogas

Project partners' countries



Coordinator: AALBORG UNIVERSITY AAU (DK)

Other partners:

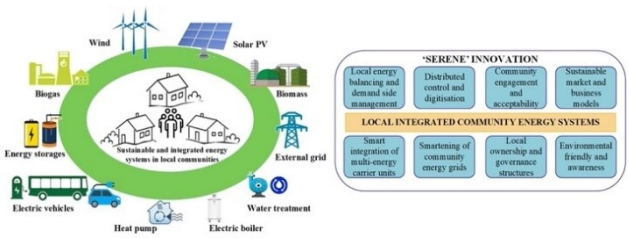
- Skanderborg Municipality (DK)
- Aura Energi (utility company) (DK)
- Neogrid Technologies Aps. (DK)
- Suntherm Aps: SNT (DK)
- Bjerregaard Consulting Aps.: BJC (DK)
- Universiteit Twente (NL)
- Stichting Saxion:SAX (NL)
- Vereiniging Aardehuis Oost Nederland (NL)
- Loqio Services B.V. (NL)
- Gmina 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. 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



SERENE approach to develop local integrated community energy islands

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.

H2020 call: LC-SC3-ES-3-2018-2020 - Integrated local energy systems (Energy islands)

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LocalRES

Empowering local renewable energy communities for the decarbonisation of the energy systems

LocalRES will deploy innovative local energy systems driven by Renewable Energy Communities (REC) for a socially fair energy transformation that puts renewable energy into the hands of communities and people. LocalRES will deliver new digital tools that will boost the expected structural change in the current energy system at different levels: 1) generation, increasing the number of small power producers of renewable energy; 2) market, creating local energy markets that enable prosumers to trade energy volumes within local communities; 3) distribution, establishing a multidirectional energy flow and promoting REC driven energy services, and 4) consumers, empowering consumers to be active and participate in the energy system and the design of their own REC.

From 2019	Project total cost	EU contribution	Website
To 2022	7.1 M€	6.1 M€	Not yet available

Technologies and services deployed

Technologies for consumers
- ✓ Smart appliance
- ✓ Demand response
- ✓ Smart metering

Grid technologies
- ✓ Micro-grid
- ✓ Network management
- ✓ Monitoring and control units

Large-scale storage technologies

Distributed storage technologies
- ✓ Batteries
- ✓ Electric vehicles
- ✓ Thermal energy storage

Generation technologies
- ✓ Micro-wind turbines
- ✓ PV
- ✓ Micro-cogeneration
- Biomass

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 (Spa
- UNIVERSITAT PASSAU (Germany)
- LAB10 COLLECTIVE EG (Austria)
- MARKTGEMEINDE OLLERSDORF IM BURGENLAND (Austria)

Project Description

Context. EU energy policy aims to deliver energy to consumers at affordable prices, enhance security of supply, and decarbonise the energy sector. According to the new Clean Energy Package (2018) consumers shall be entitled to have an active role in the EU energy system, leveraging on the possibilities offered by renewable energy. EU has set a target to reach a share of at least 27% renewables in final energy consumption by 2030, with half of the electricity coming from renewable energy sources (RES), while the electricity should be 100% carbon-free by 2050[4]. To achieve these objectives, most of this new RES capacity will continue to be deployed on the customer premises at local level, while a fully market-integration should be ensured to meet affordable energy prices.

Scope. the main focus of LocalRES is on Renewable Energy Communities (RECs) as main actors to lead the structural change towards the decarbonisation of the local energy systems through the involvement and awareness-raising of citizens and communities.

Technical description and implementation. LocalRES will develop a planning tool oriented to enable citizen participation in the REC planning decision-making processes and will allow to maximize the replicability and scalability potential of the decentralized solutions developed in the project.

LocalRES will also develop and demonstrate at TRL8 a Multi-Energy Virtual Power Plant (MEVPP) approach to optimize in real-time different energy vectors and different energy and flexibility services by the REC, according to their community preferences. The MEVPP will maximize the RES contribution, enhance the energy system flexibility and supply security.

The LocalRES solutions will promote a secure, sustainable, competitive and affordable energy supply for everyone.

Impact *Replicability:* LocalRES solutions for the decarbonisation of local energy systems will be showcased in replicability workshops to trigger the creation of new RECs across EU. Lessons learnt during the demonstration actions will be used for policy recommendations.

Socio-economics: LocalRES develops and demonstrates digital tools (planning tool and control based on Multi Energy Virtual Power Plant) to enhance the creation and the management of Renewable Energy Communities via a participatory approach, thereby involving the whole socio-technological energy system value chain.

Environment: LocalRES solutions will support the acceleration of the local energy transition and decarbonisation of local energy systems.

Market Transformation: Local energy markets will be created that enable prosumers to trade energy volumes of their choice within local communities.

Policy: Following the new Clean Energy Package (2018), LocalRES envisions a new energy system totally decentralized where electricity, H&C and mobility become increasingly interconnected. In a truly complementary approach, LocalRES will contribute to integrate the EU top-down energy and climate policy mechanisms with a bottom-up approach that aims to promote decarbonisation of the local energy system.

4 https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/631047/IPOL_BRI(2019)631047_EN.pdf

H2020 call: LC-SC3-ES-4-2018-2020 Decarbonising energy systems of geographical Islands

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GIFT

Geographical Islands FlexibiliTy

GIFT is an innovative project that aims at decarbonising the energy mix of European islands through holistic energy management, trading and innovative storage solutions.

From 2019	Project total cost	EU contribution	Website
To 2022	12 M€	9.5 M€	www.gift-h2020.eu

Technologies and services deployed		Project partners' countries
Technologies for consumers	✓ Demand response	
Grid technologies	✓ HVAC ✓ Micro-grid ✓ Network management and control tools	
Large-scale storage technologies	✓ Power to gas	
Distributed storage technologies	✓ Batteries , Electric Vehicles ✓ Thermal energy storage	
Generation technologies		
Market	✓ Electricity market ✓ Ancillary services	

Coordinator: INEA INFORMATIZACIJA ENERGETIKA AVTOMATIZACIJA DOO (Slovenia)

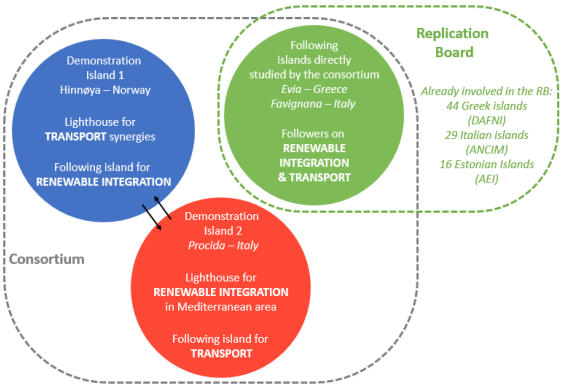
Other partners:

- INTRACOM SA TELECOM SOLUTIONS (Greece)
- TRIALOG (France)
- ETREL SVETOVANJE IN DRUGE STORITVE DOO (Slovenia)
- SYLFEN (France)
- ELESTOR BV (Netherlands)
- Odit-e (France)
- HAFENSTROM AS (Norway)
- EUROQUALITY SARL (France)
- HALOGALAND KRAFT NETT AS (Norway)
- HARSTAD KOMMUNE (Norway)
- COMUNE DI PROCIDA (Italy)
- CENTRO DE INVESTIGACAO EM ENERGIA REN - STATE GRID SA (Portugal)
- NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET NTNU (Norway)
- CENTRE FOR RENEWABLE ENERGY SOURCES AND SAVING FONDATION (Greece)
- ASSOCIATION POUR LA RECHERCHE ET LE DEVELOPPEMENT DES METHODES ET PROCESSUS INDUSTRIELS (France)
- UNIVERSITA DEGLI STUDI DI ROMA LA SAPIENZA (Italy)

Project Description

Context. Energy prices on geographical island are typically 100% to 400% higher than on the mainland; therefore the large-scale deployment of local renewable energy sources brings economic benefits and, at the same time, contributes to decarbonise the energy system of the island, reduce greenhouse gas emissions and improve, or at least not deteriorate, air quality. European islands have to abidec by the law of their countries that push toward a greener energy mixc to comply with the European and international agreements.

Scope. GIFT is willing to develop innovative systems to allow islands to integrate vast amount of renewables. In order to reach that goal, the coordinator INEA has built a well-balanced consortium gathering a total of 17 partners of 7 countries, including 1 industrial partner, 9 SMEs, two municipalities, 3 research centres and 2 universities. Through the development of multiple innovative solutions, GIFT increases the penetration rate of renewable energy sources into the islands' grid, reducing their needs for diesel generation and thus decreasing the greenhouse gases emissions directly related to it. During 4 years, the partners will develop and demonstrate the solutions in two lighthouse islands, in Hinnøya, Norway's largest island and the small island of Procida in Italy and study the replicability of the solution in a Greek and Italian islands at the minimum, respectively Evia and Favignana. The complementarity of these islands in terms of climate, energy mix, population and activities is meant to have solutions adaptable to different situations.



Technical description and implementation. In the project, we will demonstrate several technical solutions, each specifically designed to address real life scenarios in the electric grid. The main differentiator of the GIFT project is focus on the integration. We will deliver a comprehensive integrated solution that will fit to several different environments. This approach will significantly improve the exploitation potential of the GIFT solution. We segment our technologies in the following segments:

- Grid observability: short-term prediction algorithms, IoT, GIS, modelling;
- Predictions of energy supply and demand;
- Visualisation of energy supply and demand;
- Enterprise Service Bus: integration with legacy systems, supporting interoperability;
- Virtual power system: addressing the flexibility in a standardised way, through techno-economical optimisation;
- Several types of storage solutions: Ship/Harbour EMS, EVs, Virtual storage in processes, Factory EMS, Smart Energy Hub (multi vector storage), HBr storage system.

Impact. *Replicability*: Our project carries on the work from several different projects under FP7 and H2020, as well as privately funded and national projects. Most of the partners in the consortium are from industry and the technologies they bring on board are part of their strategic development. Furthermore, those partners are active on the market and will exploit the results through their market channels. We construct a special replication board within the project, which is responsible to disseminate our technologies to interested islands.

Socio-economics: Our project will enable the electricity users to become active players in optimization of electricity system. Through gains for all players, we also stimulate investments. With reducing the stress on the grid, as well as solving the congestions, we help ensuring stable and reliable supply to end users.

Environment: Our technologies are low or zero carbon. Furthermore, the whole GIFT system allows for high level penetration of renewables that would otherwise endanger the normal grid operation.

Market Transformation and Policy: We are promoting new business models through our roles and players model, which is based on European harmonized role model. We are acting local, our partners are DSOs, BRPs and local energy suppliers. We are in line with the "Winter package", which puts the prosumer in central role.

H2020 call: LC-SC3-ES-4-2018-2020 - Decarbonising energy systems of geographical Islands

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INSULAE

Maximising the impact of Innovative energy approaches in the EU Islands

INSULAE aims at helping islands find locally produced, sustainable and low-cost sources of energy. The project develops interventions linked to seven replicable use cases at three Lighthouse Islands (in Croatia, Denmark and Portugal). The goal is to demonstrate their capability to evolve RES-based systems up to 70 % cheaper than diesel. To assist Europe's policymakers, the project designs an investment planning tool to be displayed at four Follower Islands in Germany, Greece, Spain and France DOM/TOM for the improvement of related action plans.

From 2019	Project total cost	EU contribution	Website
To 2023	12.16 M€	9.99 M€	www.insulae-h2020.eu

Technologies and services deployed	
Technologies for consumers	✓ Demand Response ✓ Smart metering
Grid technologies	✓ Micro-grid
Distributed storage technologies	✓ Batteries ✓ Electric Vehicles ✓ Thermal Energy Storage
Generation technologies	✓ PV ✓ Micro-generation
Market	✓ Electricity market ✓ Ancillary services

Project partners' countries

Coordinator: FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS (Spain)

Other partners

- RINA CONSULTING SPA (Italy)
- ARTELYS (France)
- ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS (Greece)
- SUITES DATA INTELLIGENCE SOLUTIONS LIMITED (Cyprus)
- DNV GL NETHERLANDS B.V. (Netherlands)
- AALBORG UNIVERSITET (Denmark)
- WWF ADRIA -UDRUGA ZA ZASTITU PRIRODE I OCUVANJE BIOLOSKE RAZNOLIKOSTI (Croatia)
- DIKTYO AEIFORIKON NISON TOY AIGAIOU AE (Greece)
- SVEUCILISTE U ZAGREBU, FAKULTET STROJARSTVA I BRODOGRADNJE (Croatia)
- ERICSSON NIKOLA TESLA D.D. (Croatia)
- VODOOPSKRBA I ODVODNJA CRES LOSINJDOO (Croatia)
- REGIONALNA ENERGETSKA AGENCIJA KVARNER (Croatia)
- DANMARKS TEKNISKE UNIVERSITET (Denmark)
- BORNHOLMS ENERGI OG FORSYNING AS (Denmark)
- BORNHOLMS REGIONSKOMMUNE (Denmark)
- FREMSYN APS (Denmark)
- EEM EMPRESA DE ELECTRICIDADE DA MADEIRA SA (Portugal)
- EFACEC ELECTRIC MOBILITY, SA (Portugal)
- ALBUFERA ENERGY STORAGE SL (Spain)
- ASSOCIACAO COMERCIAL E INDUSTRIAL DO FUNCHAL - CAMARA DE COMERCIO E INDUSTRIA DA MADEIRA (Portugal)
- ANONIMI ETAIRIA DIAXEIRISIS ANANEOSIMON PIGON ENERGEIAS (Greece)
- DIMOS PSARON (Greece)
- STEINBEIS INNOVATION GGMBH (Germany)
- STADTWERKE NORDERNEY GMBH (Germany)
- COPPET MARYSE (France)
- CONSELL INSULAR DE MENORCA (Spain)

Project Description

Context. The main goal of INSULAE is to foster the deployment of innovative solutions aiming to the EU islands decarbonization by developing and demonstrating at three Lighthouse Islands a set of interventions linked to seven replicable use cases, whose results validate an Investment Planning Tool that is then demonstrated at four Follower Islands for the development of four associated Action Plans.

Scope. The INSULAE project is focused on:
- Developing an Investment Planning Tool (IPT): Considering METIS and running within the Artelys Crystal Suite, the software supports the decision makers on the selection and design of cost effective Action Plans looking for the island decarbonization

- Demonstrating in three lighthouse islands representing Baltic/Mediterranean/Oceanic environment (Bornholm/Unije/Madeira) seven interventions to be demonstrated in the Lighthouse islands;
- Engaging follower islands of Psara (Gr), Menorca (Es), Nordeney (D), Marie Galante (Fr) towards energy transition via action plans for decarbonize the islands deployed by using the Investment Planning Tool.

Technical description and implementation.

Seven Use Cases are studied in the project:

- ✓ (UC1) Joint management of hybridized RES and storage;
- ✓ (UC-2) Smart integration and control of water and energy systems;
- ✓ (UC-3) Empowerment of islands' energy communities through 5G and IoT technologies for flexibility services;
- ✓ (UC-4) Transition to DC grids;
- ✓ (UC-5) Local bio-based economies supporting the electrical, thermal and transport systems integrated management;
- ✓ (UC-6) Electrification of the islands' transport looking to grid frequency and voltage regulation;
- ✓ (UC-7) Storage and power electronics for the stabilization of weak grids and microgrids.

Impact.

Replicability: Replication of INSULAE is fostered in the project by the INSULAE IPT. UCs can be easily replicable in several EU islands.

Socio-economics: The engagement of citizens on clean energy solutions and their empowerment to participate in local energy transition to a carbon neutral scenario are key aspects for decarbonizing islands, thus, for a successful implementation of INSULAE.

Environment: The EU islands biodiversity and ecosystems are exceptionally rich, but, at the same time, they are as well very vulnerable to external factors and human stressors (i.e. climate change).

Market Transformation: The Actions Plans coming from the IPT are conformed by a combination of the use cases and state of the art solutions. They are supported by attractive business models for ensuring its implementation without subsidies. Increasing the digitalization of the islands systems is critical for enabling the use of new technologies and services based on data management and control.

Policy: INSULAE participates to the current policies and regulatory activities to facilitate energy and digital transition on EU Islands also in accordance/partnership with EU Island Secretariat and Clean Energy for EU Islands initiatives.

H2020 call: LC-SC3-ES-4-2018-2020 - Decarbonising energy systems of geographical Islands

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REACT

Renewable Energy for self-sustAinable island CommuniTies

REACT delivers a scalable and adaptable cloud-based ICT platform for planning and management of RES and storage enabled infrastructures supporting a holistic cooperative energy management strategy at the community level in geographical islands.

From 2019	Project total cost	EU contribution	Website
To 2022	10.7 M€	9 M€	https://react2020.eu/

Technologies and services deployed	
Technologies for consumers	✓ Demand response ✓ Smart appliance
Grid technologies	✓ HVAC ✓ Network management and control tools ✓ Micro-grid
Large-scale storage technologies	✓
Distributed storage technologies	✓ Batteries ✓ Thermal energy storage
Generation technologies	✓ PV ✓ Micro generation
Market	✓ Electricity market ✓ Ancillary services

Project partners' countries

Coordinator: VEOLIA SERVEIS CATALUNYA SOCIEDAD ANONIMA UNIPERSONAL (Spain)

Other partners:

- NATIONAL UNIVERSITY OF IRELAND GALWAY (Ireland)
- ESB NETWORKS LTD (Ireland)
- The sustainable Energy Authority of Ireland (Ireland)
- UDARAS NA GAELTACHTA (Ireland)
- MITSUBISHI ELECTRIC R&D CENTRE EUROPE B.V. (Netherlands)
- FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V. (Germany)
- AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH (Austria)
- FENIE ENERGIA SA (Spain)
- FUNDACION TEKNIKER (Spain)
- SUMINISTROS ORDUNA SL (Spain)
- ASOCIACION PROVINCIAL DE INDUSTRIALES DE ELECTRICIDAD Y TELECOMUNICACIONES DE LAS PALMAS AIE LAS PALMAS (Spain)
- UPPSALA UNIVERSITET (Sweden)
- R2M SOLUTION SRL (Italy)
- MIDAC SPA (Italy)
- COMUNE DI CARLOFORTE (Italy)
- ALBUFERA ENERGY STORAGE SL (Spain)
- Electrochaea GmbH (Germany)
- TEESSIDE UNIVERSITY (United Kingdom)
- PANEPISTIMIO AIGAIOU (Greece)
- INSTITUT MIHAJLO PUPIN (Serbia)
- COMET GESINCO SL (Spain)
- UNIVERSITE DE LA REUNION (France)

Project Description

Context. REACT develops the technical and business ecosystem to convincingly demonstrate the potential of the large-scale deployment of RES and storage assets on geographical islands to bring economic benefits, contribute to the decarbonisation of local energy systems, reduce GHG emissions and improve environmental air quality.

Scope. REACT sets up the conditions for wide-scale replicability across EU island communities by:

- Integrating existing and emerging technologies to create cloud-based solution enabling an integrated and digitalised smart grid to support 100% energy autonomy of geographical islands;
- Demonstrating in 3 pilots the potential to reduce GHG emission and energy costs both by > 60%, achieve at least 10% of energy savings;
- Developing partner-backed viable plans for large-scale replication on 5 follower islands that measure the socio-economic benefits of enhancing islands' energy autonomy.

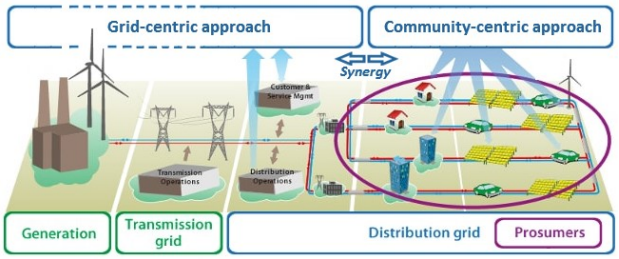
Technical description and implementation.

Advanced Innovative Technologies including optimised control of smart-grids in geographical islands, DR platform for flexibility management at community level via automated and manual strategies, smart energy grid design tool for island optimal RES integration, real-time generation and load forecasting for optimal grid balancing, energy storage (deployment of high-capacity and environmental friendly batteries), innovative heat pumps and PV systems to be managed at community level, and enhanced grid operation monitoring to perform identification, localization of grid failures during operations in a scenario of high intermittent RES penetration and storage into the island energy grid.

Technology Integration and testing in demo islands and via hardware-in-the-loop to reduce costs based on cloud-based platform, Hardware-in-the-loop (HiL) laboratory testing, and integrative optimisation approach that combines real-time optimisation of both multi-carrier energy supply and demand side of target energy infrastructure.

New Synergies - synergy between different grids such as water, transport (EV charging stations), energy and heat. REACT will use real technology assets combined with partners' expertise in computational modelling and simulation of physical systems to account for the existing grids at demo sites.

User Engagement & Business Models - REACT engages the end consumers, i.e. the island residents and involve them in demand reduction
and time shifting (e.g. peak shaving) activities. Therefore, REACT will raise the awareness of island residents through the recommendations for energy conservation opportunities, provision of estimated energy performance, monitored data, information about incentives and energy pricing, etc. As a result, REACT aims to adapt the behaviour of island residents (considering availability of renewable generation, grid load balancing, energy pricing, etc.) through their involvement, thus becoming an active part of cooperative strategy. Finally, innovative business models and exploitation plans to maximise REACT impact will be developed and deployed by strong industrial consortium.



Impact. *Replicability*: REACT integrated solution for optimal control and strategy will ensure a high degree of interoperability with current systems

Environment: REACT will enable the achievement of at least 10% energy saving in islands and 60% energy price drop that will be directly translated in end-user bill reduction and CO2 savings.

Market Transformation and Policy: REACT enables higher penetration (min. +50%) of renewables in islands grids and drastically reduce 50% the fossil fuel consumption by using battery storage to improve the technical and economic performance and the flexibility and resilience of the electricity grid. Enable innovative and integral business model unlocking new services for the entire energy value chain and will promote a holistic energy purchase and DR strategy at community level.

Socio-economics: REACT unlocks the full potential of DR in residential and tertiary buildings, making the flexible load portion available for use in grid balancing and other ancillary services. It also reduces/defers a maximum of 30% the DSOs required investments in grid reinforcements and grid balancing by improving assets and network utilization which in the mid-term will reduce the final user energy price.

H2020 call: 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

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CoordiNet

Large scale campaigns to demonstrate how TSO-DSO shall act in a coordinated manner to procure grid services in the most reliable and efficient way

CoordiNet establishes different collaboration schemes between transmission system operators (TSOs), distribution system operators (DSOs) and consumers to contribute to the development of a smart, secure and more resilient energy system.

From 2019	Project total cost	EU contribution	Website
To 2022	19 €	15 €	http://www.coordinet-project.eu/

Technologies and services deployed		Project partners' countries
Technologies for consumers	✓ Demand response ✓ Smart appliance ✓ Smart metering	
Grid technologies	✓ Network management and control tools ✓ Micro grid	
Large-scale storage technologies	✓ Power to gas CAES ✓ Hydro storage	
Distributed storage technologies	✓ Batteries ✓ Thermal Energy storage	
Generation technologies	✓ Wind power ✓ Micro generation ✓ PV	
Market	✓ Electricity market ✓ Ancillary services	

Coordinator: ENDESA DISTRIBUCION ELECTRICA S.L (Spain)

Other partners:

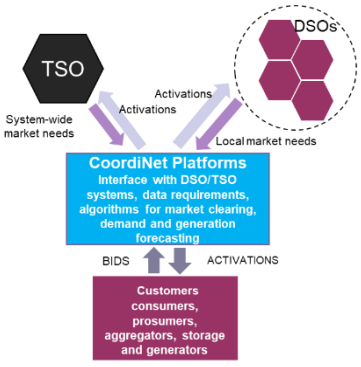
- IBERDROLA DISTRIBUCION ELECTRICA, S.A. (Spain)
- RED ELECTRICA DE ESPANA S.A.U. (Spain)
- FUNDACION TECNALIA RESEARCH & INNOVATION (Spain)
- UNIVERSIDAD PONTIFICIA COMILLAS (Spain)
- NUESTRA NUEVA ENERGIA SL (Spain)
- AYUNTAMIENTO DE MALAGA (Spain)
- VATTENFALL ELDISTRIBUTION AB (Sweden)
- E.ON Energidistribution AB (Sweden)
- AFFARSVERKET SVENSKA KRAFTNAT (Sweden)
- UPPSALA KOMMUN (Sweden)
- ENERGIFORSK AB (Sweden)
- EXPEKTRA AB (Sweden)
- RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (Germany)
- DIACHEIRISTIS ELLINIKOU DIKTYOU DIANOMIS ELEKTRIKIS ENERGEIAS AE (Greece)
- INDEPENDENT POWER TRANSMISSION OPERATOR SA (Greece)
- INSTITUTE OF COMMUNICATION AND COMPUTER SYSTEMS (Greece)
- VLAAMSE INSTELLING VOOR TECHNOLOGISCH ONDERZOEK N.V. (Belgium)
- N-SIDE (Belgium)
- ENGINEERING - INGEGNERIA INFORMATICA SPA (Italy)
- OFFIS EV (Germany)
- EUROPEAN DISTRIBUTION SYSTEM OPERATORS FOR SMART GRIDS AISBL (Belgium)
- ETRA INVESTIGACION Y DESARROLLO SA (Spain)

Project Description

Context. The pan-European power system is experiencing a major and profound change as a result of the massive integration of Renewable Energy Sources (RES) and the increasing role of consumers as active participants under various forms (e.g. self-generation, energy efficiency or demand response). The shift of generation is multifold: generation is moved from conventional sources connected to the transmission grid towards the distribution grid thereby becoming more dispersed, less predictable and less dispatchable. All these aspects require an additional change to make both generation and consumption more flexible. This is leading to an evolved role of the end-consumer and the emergence of new actors as market participants (e.g. storage, aggregators, virtual power plant).

Scope. CoordiNet aims to demonstrate how DSOs and TSOs, by acting in a coordinated manner, can provide favourable cooperation conditions to all actors while removing barriers to participation for customers and small market players connected to distribution networks. CoordiNet also develops new mechanisms, which are more suitable for real time operations, in order to define requirements for the development of standard European platforms. The proposed CoordiNet mechanisms is tested at three large-scale demonstration projects across 10 different locations spread out Spain, Sweden and Greece. They apply different coordination schemes and test the complete set of products for grid services defined within the project.

Technical description and implementation. The CoordiNet project contribute to, among others a smart, secure and more resilient energy system through demonstrating cost-efficient model(s) for electricity network services that can be scaled up to include networks operated by other TSOs and DSOs, that are replicable across the EU energy system, and provide the foundations for new network codes, particularly on demand-response.



Impact.

Replicability: contribute to a smart, secure and more resilient energy system through demonstrating cost-efficient model(s) for electricity network services. Replicability of the very same standardized products and market platforms tested within the ten demonstration pilots will be assessed and through consultations within the Stakeholders Forum (targeted stakeholders in other geographic areas and though other load, voltage and grid morphology contexts).

The result of this analysis will be a set of rules on how to replicate the proposed solutions at the national level but also in other EU countries, considering their specificities and the overall European framework.

Socio-economics: Opening up significant new revenue streams for consumers to provide grid services. The industrial partners (utilities, energy service companies, aggregators and RES providers) benefit from clear market rules and platforms allowing transparency and non-discriminatory access to grid services market.

Environment: Increase the share of RES in the electricity system. CoordiNet contributes to the overall GHG emissions reduction of the pan-European power system through increased market integration of RES.

Market Transformation: As an innovation action CoordiNet capitalizes some R&I results in terms of lessons learned from previous projects and demonstrations. New knowledge will consist in new market design schemes, new operation protocols and new use of data resulting from operations to draw recommendations and improvement of standards. The project explores new types of interaction between project partners (System Operators - IT industry – academic - market participants). Several tasks also investigates brand new routes. Potential game changer technologies to facilitate consumer participation and reduce transaction costs. New market mechanisms for local services to solve constraints at DSOs networks constitute real test cases for extending current market designs as well as opening the existing markets (at TSO level) to new participants: demand-side resources, energy storage and small agents (tested in the Spanish demonstration).

Policy: CoordiNet provides recommendations on market designs and regulations that are the object of consultation by targeted stakeholders. The outputs of the project will support the Clean Energy for all Europeans Package in general, but both the Market Design Directive and the Market Design Regulation will be object of specific recommendations.

H2020 call: 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

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INTERRFACE

TSO-DSO-Consumer INTERFACE architecture to Provide innovative Grid Services for an efficient power system

The INTERRFACE project designs, develops and exploits an Interoperable pan-European Grid Services Architecture (IEGSA) to act as the interface between the power system operators (TSO and DSO) and the customers and allow the coordinated operation of all stakeholders to use and procure common services.

From 2019	Project total cost	EU contribution	Website
To 2022	20.9 M€	16.8 M€	www.interrface.eu

Technologies and services deployed		Project partners' countries
Technologies for consumers	✓ Demand Response	
Grid technologies	✓ Network management and control tools ✓ Micro-grid	
Large-scale storage technologies	✓	
Distributed storage technologies	✓ Batteries	
Generation technologies	✓ Micro-generation ✓ PV	
Market	✓ Electricity Market ✓ Ancillary Services	

Coordinator: EUROPEAN DYNAMICS Luxembourg S.A. (Luxembourg)

Other partners:

- UNIVERSITY OF PIRAEUS RESEARCH CENTER (Greece)
- European Network of Transmission System Operators for Electricity (ENTSO-e) (Belgium)
- EMAX (Belgium)
- INNOVATIVE ENERGY AND INFORMATION TECHNOLOGIES LTD (Bulgaria)
- EMPOWER IM OY (Finland)
- SOFTWARE COMPANY EOOD (Bulgaria)
- C & G ZASTOPANJE, SVETOVANJE IN INZENIRING DOO (Slovenia)
- CINTECH SOLUTIONS LTD (Cyprus)
- PREDUZECE ZA TELEKOMUNIKACIJSKE USLUGE REALAIZ DOO BEOGRAD (SAVSKI VENAC) (Serbia)
- EUROPEAN UNIVERSITY INSTITUTE (Italy)
- RICERCA SUL SISTEMA ENERGETICO - RSE SPA (Italy)
- UNIVERSITATEA POLITEHNICA DIN BUCURESTI (Romania)
- TECHNICAL UNIVERSITY OF SOFIA (Bulgaria)
- BUDAPESTI MUSZAKI ES GAZDASAGTUDOMANYI EGYETEM (Hungary)
- FUNDACION UNIVERSIDAD LOYOLA ANDALUCIA (Spain)
- UNIVERSITA POLITECNICA DELLE MARCHE (Italy)
- RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (Germany)
- RIGAS TEHNISKA UNIVERSITATE (Latvia)
- TAMPEREEN KORKEAKOULUSAATIO SR (Finland)
- ELERING AS (Estonia)
- AKCIJU SABIEDRIBA AUGSTSPRIEGUMA TIKLS (Latvia)
- FINGRID OYJ (Finland)
- ELEKTROENERGIEN SISTEMEN OPERATOR EAD (Bulgaria)
- COMPANIA NATIONALA DE TRANSPORT ALENERGIEI ELECTRICE TRANSELEC SA (Romania)
- ELES DOO SISTEMSKI OPERATOR PRENOSNEGA ELEKTROENERGETSKEGA OMREZJA (Slovenia)
- REN - REDE ELECTRICA NACIONAL SA (Portugal)
- EDP DISTRIBUICAO ENERGIA SA (Portugal)
- CEZ DISTRIBUTION BULGARIA AD (Bulgaria)
- DISTRIBUTIE ENERGIE OLTENIA SA (Romania)
- ELEKTRO LJUBLJANA PODJETJE ZADISTRIBUCIJO ELEKTRICNE ENERGIJE D. (Slovenia)
- ELEKTRILEVI OU (Estonia)
- ELENIA OY (Finland)
- E.ON DEL-DUNANTULI ARAMHALOZATI ZARTKORUEN MUKODO RESZVENYTARSASAG (Hungary)
- NKM ARAMHALOZATI KFT (Hungary)
- AGENCIJA ZA ENERGIJO (Slovenia)
- ASTEA SPA (Italy)
- MYTILINAIOS ANONIMI ETAIREIA (Greece)
- MIG 23 LTD (Bulgaria)
- ALTEO ENERGIASZOLGALTATO NYILVANOSAN MUKODO RESZVENYTARSAS/ (Hungary)
- BULGARSKA NEZAVISIMA ENERGIJNA BORSA EAD (Bulgaria)

Project Description

Context. With an increasingly RES-dominated future grid, both TSOs and DSOs are expected to face similar problems and challenges in grid operation and the collaboration between these operators is crucial. Digitalisation is a key driver for coordination and active system management in the electricity grid, enabling TSOs and DSOs to optimise the use of distributed resources to ensure a cost-effective and secure supply of electricity for all customers. The measures encourage procurement of services at both the transmission and distribution level, recognizing that this will enable more efficient and effective network management, will increase the level of demand response and will increase the capacity of renewable generation that is connected to the European electricity network. TSOs and DSOs must now define the services they want to procure in collaboration with market participants and must set up ways to procure them in a coordinated manner.

Scope. The INTERRFACE project demonstrates the added value of sharing data among all participants in the electricity system value chain (customers, grids, market), from local, regional to EU level. Also, it enables TSOs, DSOs and customers to coordinate their efforts to maximise the potential of distributed energy resources (DERs), demand aggregators and grid assets, to procure energy services in a cost-efficient way and create consumer benefits. It therefore facilitates renewable energy integration and demonstrates global leadership by the EU electricity sector in a way that is cost effective and secure. It also simulates an integrated wholesale and retail market at local and global levels, engaging consumers/prosumers to exploit the DERs capacity and channel it into the common EU electricity market. INTERRFACE demonstrates services for congestion management and local flexibility in the network, supporting the integration of new and existing distributed generation projects.

Technical description and implementation. A range of state-of-the-art ICT technologies and control improvements will be exploited to enhance the interconnection among system operators and customers. Digital tools based on blockchains and big data management will provide new opportunities for electricity market. The INTERRFACE project designs, develops and exploits an Interoperable pan-European Grid Services Architecture (IEGSA) to act as the interface between the power system (TSO and DSO) and the customers and allow the seamless and coordinated operation of all stakeholders to use and procure common services. INTERRFACE incorporates a design phase, providing the design of new services, market and INTERRFACE system architecture design, based on customers, grid, and market participants' perspective, as well as a demonstration phase, including the elaboration of well-designed demonstrations, in three discrete pillars: (a) Congestion management and balancing issues, (b) Peer to peer transactions, and (c) Integrated retail and wholesale market. The project provides an architecture that can integrate the main tools and data for TSOs, DSOs, consumers, power exchanges and market participants, and enables communication between different data hubs and market participants, facilitating market integration.

Impact. *Replicability/Scalability*: Solutions are replicable across the EU energy system and architecture is interoperable –based on a plug' n' play concept that enables inclusion of new actors and platforms- across borders and is suitable for deployment in energy systems throughout Europe. It decreases the cost to deliver renewable energy projects and flexibility services.

Socio-economics: INTERRFACE assists national markets in acquiring a pan-European monitoring framework that ensures integrity and transparency at the European level. The project ensures that the EU electricity network operates within a wholesale market, providing consumers with competitive prices and integrating renewable sources, upgrading at the same time consumers' position within the value chain and constituting them active market participants.

Environment: The project facilitates the increased integration of renewables into the European electricity mix. This increase in RES would lead toward the reduction of CO2 and other greenhouse gases emissions. It would also reinforce the preservation of natural resources. This increase in RES will lead toward the reduction of CO_2 and other greenhouse gases emissions.

Market Transformation: The coupling of the retail and wholesale markets also creates revenue visibility that does not exist in today's electricity market. This drives price signals, creating much stronger commercial incentives for flexibility service providers to participate in the market.

Policy: INTERRFACE provides policy recommendations to TSOs, DSOs, Market Operators and other actors of the energy value chain.

H2020 call: SU-DS04-2018-2020 - Cybersecurity in the Electrical Power and Energy System (EPES): an armour against cyber and privacy attacks and data breaches

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EnergyShield

Integrated Cybersecurity Solution for the Vulnerability Assessment, Monitoring and Protection of Critical Energy Infrastructures

ENERGY SHIELD

EnergyShield captures the needs of Electrical Power and Energy System (EPES) operators and combines the latest technologies for vulnerability assessment, supervision and protection to draft a defensive toolkit. The toolkit combines the latest technologies for automated threat modelling and security behaviour analysis, anomaly detection and DDoS mitigation and security information and event management) The results will be validated and demonstrated in two locations: Italy (offline pilot) and Bulgaria.

From 2019	Project total cost	EU contribution	Website
To 2022	9.8 M€	7.4 M€	http://energy-shield.eu/

Technologies and services deployed		
Technologies for consumers		
Grid technologies	✓	Network management and control tools
Large-scale storage technologies	✓	
Distributed storage technologies	✓	
Generation technologies	✓	
Market	✓	Electricity market
	✓	Ancillary services

Project partners' countries

Coordinator: SIVECO Romania SA (Romania)

Other partners:

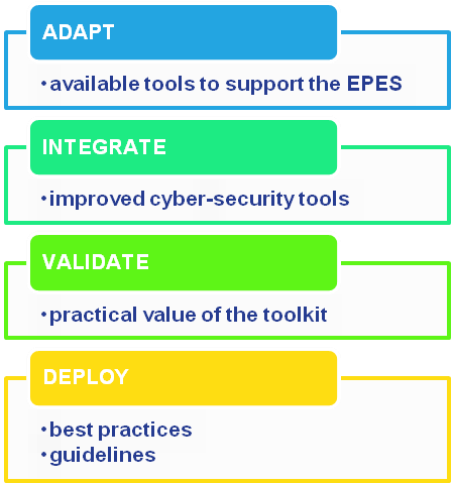
- PSI SOFTWARE AG (Germany)
- SI-GA DATA SECURITY (2014) LTD (Israel)
- FORESEETI AB (Sweden)
- L7 DEFENSE LUXEMBOURG SARL (Luxembourg)
- TECH INSPIRE LTD (United Kingdom)
- KONNEKT ABLE TECHNOLOGIES LIMITED (Ireland)
- CITY UNIVERSITY OF LONDON (United Kingdom)
- KUNGLIGA TEKNISKA HOEGSKOLAN (Sweden)
- NATIONAL TECHNICAL UNIVERSITY OF ATHENS - NTUA (Greece)
- SOFTWARE COMPANY EOOD (Bulgaria)
- KOGEN ZAGORE EOOD (Bulgaria)
- MVETS LENISHTA OOD (Bulgaria)
- ELEKTROENERGIEN SISTEMEN OPERATOR EAD (Bulgaria)
- CEZ DISTRIBUTION BULGARIA AD (Bulgaria)
- MIG 23 LTD (Bulgaria)
- DIL DIEL (Bulgaria)
- IREN SPA (Italy)

Project Description

Context. Power and Utilities sector undergoes a series of digital transformations in the latest period. The electricity sector is at the centre of this transformation as it breaks the boundaries between generation and consumption. The benefits of the digitalization are major and include performance improvements and cost savings, but makes energy systems more vulnerable to cyber-attacks. Moreover, the use of digital devices and interconnected systems exposes Electrical Power and Energy Systems (EPES) to external threats such as worms, viruses, hackers and data privacy breaches..

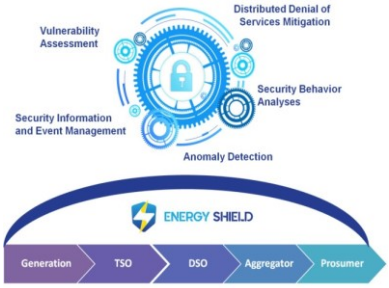
Scope. EnergyShield will test different attack scenarios in a live cyber-defence exercise: a small-scale attacks targeting specific organizations and a large-scale disruption attacks targeting the entire EPES value chain.

Project Objectives. The project addresses the implementation gap between research projects and industrial applications. The Consortium focuses on applied interdisciplinary research, industry-driven requirements, knowledge and technology transfer.



Technical description and implementation. Although the selected technologies are currently available, their combination within this project will go beyond the state of the art as the technologies represent already leading-edge developments in their fields and will be combined for the first time in the EPES domain. Generators (cogeneration thermal power plant, small hydro power plan) DSOs, TSOs, aggregators and prosumers are recognized as EPES value chain.

Impact. The project will combine best-of-breed cybersecurity tools into a holistic solution able to address all the requirements of EPES operators, and specifically vulnerability assessment (automated threat modelling and security behaviour analysis), monitoring & protection (anomaly detection and DDoS mitigation) and learning & sharing (security information and event management), resulting in the following impacts



Replicability: EnergyShield architecture relies on an open, modular architecture (toolkit concept). Keeping the module operation separate enables applications to run independently and to potentially be swapped out / replaced by other modules to accommodate future evolution of the platform). This methodology ensures interoperability and future-proof.

Socio-economics: EnergyShield proposes a complete socio-cyber-physical threat model based on cyber security risks evaluation and risk cost modeling to decrease the impact of cyber-attacks on EPES value chain.

Environment: The proposed solution also aims at increasing awareness on the necessity to clearly define and address the particularities of cybersecurity in energy sector.

Market Transformation: The toolkit can be used as a development environment for third party application developers joining the EnergyShield ecosystem.

Policy: Improving the European cyberdefence capabilities by sharing early results through participation in relevant associations and working groups and via promoting standardization initiatives related to cybersecurity in energy sector.

H2020 call: SU-DS04-2018-2020 - Cybersecurity in the Electrical Power and Energy System (EPES): an armour against cyber and privacy attacks and data breaches

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PHOENIX

Electrical Power System's Shield against Complex Incidents and Extensive Cyber and Privacy Attacks

PHOENIX aims to offer a cyber-shield armour to European EPES infrastructure enabling cooperative detection of large scale, cyber-human security and privacy incidents and attacks, guarantee the continuity of operations and minimise cascading effects in the infrastructure itself, the environment, the citizens and the end-users at reasonable cost.

From Sep 2019	Project total cost	EU contribution	Website
To Aug 2022	10.83 M€	7.99 M€	www.phoenix-h2020.eu

Technologies and services deployed	
Technologies for consumers	
Grid technologies	✓ Network management and control tools, HVAC
Large-scale storage technologies	
Distributed storage technologies	✓ EVs, batteries
Generation technologies	✓ PV, Wind Turbine, Hydroelectric Power Plants
Market	✓Energy market

Project partners' countries

Coordinator: Capgemini Technology Services (France)

Other partners:

- THALES SIX GTS FRANCE SAS (France)
- THALES SA (France)
- SINGULARLOGIC ANONYMI ETAIREIA PLIROFORIAKON SYSTIMATON KAI EFARMOGON PLIROFORIKIS (Greece)
- DNV GL AS (Norway)
- INTRASOFT INTERNATIONAL SA (Luxembourg)
- ISKRAEMECO, MERJENJE IN UPRAVLJANJEENERGIJE, D.D (Slovenia)
- ASM TERNI SPA (Italy)
- STUDIO TECNICO BFP SOCIETA A RESPONSABILITA LIMITATA (Italy)
- EMOTION SRL (Italy)
- ELEKTRO LJUBLJANA PODJETJE ZADISTRIBUCIJO ELEKTRICNE ENERGIJE D.D (Slovenia)
- BLAGOVNO TRGOVINSKI CENTER DD (Slovenia)
- PUBLIC POWER CORPORATION S.A. (Greece)
- DELGAZ GRID SA (Romania)
- COMPANIA NATIONALA DE TRANSPORT ALENERGIEI ELECTRICE TRANSELECTRICA SA (Romania)
- SOCIETATEA PENTRU SERVICII DE TELECOMUNICATII SI TEHNOLOGIA INFORMATIEI IN RETELE ELECTRICE DE TRANSPORTTELETRANS SA (Romania)
- CENTRUL ROMAN AL ENERGIEI - CRE (Romania)
- CYBERETHICS LAB SRLS (Italy)
- SYNELIXIS LYSEIS PLIROFORIKIS AUTOMATISMOU & TILEPIKOINONION ANONIMI ETAIRIA (Greece)
- COMSENSUS, KOMUNIKACIJE IN SENZORIKA, DOO (Slovenia)
- AALTO KORKEAKOULUSAATIO SR (Finland)
- RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (Germany)
- ATOS IT SOLUTIONS AND SERVICES IBERIA SL (Spain)
- DNV GL NETHERLANDS B.V. (Netherlands)

Project Description

Context: The Electrical Power and Energy System (EPES) is considered among the most complex Cyber-Physical systems with huge (cascading) effects to other critical infrastructures. As a result, it has already experienced complex cyber-attacks. EPES systems are dispersed and widely-diverse infrastructures with multifaceted operational environment, complex multi-stakeholder ownership and regulatory structures, accompanied by ubiquitous human involvement at different levels (O&M, monitoring & control). Extensive and sophisticated cyberattacks are challenging even the most comprehensive EPES security systems.

Scope. PHOENIX provides a cyber-shield armour to European EPES to survive large scale security and privacy incidents, guarantee the continuity of operations and minimize cascading effects in the infrastructure itself, the environment and the end-users at reasonable cost. PHOENIX will realize 3 strategic objectives:

- Strengthen EPES cybersecurity preparedness
- Coordinate EPES cyber incident discovery, response and recovery
- Accelerate research and innovation in EPES cybersecurity

Technical description and implementation.

PHOENIX focuses on the protection of the European end-to-end EPES (from energy production to prosumption) via prevention, early detection and fast mitigation of cyber-attacks against EPES assets and networks and from (intentional and unintentional, internal and external) human activities, while protecting the utilities and end-users' privacy from data breaches by design. It offers a holistic EPES security & privacy protection framework, including: (i) 5G/ inter-DLT secure & traceable communications, (ii) Situation Awareness, Perception & Comprehension based on privacy-preserving federated ML/zero knowledge verification, (iii) traceable incidents information sharing platform (I2SP), (iv) GDPR Privacy Protection Toolkit, (v) innovative Security & Privacy as a service business model.

Impact.

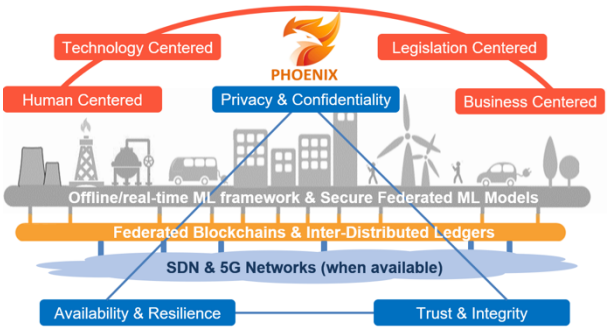
Replicability: PHOENIX may contribute to cybersecurity components certification, providing a detailed roadmap of procedures, blueprints and best practices specifying cybersecurity tears of components, systems and processes. Also, PHOENIX will be validated in real-world scenarios across five European Large-Scale Pilots (LSPs), in Italy, Slovenia, Greece and Romania involving the complete end-to-end generation, transmission, distribution and prosumption value chain.

Socio-economics: PHOENIX provides increased resilience against different levels of cyber and privacy attacks and data breaches (including personal data breaches) in the energy sector. Also, it ensures continuity of critical business energy operations. Reduced EPES cyber risks lead to increasing citizens' trust. The EU economy will benefit through secure and trusted Open APIs, new business models and the active engagement of SMEs and industries.

Environment: PHOENIX protects EPES security, which is challenged by the introduction of distributed micro-grid, RES and storage. Thus, it enables higher and smooth RES penetration and integration, towards the EU Green Deal goals.

Market Transformation: PHOENIX encourages higher adoption of security minded corporate plans by Utilities, moving beyond attackers who invent new attack vectors in the digital attack surface. PHOENIX enables cybersecurity professionals to protect both OT and IT systems, which were not designed to be integrated under a unified security architecture in the first place. PHOENIX creates new market potentials in cross-border coordination, facilitating cyber-threat intelligence information sharing among EU countries and reducing cascading effects.

Policy: Technical information sharing is considered a vital requirement towards cybersecurity in the electricity sector and constitutes one of the six pillars of the Network Code on Cybersecurity, suggested by ENTSO-E. PHOENIX I2SP will contribute to the NIS Directive implementation via traceable and trusted communications and information exchange between operators, National CSIRTs and international cooperation among cyber-security and EPES stakeholders.



H2020 call : SU-DS04-2018-2020 - Cybersecurity in the Electrical Power and Energy System: an armour against cyber and privacy attacks and data breaches

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SDN-microSENSE

SDN-µSense

SDN - microgrid reSilient Electrical eNergy SystEm

The smart energy ecosystem constitutes the next technological leap of the conventional electrical grid. However, despite the fact that it brings beneficial environmental, economic and social changes, it also generates significant security and privacy challenges. The SDN-microSENSE project intends to provide a set of secure, privacy-enabled and resilient to cyberattacks tools, thus ensuring the normal operation of EPES as well as the integrity and the confidentiality of communications.

From May 2019	Project total cost	EU contribution	Website
To April 2022	10.1 M€	7.9 M€	https://www.sdnmicrosense.eu/

Technologies and services deployed	
Technologies for consumers	
Grid technologies	✓
Large-scale storage technologies	
Distributed storage technologies	
Generation technologies	
Market	✓

Project partners' countries

Coordinator: AYESA ADVANCED TECHNOLOGIES SA (Spain)

Other partners:

- PANEPISTIMIO DYTIKIS MAKEDONIAS (Greece)
- ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS (Greece)
- PREDUZECE ZA TELEKOMUNIKACIJSKE USLUGE REALAIZ DOO BEOGRAD (SAVSKI VENAC) (Serbia)
- PUBLIC POWER CORPORATION S.A. (Greece)
- FUNDACION TECNALIA RESEARCH & INNOVATION (Spain)
- DIMOS AVDIRON (Greece)
- INDEPENDENT POWER TRANSMISSION OPERATOR SA (Greece)
- SINTEF ENERGI AS (Norway)
- DIL DIEL(Bulgaria)
- OPTIMIZACION ORIENTADA A LA SOSTENIBILIDAD SL (Spain)
- GEIE ERCIM (France)
- SCHNEIDER ELECTRIC INDUSTRIES SAS (France)
- ATOS IT SOLUTIONS AND SERVICES IBERIA SL (Spain)
- CHECKWATT AB (Sweden)
- ESTABANELL Y PAHISA ENERGIA SA (Spain)
- INNOVATIVE ENERGY AND INFORMATION TECHNOLOGIES LTD (Bulgaria)
- ELEKTROENERGIEN SISTEMEN OPERATOR EAD (Bulgaria)
- CEZ DISTRIBUTION BULGARIA AD (Bulgaria)
- UBITECH LIMITED (Cyprus)
- CYBERLENS LTD (United Kingdom)
- SIDROCO HOLDINGS LIMITED (Cyprus)
- 0 INFINITY LIMITED (United Kingdom)
- EIGHT BELLS LTD (Cyprus)
- INCITES CONSULTING SA (Luxembourg)
- ENERGYNAUTICS GMBHAsfd (Germany)
- NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET NTNU (Norway)
- SIAXAMPANIS E.E. (Greece)
- GOTTFRIED WILHELM LEIBNIZ UNIVERSITAET HANNOVER (Germany)
- RAVNA HYDRO LTD (Bulgaria)
- FUNDACIO INSTITUT DE RECERCA DE L'ENERGIA DE CATALUNYA (Spain)

Project Description

Context.

SDN-MicroSENSE will adopt an SDN architecture providing central control and global visibility capabilities. Based on this SDN architecture, SDN-MicroSENSE will promote a security management and risk assessment framework(S-RAF). Moreover SDN-MicroSENSE will implement a fully functional software framework which will be capable of detecting and preventing cybersecurity attacks as well as unidentified threats in real time(XL-EDPS).At the same time, it will provide an anonymous security channel that will enable information sharing. Furthermore a self-healing framework SDN-SELF will provide necessary response processes to cyber-attacks that will be activated in the case of emergency.

Scope. SDN-microSENSE project is focused on:

- Increase the EPES resilience in addressing cyber threats and attacks.
- Protect and advance the current SCADA, ICS infrastructure and all the interconnected systems from power outages, brownouts and blackouts.
- Apply collaborative risk assessment and management in a large-scale level.
- Develop innovative solutions for enhancing the EPES resilience in the power level such as self-healing and islanding.
- Setting up common security principles and requirements in the physical level of the energy domain.
- Demonstrate the provided solutions in large-scale environments by involving all energy-related stakeholders.
- Foresee standardisation activities in all layers of the EPES ecosystem based on best practices and lessons learnt.

Technical description & implementation

- *Design of a resilient, multi-layered & SDN-enabled microgrid architecture offering global visibility & addressing disruptions on the existing SCADA & industrial control systems (ICS) infrastructure*
- *Design & development of a risk assessment & management framework considering the existing infrastructure.*
- *Exploitation of direct networking controllability & programmability (SDN) & achievement of resilient & cybersecure operations through multiple security applications.*
- *Delivery of an energy trading platform for secure & flexible trading management.*
- *Provide robust, distributed & effective cyber-defence capabilities for large-scale EPES ecosystem*
- *Deployment of anonymous EPES channels for secure information sharing between actors & operators*
- *Delivery of a privacy-preserving framework for enhancing EPES against data breaches*

Impact. *Replicability:* Although the technologies and solutions developed in the project are demonstrated in specific pilot sites, they are not limited to them. They have a more generic applicability and can easily be adjusted for all relevant stakeholders who may be interested in adapting them.

Socio-economics:

The outcomes of SDN-microSENSE are expected to address the need for trust and confidence in EPES. The SDN-microSENSE architecture will act as an enabler for many critical social applications and services, where a high level of security is required for the transport of data and infrastructure monitoring.

Environment:

SDN-microSENSE architecture will enable the integration of higher shares of renewables and will promote a more energy efficient system. This will have a positive environmental impact by means of physical resources expenditure limitation and better network load balancing.

Market Transformation:

SDN-microSENSE will bring several competitive advantages to Operators, Generators and Utility Companies, enhancing their part in the value chain. By implementing an anonymous and secure communication channel between them at EU level, SDN-microSENSE will increase the trust between smart grid operators and drive EU consensus towards confronting cyber-attacks.

Policy:

Based on the project results and lesson learnt, SDN-microSENSE will provide recommendations for certification, by identifying possible security gaps in the EPES ecosystem, taking into consideration the NIS directive, GDPR regulation as well as several global/European certifications schemes concerning the energy sector.

H2020 call: LC-SC3-ES-1-2019 - Flexibility and retail market options for the distribution grid

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ebalance-plus

Energy balancing and resilience solutions to unlock the flexibility and increase market options for distribution grid

ebalance-plus develops an energy management platform equipped with balancing and resilience services which increase and unlock the electric flexibility by means of generation and storage solutions, power electronics and grid control technologies, to provide ancillary services for new markets.

From 2020	Project total cost	EU contribution	Website
To 2023	9.5 M€	8.0 M€	http://www.ebalanceplus.eu/

Technologies and services deployed		
Technologies for consumers	✓ Demand response ✓ Smart metering	
Grid technologies	✓ Network management and control tools ✓ Micro-grid	
Large-scale storage technologies	✓	
Distributed storage technologies	✓ Batteries ✓ Electric Vehicle ✓ ✓ Thermal energy storage	
Generation technologies	✓ ✓ PV	
Market	✓ Electricity Market ✓ Ancillary Services	

Project partners' countries

Coordinator: CENTRO DE ESTUDIOS DE MATERIALES Y CONTROL DE OBRA SA (SPAIN)

Other partners:

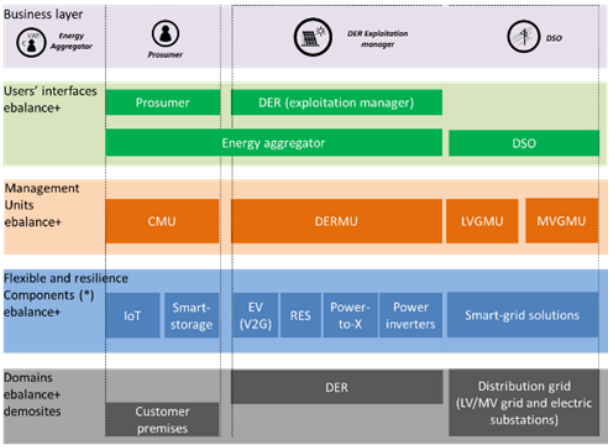
- IHP GMBH - INNOVATIONS FOR HIGH PERFORMANCE MICROELECTRONICS/LEIBNIZ-INSTITUT FUER INNOVATIVE MIKROELEKTRONIK (Germany)
- OSRODEK PRZETWARZANIA INFORMACJI-PANSTWOWY INSTYTUT BADAWCZY (Poland)
- AMPERE POWER ENERGY SL (Spain)
- UNIVERSIDAD DE MALAGA (Spain)
- SOFTWARE FOR CRITICAL SYSTEMS SL (Spain)
- REENGEN ENERJI TEKNOLOJILERI ANONIM SIRKETI (Turkey)
- TURBO POWER SYSTEMS LTD (United Kingdom)
- EMTECH DIASTIMIKI MONOPROSOPI IDIOTIKI ETAIREIA (Greece)
- MAGNUM CAP - ELECTRICAL POWER SOLUTIONS LDA (Portugal)
- UNIVERSITA DELLA CALABRIA (Italy)
- YNCREA HAUTS DE FRANCE (France)
- DANMARKS TEKNISKE UNIVERSITET (Denmark)
- ENFOR AS (Denmark)
- EUROPEAN SCIENCE COMMUNICATION INSTITUTE (ESCI) GGMBH (Germany)

Project Description

Context. In 2018, the EC presented the long-term strategy to achieve a low carbon neutral economy by 2050. It was focused on a **fully-integrated internal energy market aiming at:** (i) allowing EU free energy flows without technical and legal barriers, (ii) promoting renewable energy sources (RES) and other efficient technologies, (iii) proposing new EU Directives to transform the energy market and (iv) empowering energy consumers. This context requires increasing the number of electric substations with monitoring and control devices as well as developing cost-effective storage system and smart solutions to engage consumers in energy issues and promoting new market models.

Scope. ebalance-plus develops an ICT Energy Management Platform (EMP) to integrate and demonstrate a variety of solutions in 4 different energy market frameworks (Spain, Italy, France and Denmark) with specific technical challenges. The goal is to unlock the energy flexibility and provide ancillary services that improve the grid resilience and open new market options regarding energy aggregators, communities and cooperatives. The EMP is based on a hierarchical architecture of Management Units (MU), where each level is related to the electricity domains of the standard Smart Grid Architecture Model (SGAM): customer, DER, distribution and transmission. Every MU integrates a set of balancing algorithms and prediction models to coordinate the MU located at the immediate lower level in the hierarchical structure. The EMP guarantees interoperability: it allows deploying new flexibility solutions (storage, IoT, V2G, district RES, power-to-heat…) based on a common data exchange format and integrating it into existing Building Automation Systems (BACS) to operate technical facilities and appliances according to the grid and market conditions. Furthermore, the solution is designed following user centric approaches, including social studies in the design of appealing and engaging end user interfaces (mobile app).

Technical description and implementation. The MU is developed and integrated at building and grid level. The Customer Management Unit at building level (CMU) will control the smart appliances, IoT devices and technical facilities through BACS. At grid level, three MU will be developed for: the Distributed Energy Resources (DERMU), secondary (LVGMU) and primary (MVGMU) substations. The grid management units increase the system observability and improve its control capabilities. Besides, ebalance-plus develops and test a variety of technologies in different demo sites: (1) smart-batteries (Li-ion) for large buildings; (2) high-efficient power inverters based on silicon carbide (SiC) transistors that enable DC networks; (3) vehicle-to-grid (V2G) charging points for DC networks and PV generation; (4) IoT devices to integrate smart-appliances and technical facilities; and (5) user-friendly mobile app to engage end-customers in demand response services.



Impact. *Replicability:* ebalance-plus solution is based on the concept of MU's which are scalable and replicable in a hierarchical architecture. Scalability and replicability are at the core of this project concept. Besides, the variety of energy solutions tested different market contexts will boost the replicability chances.

Socio-economics: ebalance-plus will empower customers with further information about their energy costs and friendly end-user interfaces. It will also increase the new markets flexibility potential transparency. As a result, the potential end-user acceptance is high.

Environment: ebalance-plus allows integrating RES and power-to-heat facilities in the electric grid and facilitates its control for an optimal grid operation which reduces power peaks and power losses and thus, carbon emissions.

Market Transformation: ebalance-plus quantify and manage the available and foreseen energy flexibility of buildings and other grid facilities, enabling ancillary services that can impact most of electricity stakeholders (energy suppliers, aggregators, DSO, among others).

Policy: The demonstration in 4 real sites and countries with different regulations, market frameworks and customer behaviours will support the development of new policies and provide tools to motivate the role of new energy aggregators, communities and cooperatives.

H2020 call: LC-SC3-ES-1-2019 - Flexibility and retail market options for the distribution grid

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EUniversal

Market enabling interface to unlock flexibility solutions for cost-effective management of smarter distribution grids

EUniversal aims at implementing the Universal Market Enabling Interface (UMEI) concept by bringing forward a universal, open, adaptable and modular approach to interlink active system management with electricity markets and foster the provision of flexibility services, also acknowledging the activation needs and the coordination requirements with other commercial parties and TSOs. A set of market-oriented flexibility services from DERs will be implemented to answer DSOs' needs in a cost-effective way.

From 2020	Project total cost	EU contribution	Website
To 2023	9.8 M€	7.9 M€	https://euniversal.eu/

Technologies and services deployed	
Technologies for consumers	✓ Demand response ✓ Smart Appliance ✓ Smart Metering
Grid technologies	HVAC ✓ Inertia ✓ Micro-grid ✓ Network management and control tools
Large-scale storage technologies	
Distributed storage technologies	Batteries ✓ Electric Vehicles ✓ Thermal energy storage
Generation technologies	Wind Turbine ✓ PV ✓ Micro-generation
Market	Electricity market ✓ Ancillary services

Project partners' countries

Coordinator: EDP DISTRIBUICAO ENERGIA SA (PORTUGAL)

Other partners:

- INNOGY SE (Germany)
- ENERGA OPERATOR SA (Poland)
- EUROPEAN DISTRIBUTION SYSTEM OPERATORS FOR SMART GRIDS (Belgium)
- EUROPEAN ASSOCIATION FOR STORAGE OF ENERGY (Belgium)
- INESC TEC - INSTITUTO DE ENGENHARIADE SISTEMAS E COMPUTADORES, TECNOLOGIA E CIENCIA (Portugal)
- THE UNIVERSITY OF MANCHESTER (United Kingdom)
- UNIVERSIDAD PONTIFICIA COMILLAS (Spain)
- VLAAMSE INSTELLING VOOR TECHNOLOGISCH ONDERZOEK N.V. (Belgium)
- TRACTEBEL IMPACT BELGIUM SA (Belgium)
- N-SIDE (Belgium)
- NODES AS (Norway)
- CENTRICA BUSINESS SOLUTIONS BELGIUM (Belgium)
- INSTYTUT ENERGETYKI (Poland)
- MIKRONIKA SPOLKA Z OGRANICZONA ODPOWIEDZIALNOSCIA (Poland)
- KATHOLIEKE UNIVERSITEIT LEUVEN (Belgium)
- VLERICK BUSINESS SCHOOL (Belgium)
- ZABALA INNOVATION CONSULTING, S.A. (Spain)

Project Description

Context. The present context shows the potential of electricity grids to lead the energy system transition as new solutions deal with the challenges related to flexibility, grid observability and controllability, market mechanisms and interoperability in a holistic way. The new solutions need to cover the technological aspects by linking smart and integrated services and tools for distribution grid with market mechanisms. This architecture will guarantee a significant impact on the environment and society, putting consumers at its centre.

Scope. EUniversal enables the transformation of the electricity grid by overcoming existing limitations in the use of flexibility by DSOs through the implementation of a Universal Market Enabling Interface (UMEI). To achieve this vision, EUniversal relies on the following key elements:

- Bringing forward a universal, open, adaptable and modular approach to interlink active system management with electricity markets and foster the provision of flexibility services, also acknowledging the activation needs of and the coordination requirements with other commercial parties and TSOs.
- A set of market-oriented flexibility services from DERs will be implemented to answer DSOs' needs in a cost-effectively way, supporting the energy transition.
- Three heterogeneous groups of pilot demonstrators in three different countries have been selected to cover a broad range of distribution grid typologies and to test the solutions in distinct regulatory environments and in alignment with national plans for the energy transition in 2030.

Technical description and implementation. UMEI concept relies on the following four structural pillars:

- Universal Market Enabling Interface (UMEI);
- Flexibility enabling technologies and solutions;
- Smart Grid Solutions;
- Flexibility market mechanisms, products and platforms.

EUniversal develops a fully interoperable, adaptive, evolutive, technology neutral and replicable DSO interface for flexibility services providers, enabling the standard provision of flexibility and the uptake of existing and new market solutions. While developing a flexibility toolbox, the project aims to revise DSO smart grid management and the control paradigm for enabling the integration of new market mechanisms and flexibility services as new assets for network planning, operation and automation schemes. Innovative market mechanisms for the procurement and activation of a selection of grid services for DSOs are designed and assessed, led by the increase of the options to operate the distribution grid in a secure and stable manner at an affordable cost through the use of flexibility from DERs. Three DEMO sites (PT, DE, PL) are monitored.

Impact. *Replicability:* EUniversal allows increase in RES and DERs' hosting capacity of more than 50% as well as of energy storage solutions' penetration, through more than 6 standardised flexibility services for distribution grids provided by DERs, storage, microgrids or energy communities, through UMEI standard, in different regulatory/ grid contexts. It enables 60% of SAIDI and SAIFI improvement using novel methodology for including distribution grid resilience metric in planning and operation; grid investment avoidance or deferral due to the use of flexibility (>30%); reinforcement of Resilience and Flexibility to Extreme Events (40%).

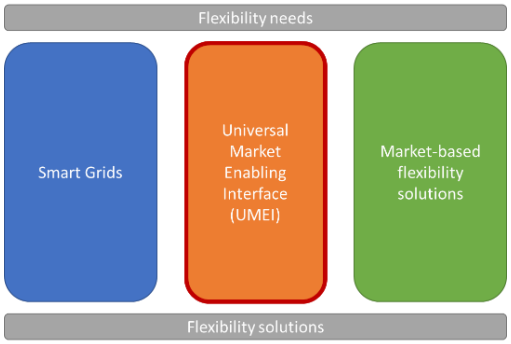
Socio-economics: EUniversal empowers energy consumers and contributes to job creations.

Environment: EUniversal solutions allows a GHG emissions reduction until 40% and enable an increase of at least +32% of the share of renewables

Market Transformation: EUniversal improves infrastructure (strengthening the grids); fosters digitalisation; contributes to an extensive business process transformation, necessary to overcome the new challenges and to capitalise on investments in smart technology. The project offers a relatively fast market introduction of new solutions for grid operators and market parties.

Policy: EUniversal supports:

- the development of new approaches for distribution planning and operation including flexible resources;
- the implementation of incentives for DSOs to procure flexibility from network users;
- the TSO-DSO coordination;
- the role of DSOs in emerging business models;
- the customers access to the energy markets to trade their flexibility and self-generated electricity.



H2020 call: LC-SC3-ES-1-2019 - Flexibility and retail market options for the distribution grid

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FEVER

Flexible Energy Production, Demand and Storage-based Virtual Power Plants for Electricity Markets and Resilient DSO Operation

FEVER aims at implementing and demonstrating solutions and services that leverage flexibility towards offering electricity grid services that address problems of the distribution grid, thus enabling it to function in a secure and resilient manner. The project encompasses technologies and techniques for extraction of energy flexibility from virtual and physical energy storage assets (batteries, V2G) and demand response. FEVER's holistic approach to flexibility will facilitate establishing and operating appropriate business models for all players in the market, thereby providing the EU with a secure, efficient, and resilient electric grid.

From 2020 To 2023	Project total cost	EU contribution	Website
	10 M€	7.8 M€	www.fever-h2020.eu

Technologies and services deployed	
Technologies for consumers	✓ Demand Response
Grid technologies	✓ Network management and control tools
Large-scale storage technologies	
Distributed storage technologies	Batteries ✓ Electric Vehicles ✓ Thermal energy storage
Generation technologies	
Market	Electricity market ✓ Ancillary services

Project partners' countries

Coordinator: Intracom Telecom (GREECE)

Other partners:

- UNIVERSITY OF CYPRUS (Cyprus)
- PANEPISTIMIO PATRON (Greece)
- INEA INFORMATIZACIJA ENERGETIKA AVTOMATIZACIJA DOO (Slovenia)
- ESTABANELL Y PAHISA ENERGIA SA (Spain)
- ESTABANELL Y PAHISA MERCATOR SA (Spain)
- UNIVERSITAT DE GIRONA (Spain)
- UNIVERSITE CATHOLIQUE DE LOUVAIN (Belgium)
- UNIVERSITAT POLITECNICA DE CATALUNYA (Spain)
- SWW WUNSIEDEL GMBH (Germany)
- ELLINIKO HRIMATISTIRIO ENERGEIAS (Greece)
- B.A.U.M. CONSULT GMBH (Germany)
- AALBORG UNIVERSITET (Denmark)
- STADTWERK HASSFURT GMBH (Germany)
- ES-GEHT!-ENERGIESYSTEME GMBH (Germany)
- IBM IRELAND LIMITED (Ireland)
- FLEXSHAPE APS (Denmark)

Project Description

Context. Electricity grids are planned, operated and controlled to provide an economical, safe and reliable supply. In this context the reliability considers only the most likely events. Extreme climate events are mostly not considered in the typical grid planning phase, but also need to be taken into account for in grid operation, via appropriate automation and control strategies. Active Distribution Networks (ADNs) have the potential to improve the distribution system reliability and resiliency by leveraging new tools that offer intelligent functions. ADNs may also leverage flexibility as a service to overcome critical events.

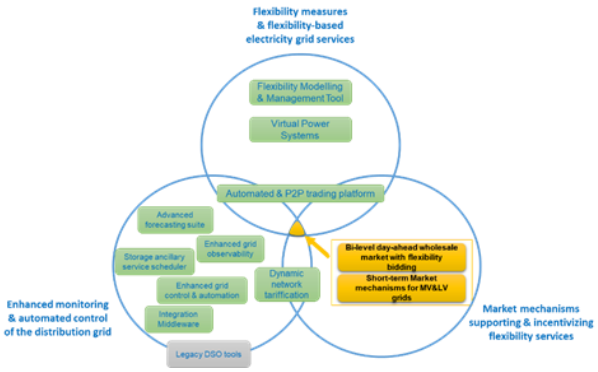
Scope. FEVER's scope is defined by three axes. First, to develop and demonstrate solutions and innovative services that leverage flexibility towards offering electricity grid services that address problems of the distribution grid, enabling it to function in a secure and resilient manner in light of the ever-expanding penetration of distributed variable renewables. These solutions will incorporate established and emerging technologies among others related to demand response, distributed storage (stationary and EVs), and power electronics. Second, to enhance advanced monitoring and automated control of the distribution grid, supporting functions related to continuity of supply, operation restoration, and power quality monitoring. Third, to analyze and demonstrate novel market mechanisms and tools that support and incentivize flexibility services, taking into account the policy context and market rules.

The envisaged solutions will allow DSOs to better plan, build, monitor, control and safely operate their grid, while creating business opportunities for stakeholders such as the Prosumers and Flexibility Aggregators.

Technical description and implementation.

FEVER will implement:

- flexibility measures that address the local needs for flexibility at the distribution grid, leveraging flexibility assets such as residential and industrial loads, EVs, stationary batteries, as well as the potential for flexibility due to the electrification of various sectors, such as heating and cooling
- a comprehensive flexibility aggregation, management and trading solution that incorporates intelligence around the optimal flexibility orchestration (both with technical and economic criteria) and is capable to offer flexibility services in different markets (local, peer-to-peer, wholesale)
- electricity grid services such as congestion management and overvoltage avoidance based on flexibility management techniques such as EVs' (dis)-charging control
- an innovative toolbox that empowers the DSOs with advanced monitoring and automated control functions
- an advanced technology that leverages batteries' inverters towards providing ancillary services
- a hierarchical and scalable operational mechanism for day-ahead and continuous trading of flexibility services
- a toolbox for peer-to-peer flexibility trading based on decentralized ledger technologies (DLTs).
- an innovative combined automated trading that also leverages the DLTs toolbox to realize complex business models in closed systems such as local energy communities.



Impact. *Replicability*: Contribute to define the conditions of a well-functioning electricity market which creates business case for stakeholders willing to provide such flexibility and allow to sustain the necessary investments (e.g. variable price strategies).

Socio-Economics: (i) Improve the capability to manage future energy loads including electrical vehicles. (ii) Improve distribution grid operations which guarantee security of supply and the use of flexibility products while integrating large shares of variable renewables avoiding unnecessary investments by solving congestion.

Environment: Decarbonizing the economy.

Market transformation: (i) Increased resiliency of the electricity grid – increased system security. (ii) Improving innovation capacity, creating new market opportunities, strengthening competitiveness and growth of companies and integrating new knowledge.

Policy: Alignment with the EU policy.

H2020 call: LC-SC3-ES-1-2019 - Flexibility and retail market options for the distribution grid

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FlexiGrid (864048)

Enabling FLEXIbility for future distribution GRIDs with high penetration of variable renewable generation

FlexiGrid demonstrates cutting-edge technologies and innovative flexible markets enabled by advanced cross-platforms for local energy exchanges and providing flexibility to distribution system operators in order to ensure secure, stable and affordable operations of electrical distribution grids for de-carbonising energy systems with high shares of renewables (up to and above 100%). By leveraging digital, smart grid technologies, IoT, blockchain, FlexiGrid provides a transparent data management platform by broadcasting real-time information on the conditions of the network to optimise the observability of the grid and market functioning.

From 2019	Project total cost	EU contribution	Website
To 2023	10.4 M€	8.1 M€	www.flexigrid.org

Technologies and services deployed	
Technologies for consumers	✓ Demand Response ✓ Smart appliance
Grid technologies	✓ Network management and control tools ✓ Microgrid
Large-scale storage technologies	✓ Power to gas
Distributed storage technologies	✓ Batterie ✓ Electric Vehicles ✓ Thermal energy storage
Generation technologies	✓ PV
Market	✓ Electricity market ✓ Ancillary services

Project partners' countries

Coordinator: IMCG SWEDEN AB (SWEDEN)

Other partners:

- TECHNISCHE UNIVERSITEIT EINDHOVEN (Netherlands)
- CHALMERS TEKNISKA HOEGSKOLA AB (Sweden)
- EMAX (Belgium)
- SIVECO ROMANIA SA (Romania)
- RISE RESEARCH INSTITUTES OF SWEDEN AB (Sweden)
- AKADEMISKA HUS AKTIEBOLAG (Sweden)
- ENERGO-PRO ENERGY SERVICES EOOD (Bulgaria)
- GOTEBORG ENERGI AB (Sweden)
- TECHNICAL UNIVERSITY OF SOFIA (Bulgaria)
- OSMANGAZI ELEKTRIK DAGITIM ANONIM SIRKETI (Turkey)
- ENTRA ENERGY (Bulgaria)
- HAUTE ECOLE SPECIALISEE DE SUISSE OCCIDENTALE (Switzerland)
- L'ENERGIE DE SION-REGION SA, ESR (Switzerland)
- INAVITAS ENERJI ANONIM SIRKETI (Turkey)

Project Description

Context. The demand for electricity in Europe's internal market triggered a radical change project, starting with the shift to the single internal market, then followed by the energy transition towards 2030 Climate-Energy objectives and the negotiation of the Clean Energy Package. Europe has seen paradigm shifts on the decentralization of generation with renewable and variable electricity demand, as well as electrification of thermal and transport sectors. The result is a shift to an energy system with high levels of fluctuation in supply and much greater demand elasticity.

Scope. The overall objectives of FlexiGrid are:

- To develop an integrated architecture for flexibility measures and electricity grid services provided by storage of electricity, vehicle charging, power to-heat, demand response and variable generation to enable additional decarbonisation;
- To define, test, deploy and demonstrate markets and market mechanisms that incentivise flexibility, in particular for mitigating short-term and long-term congestions or other problems in the distribution network such as voltage issues;
- To drive cooperation between distribution system operators, TSOs, consumers and generators by defining market interactions, facilitating the integration of wholesale and retail markets and cross sector interactions;
- To deploy smart grid technologies to enable the architecture and markets, bringing actors together to participate as distributed energy sources, driving increased resilience of the electricity grid, increased system security, greater observability, higher automation and improved control of the grid;
- To enable future technical and commercial innovation by identifying barriers to innovation, developing pathways to regulatory and policy reform, developing business models, and through strategic collaboration.

Technical description and implementation. Through intelligent clustering, near real-time transition between energy and grid services markets and various storage systems, FlexiGrid maximizes the utilization of existing assets and circumvent the need of extensive investment for network reinforcement. On the one hand, this increases the renewable hosting capacity of distribution networks, while on the other hand it promotes increasing self-consumption at the end-user levels. Integrated solutions for managing flexibility are delivered including different energy storage systems (stationary batteries, as well as EV batteries, vehicle-to-grid), power-to-heat, power-to-gas and demand response schemes.

Impact. *Replicability:* Demonstration sites prove that cutting-edge technology such as improved grid monitoring, Energy IoT platforms, peer-to-peer trading, and blockchain can be deployed to manage future loads such as electric vehicles and electric heating. Demonstration sites in Switzerland, Turkey, Bulgaria and Sweden prove peak demand and congestion management in the distribution network by optimizing both supply and demand schedules. The leading-edge nature of the demonstration projects reinforces Europe as a global leader in renewables and provide new export opportunities for knowledge and technology.

Socio-economics: Distribution grid and local markets flexibility lower the overall investment cost for infrastructure by leveraging smart resources with possible support services towards stakeholders. This creates viable business models to have sustainability impacts on the social economy. Better exploitation of local resources and increased self-consumption further improve the overall economics off DSOs and customers. In the long run, FlexiGrid contributes to the development of sustainable buildings and in a larger scale, sustainable cities.

Environment: FlexiGrid contributes to improve environmental and sustainability issues in the following ways:

- Enhanced RES penetration, resulting in smaller environmental footprint;
- Decreased RES curtailment due to grid's flexibility and real-time clustering ability;
- Improved exploitation of local resources, resulting in decreased energy loss and less emissions.

Market Transformation: The development of bankable business models (realized in WP2) decreases risks and cost of capital and supports deployment pace, as they are attractive for lenders, associated with relatively low risk and easy to replicate.

Policy: The major policy and regulatory impacts Flexigrid contributes are:

- Policy which enables the DSO to manage the markets for services from the demand-side to support grid operation;
- Regulation regarding the ability of the DSO to alter grid structure depending on the existing condition and markets signals.

H2020 call: LC-SC3-ES-1-2019 - Flexibility and retail market options for the distribution grid

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FLEXIGRID (864579)

Interoperable solutions for implementing holistic FLEXIbility services in the distribution GRID

FLEXIGRID improves the distribution grid operation making it more flexible, reliable and cost-efficient through the development of 8 solutions interoperable with the IT systems used by the energy stakeholders.

From 2019	Project total cost	EU contribution	Website
To 2023	8.5 M€	6.8 M€	www.flexigrid-h2020.eu

Technologies and services deployed	
Technologies for consumers	Demand Response Smart metering
Grid technologies	HVAC ✓ Protections ✓ Network management and control tools ✓ Micro-grid
Large-scale storage technologies	
Distributed storage technologies	Batteries ✓ Electric Vehicles ✓ Thermal Energy Storage
Generation technologies	✓ PV ✓ Micro-generation
Market	✓ Electricity market ✓ Ancillary services

Project partners' countries

Coordinator: FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS (Spain)

Other partners:

- VIESGO DISTRIBUCION ELECTRICA SL (Spain)
- ELIN VERD ANONYMI ETAIRIA AEIFORONPROIONTON KAI YPIRESION (Greece)
- HEP-OPERATOR DISTRIBUCIJSKOG SUSTAVA DOO ZA DISTRIBUCIJU I OPSKRBU ELEKTRICNE ENERGIJED.O.O. (Croatia)
- EDYNA SRL (Italy)
- ORMAZABAL PROTECTION AND AUTOMATION SL (Spain)
- ZIV APLICACIONES Y TECNOLOGIA SL (Spain)
- SELTA SPA (Italy)
- ATOS SPAIN SA (Spain)
- IOANNIS SARANTIS-TOURISTIKAI-XENODOCHEIAKAI-KTIMATIK TECHNIKAI KAI GENIKAI EPICHEIRISEIS ANONYMOS ETAIRIA (Greece)
- HYPERTECH (CHAIPERTEK) ANONYMOS VIOMICHANIKI EMPORI ETAIREIA PLIROFORIKIS KAI NEON TECHNOLOGION (Greece)
- UNIVERSIDAD DE CANTABRIA (Spain)
- SVEUCILISTE U ZAGREBU FAKULTET ELEKTROTEHNIKE I RACUNARSTVA (Croatia)
- FONDAZIONE LINKS - LEADING INNOVATION & KNOWLEDGE I SOCIETY (Italy)
- CAPENERGIES ASSOCIATION (France)
- CONFEDERATION EUROPEENNE DES DISTRIBUTEURS PUBLICS CUMMUNAUX D ENERGIE (Belgium)

Project Description

Context. The main goal of FLEXIGRID is to allow the distribution grid to operate in a secure and stable manner when a large share of variable generation electricity sources is connected to low and medium voltage grids. To do so, FLEXIGRID proposes a three-level approach aiming at (1) Flexibility, (2) Reliability, and (3) Economic Efficiency through the development of innovative hardware and software solutions. These solutions will be demonstrated in four Demo-Sites across Europe ensuring their interoperability through its integration into an open source platform able to harmonize the data flow between FLEXIGRID solutions and the real grid.

Scope. FLEXIGRID project is focused on:

- Improving the power system flexibility by enhancing the grid hosting capacity of RES towards the energy network decarbonization.
- Increasing the observability, controllability and automation of the network systems for the improvement of both the security and resilience of the grid.
- Mitigation of congestions in the distributed grid thus reducing the cost of the European energy transition.
- Ensuring the interoperability and compatibility of the developed solutions with the different platforms used by the European DSOs guaranteeing a proper and secure data management.
- Demonstrating program up to TRL 8 in four different demo-sites, obtaining reliable results on its replicability and ensuring its attractiveness for European stakeholders.
- Identifying and analysing the needs and shortfalls of the distribution grid as well as the obstacles to innovation under the current local and international context and regulation framework
- Raising awareness among citizens and stakeholders of the transition towards a low carbon economy considering them as an active player in the energy system
- Ensuring the exploitation of the project results by a corresponding business plan as well as their dissemination by exchanging knowledge with other projects under the BRIDGE Initiative.

Technical description and implementation. FLEXIGRID aims to demonstrate a set of hardware and software solutions to enhance the flexibility, observability and resilience in four European distribution grids with very different characteristics. These solutions include, among other developments, the SS of the future, a new generation of smart meters and protection schemes and several modules and services for forecasting, fault detection, self-healing, congestion management and demand response. All these solutions are focused on guaranteeing the security and stability of the distribution grid in scenarios with high rates of renewables avoiding large investments in infrastructure. The success of such an ambitious project requires a clear and well-defined methodology:

Data gathering and demo-sites characterization, ICT architecture and CIM definition, Technological developments, FUSE platform development and integration, Validation and demonstration, Results gathering, Overall impact analysis and Definition of replication strategy.

Impact. *Replicability*: The demo-sites selected in FLEXIGRID covers a comprehensive scenario of distribution grids' topologies available in Europe offering a high replicability potential.

Socio-economics: Doubling the share of renewables increases direct and indirect employment in the sector. Renewable energy jobs will grow across all technologies. Additionally, the solutions developed based on the improvement of distribution network control allow to achieve reductions of the reinforcement of interconnections and investments needed to maintain the quality and stability of the grid.

Environment: FLEXIGRID's solutions allow renewable energies curtailments decrease thanks to the improvement of the observability and control over the grid, at the same time that contribute to make energy grids more sustainable, flexible and reliable. This contribute significantly to achieve CO_2 emissions savings due to the larger penetration of share RES, contributing to the 2030 Climate-Energy objectives.

Market Transformation: FLEXIGRID covers the whole spectrum of many items included in the EU policy and market trends regarding the improvement of distribution networks.

Policy: FLEXIGRID intends to provide recommendations on new policy developments and regulations at regional and EU level. The project outputs aim to impact on specific articles of the Directive regarding the ownership and the operation of flexibility solutions by the market and regulated players, others relative to the new regulatory environment for DSO, and others regarding the new regulatory environment for distribution system operator.

H2020 call: LC-SC3-ES-1-2019 - Flexibility and retail market options for the distribution grid

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PARITY

Pro-sumer AwaRe, Transactive Markets for Valorization of Distributed flexibilITY enabled by Smart Energy Contracts

PARITY project targets at developing Local Flexibility Markets & Smart Energy Grids through peer-to-peer and decentralised intelligence in a human-centric manner.

From 2019	Project total cost	EU contribution	Website
To 2023	9.3 M€	7.1 M€	https://parity-h2020.eu/

Technologies and services

Technologies for consumers	✓ Demand response ✓ Smart metering
Grid technologies	✓ Protections ✓ Network management and control tools
Large-scale storage technologies	✓
Distributed storage technologies	✓ Batteries ✓ Electric Vehicles ✓ Thermal energy storage
Generation technologies	✓
Market	✓ Electricity market ✓ Ancillary services

Project partners' countries

Coordinator: ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS (GREECE)

Other partners:

- FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS (Spain)
- EDEX - EDUCATIONAL EXCELLENCE CORPORATION LIMITED (Cyprus)
- HYPERTECH (CHAIPERTEK) ANONYMOS VIOMICHANIKI EMPORIKI ETAIREIA PLIROFORIKIS KAI NEON TECHNOLOGION (Greece)
- MERIT CONSULTING HOUSE (Belgium)
- MONTAJES ELECTRICOS CUERVA S.L. (Spain)
- SISTEMAS URBANOS DE ENERGIAS RENOVABLES SL (Spain)
- BUILDING FACILITY SERVICES PAROCHIYPIRESION ANONYMI ETAIREIA (Greece)
- DIACHEIRISTIS ELLINIKOU DIKTYOU DIANOMIS ELEKTRIKIS ENERGEIAS AE (Greece)
- CHECKWATT AB (Sweden)
- E.ON ENERGILOSNIGAR AKTIEBOLAG (Sweden)
- AZIENDA ELETTRICA DI MASSAGNO SA (Switzerland)
- SCUOLA UNIVERSITARIA PROFESSIONALE DELLA SVIZZERA ITALIANA (Switzerland)
- HIVE POWER SAGL (Switzerland)
- E7 ENERGIE MARKT ANALYSE (Austria)
- QUE TECHNOLOGIES KEFALAIOUCHIKI ETAIREIA (Greece)
- UNIVERSIDAD DE LA IGLESIA DE DEUSTO ENTIDAD RELIGIOSA (Spain)

Project Description

Context. Today's energy markets remain inherently incomplete and imperfectly competitive. Inelasticity of Demand along with the increasing number of distributed energy sources have negative impact on the overall grid balance. Furthermore, non-forecastable variable generation from RES is another challenge for grid management. To overcome the limitations of centralized control methods, distributed flexibility management services can be implemented by combining distributed intelligence technologies (IoT) with market-based blockchain enabled solutions.

Scope. PARITY addresses the "structural inertia" of Distribution Grids and aims to enable the set-up and operation of local flexibility markets at the distribution network level. The main objectives are to provide:

- A DER flexibility ecosystem seamlessly integrating Heterogeneous DER within a Unified Flexibility Management Framework
- A Storage-as-a-Service framework which combines Actual Storage (EVs and batteries) and Virtual Energy Storage (Power-to-Heat)
- A Smart Contracts Enabled Local Flexibility Market Platform through integration of IoT and Blockchain technologies
- Smart Grid monitoring and management tools to enable the DSO to optimally manage the low voltage distribution network

Additionally, PARITY investigates and contributes to market coupling mechanisms and the definition of Local Flexibility Market actors.

Technical description and implementation. Various technology solutions are developed within the project towards fulfilling the objectives, such as:

- Local Flexibility Market Platform
- IoT platform for data collection from buildings
- Module for exposing flexibility potential (Building-as-a-Battery)
- Innovative grid component - STATCOM (static synchronous compensator) to facilitate network management by providing balancing and ancillary services
- Active Network Management services for monitoring and managing the distribution networks
- Aggregator tools for distributed flexibility management
- EV profiling and V2G services

The PARITY solutions are demonstrated in 4 pilot sites located in Spain, Greece, Sweden and Switzerland. Various types of buildings are included in the pilot sites, such as commercial, residential and light industrial buildings, as well as various DERs.

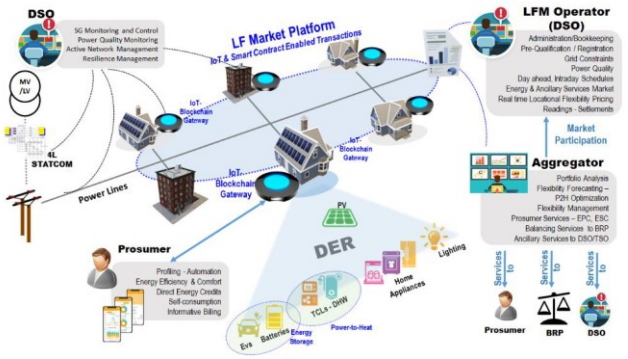
Impact. *Replicability:* The PARITY end-to-end interoperability and data management framework aims to offer high replicability across different building types and systems, independently of devices and energy management systems available in each building.

Socio-economics: Business models for Local Flexibility Markets are explored. Moreover, increased flexibility potential and improved distribution grid operations (e.g. peak load reduction) are anticipated.

Environment: PARITY solutions are expected to contribute to more efficient RES integration and generation, for example through the increase of self-consumption rate.

Market Transformation: The involvement of end users – prosumers within the project help to identify what is needed in order to improve electricity markets operation. As a result, market reform recommendations will be provided.

Policy: The project intends to deliver policy recommendations to enable all relevant stakeholders, including regulatory authorities, to understand the complications and the actions needed to facilitate sustainable flexibility markets in Europe.



H2020 call: LC-SC3-ES-1-2019 - Flexibility and retail market options for the distribution grid

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Platone

PLATform for Operation of distribution Networks

Platone aims at developing a layered set of platforms to meet the needs of system operators, aggregators and end users. A blockchain-based platform is the access layer to generators' and customers' flexibilities able to break traditional access barriers by providing certified measures to all the players. In conjunction, certified data and signals are used for an innovative DSO platform to locally maintain system integrity fostering confidence in flexibility operations. An upper layer implements a new concept of blockchain-based open market platform to link the local system to the TSO domains and enhance the overall system cost efficiency. The platforms are tested in three large pilots in Europe and analysed in cooperation with a large research initiative in Canada.

From 2019	Project total cost	EU contribution	Website
To 2023	9.6 M€	7.5 M€	https://www.platone-h2020.eu

Technologies and services deployed

Technologies for consumers	✓	Smart appliance
Grid technologies	✓	Network management and control tools
Large-scale storage technologies	✓	
Distributed storage technologies	✓	
Generation technologies	✓	
Market	✓	Electricity Market

Project partners' countries

Coordinator: RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (Germany)

Other partners:

- RICERCA SUL SISTEMA ENERGETICO - RSE SPA (Italy)
- EUROPEAN DISTRIBUTION SYSTEM OPERATORS FOR SMART GRIDS (Belgium)
- ACEA ENERGIA SPA (Italy)
- SIEMENS SPA (Italy)
- APIO S.R.L. (Italy)
- ARETI S.P.A. (Italy)
- DIACHEIRISTIS ELLINIKOU DIKTYOU DIANOMIS ELEKTRIKIS ENERGEIAS AE (Greece)
- NATIONAL TECHNICAL UNIVERSITY OF ATHENS - NTUA (Greece)
- B.A.U.M. CONSULT GMBH (Germany)
- AVACON NETZ GMBH (Germany)
- ENGINEERING - INGEGNERIA INFORMATICA SPA (Italy)

Project Description

Context. As the Energy System becomes dominated by renewable energy sources, customers become key players through their generation assets and the flexibility in their load operation. Platone aims at creating unique synergies between market and operation developing a multi-layer platform for customer integration into network operation.

Scope. Platone provides a seamless integration of operation and market, simplifying the life of customers, distribution grid operator and aggregators. A multilayer platform architecture collects data on the edge and delivers secure information both to distribution management systems and to an open marketplace for service provision. Platone intends to create a mechanism to link the edge structure with the DSO operation both for flexibility marketing and grid management, creating a unique synergy in data acquisition and management.

Technical description and implementation. Platone develops a cost effective two-layer platform where edge cloud technology supported by blockchain mechanisms provides an easy and secure access to customer level data for operation and flexibility markets. The Platone solution is developed integrating also advanced monitoring data-driven algorithms for increased observability up to the low voltage level and the inclusion of low cost high-precision measurement devices.

Impact.

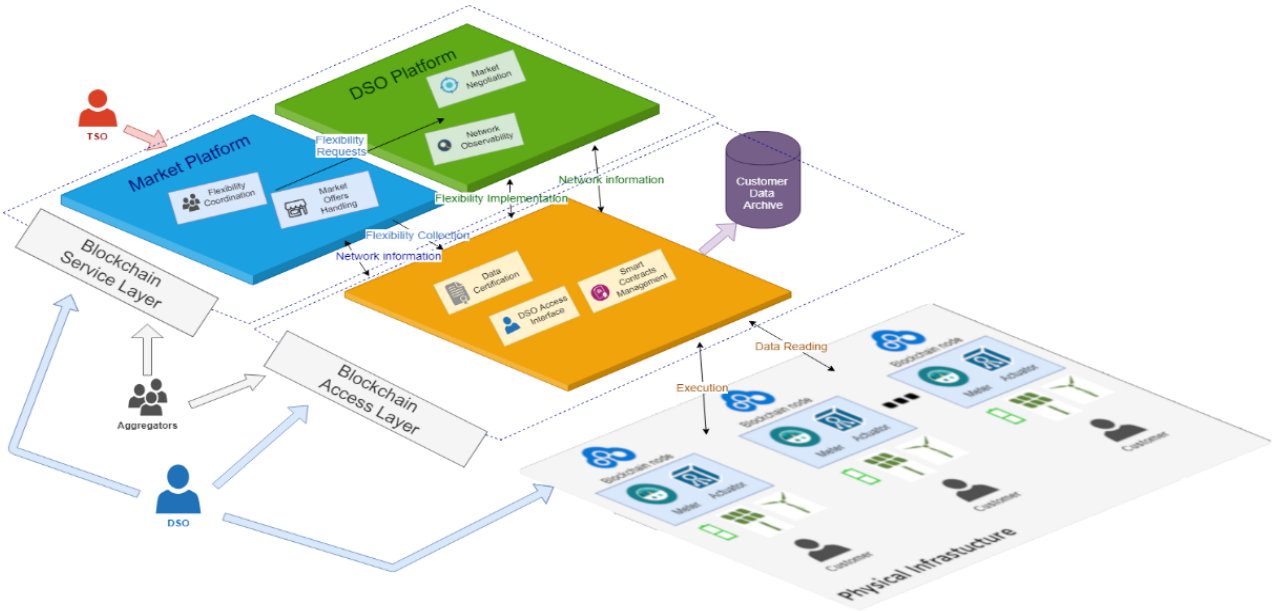
Replicability: Platone open-source software allows DSOs to experiment with innovative grid management services.

Socio-economics:
Platone creates the right conditions for new business models disrupting the status quo in the field of energy economics. All these disruptive transformations will reflect also in a required change in education program at different levels.

Environment: The Platone solution facilitates a higher share of renewable energies to the grid by unlocking energy flexibilities, contributing to the reduction of greenhouse emissions and towards decarbonisation.

Market Transformation: Platone brings a significant impact in the operation of distribution grids and the marketing of flexibility, starting from the customers and the Local Energy Communities. By integrating market and operations, Platone creates the right conditions for a dual-use of data facilitating a rapid deployment of intelligent solutions and limited cost.

Policy: Platone develops proposals for changes to regulations and standards required to implement flexible markets.



H2020 call: LC-SC3-ES-1-2019 - Flexibility and retail market options for the distribution grid

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X-FLEX

Integrated energy solutions and new market mechanisms for an eXtended FLEXibility of the European grid

X-FLEX aims at designing, developing and demonstrating a set of tools to integrate the emerging decentralized ecosystem of RES and flexibility systems into the existing European energy system, in an efficient and cost-effective manner, to create more stable, secure and sustainable smart grid, with special attention to extreme weather conditions. The project addresses all the actors of the smart grid value chain, from DSO to final consumers, including microgrid operators and utilities, considering flexibility in both on the generation and on the demand side, on an individual or aggregated level.

From 2019	Project total cost	EU contribution	Website
To 2023	9.4 M€	7.3 M€	http://xflexproject.eu/

Technologies and services deployed

Technologies for consumers	✓ Demand response
Grid technologies	✓ Network management and control tools
Large-scale storage technologies	✓ Power to Gas
Distributed storage technologies	✓ Batteries ✓ Thermal energy storage
Generation technologies	✓ PV Biogas
Market	✓ Electricity market ✓ Ancillary services

Project partners' countries

Coordinator: ETRA INVESTIGACION Y DESARROLLO SA (Spain)

Other partners:

- UNIVERZA V LJUBLJANI (Slovenia)
- PETROL SLOVENSKA ENERGETSKA DRUZBA DD LJUBLJANA (Slovenia)
- ELEKTRO CELJE D.D. (Slovenia)
- ALBENA AD (Bulgaria)
- ELEKTROENERGIEN SISTEMEN OPERATOR EAD (Bulgaria)
- INSTITUTE OF COMMUNICATION AND COMPUTER SYSTEMS (Greece)
- DIACHEIRISTIS ELLINIKOU DIKTYOU DIANOMIS ELEKTRIKIS ENERGEIAS AE (Greece)
- SUITES DATA INTELLIGENCE SOLUTIONS LIMITED (Cyprus)
- BLUEPRINT ENERGY SOLUTIONS GMBH (Austria)
- SYSTEMS SUNLIGHT INDUSTRIAL & COMMERCIAL COMPANY OF DEFENSIVE, ENERGY, ELECTRONIC AND TELECOMMUNICATIONS SYSTEMS S.A. (Greece)
- JOANNEUM RESEARCH FORSCHUNGSGESELLSCHAFT MBH (Austria)

Project Description

Context. The increasing share of Distributed Renewable Energy Sources (DRES) in the energy grid has become key for the decarbonization of the European electricity system and thus for the achievement of the EU energy and climate change policy goals. The variability and uncertainty of these distributed sources pose important risks and challenges to the stability and security of the European, national and local grids, but at the same time they open new opportunities to the energy value chain. This overall picture is completed by an emerging decentralized ecosystem where new energy systems, such as batteries, power to heat/cold, vehicle to grid and other storage solutions, are offering a large flexibility potential to the grid.

Scope. X-FLEX project proposes, a set of efficient, cost-effective, integrated solutions, that will facilitate the optimum combination of decentralised flexibility assets, both on the generation (DER) side and on the demand side (V2G, power-to-heat/cold/gas, batteries, demand response), enabling all parties, including final prosumers, to offer their flexibility in the market creating benefits to all the actors in the smart grid value chain.

X-FLEX is unique in its multi-technology, multi-actor approach which, in an increasingly RES-powered grid, will ensure security, resilience and stability for all, even under grid-stressing scenarios such as extreme climate events.

Technical description and implementation.

X-FLEX aims to develop 4 complementary products that offer services to all the energy stakeholders, from network operators (TSO, DSO, microgrid operators) to final consumers/prosumers and flexibility providers, including other intermediate players, such as retailers and aggregators.

- SERVIFLEX tool (Integrated flexibility management tool): It is the tool for flexibility managers to take advantage of the value of energy storage along with other demand flexibility resources towards the establishment of a holistic framework for flexibility extraction, profiling, forecasting, classification, clustering and management to serve different market and grid needs.
- GRIDFLEX tool (Advanced tools for automatic control and observability): It is the tool for grid and microgrid operators in order to prevent congestion (voltage and current issues) and power quality problems with the increasing share of intermittent RES, giving special attention to the potential grid problems due extreme climate events.
- MARKETFLEX tool (Market platform and new market mechanisms): This tool enables final consumers and prosumers (generation, DR, flexibility providers) to access the market individually, through an aggregator or through a Balancing Responsible Party to participate on different markets: wholesale market, local energy market or ancillary services market for TSO or DSO.
- X-FLEX platform (Flexible and scalable integrated platform): This platform integrates all the X-FLEX solutions in order to provide services for all the energy actors and ensure more secure, stable and clean energy supply.

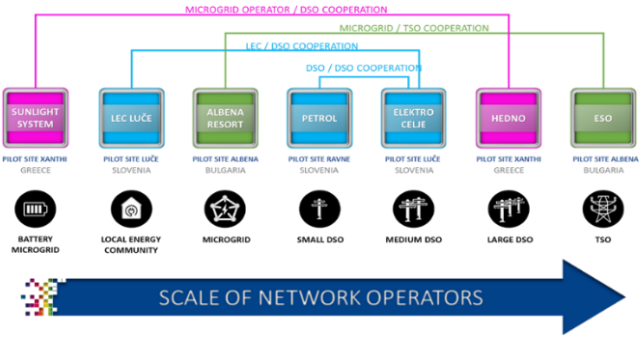
These solutions are tested in real conditions in 4 pilot sites in 3 EU Member states: Bulgaria, Slovenia and Greece.

Impact. *Replicability:* The complementarity of the project pilot sites facilitate the replicability since it is including different conditions, infrastructure and stakeholders, and therefore it facilitates the analysis for the recommendation of future implementation of the solutions after the end of the project.

Socio-economics: By means of the commercialization, deployment and implementation of the X-FLEX solutions is expected to generate 55,480 (direct and indirect) jobs related to RES after 5 years of the X-FLEX commercialization.

Environment: X-FLEX predicts to increase the RES production in the 3 pilot countries by 6,992 GWh over the next 5 years of the project. This increase in the RES production will entail a reduction of 5 MTn CO2eq of CO2 emissions in the pilot countries after the commercialization of the X-FLEX solutions.

Market Transformation: It is expected that X-FLEX will enable the increase of 28% of energy renewable into the distribution grid of the four project pilot sites by end of the project, in 2023.



H2020 call: LC-SC3-ES-2-2019 - Solutions for increased regional cross-border cooperation in the transmission grid

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FARCROSS

Facilitating Regional CROSS-border Electricity Transmission through Innovation

FARCROSS promotes state of the art technologies to enhance the exploitation/ capacity/ efficiency of transmission grid assets. The hardware and software solutions aim to increase grid observability to facilitate system operations at a regional level. FARCROSS considers cross-border connections, planning to use a wide-area protection approach to ensure the safe integration of renewable energy sources into the grid, mitigate disturbances and increase power system stability.

From 2019	Project total cost	EU contribution	Website
To 2023	13.6 M€	9.9 M€	https://farcross.eu/

Technologies and services deployed

Technologies for consumers	✓
Grid technologies	✓ Network management and control tools
Large-scale storage technologies	✓
Distributed storage technologies	✓
Generation technologies	✓
Market	✓ Electricity Market ✓ Ancillary Services

Project partners' countries

Coordinator: GIOUMPITEK MELETI SCHEDIASMOS YLOPOIISI KAI POLISI ERGON PLIROFORIKIS ETAIREIA PERIORISMENIS EFTHYNIS (GREECE)

Other partners:

- UBITECH ENERGY (Belgium)
- INDEPENDENT POWER TRANSMISSION OPERATOR SA (Greece)
- ELEKTROENERGIEN SISTEMEN OPERATOR EAD (Bulgaria)
- MAVIR MAGYAR VILLAMOSENERGIAIPARI ATVITELI RENDSZERIRANYITO ZARTKORUEN MUKODO RESZVENYTARSASAG (Hungary)
- AUSTRIAN POWER GRID AG (Austria)
- COMPANIA NATIONALA DE TRANSPORT ALENERGIEI ELECTRICE TRANSELECTRICA SA (Romania)
- HRVATSKI OPERATOR PRIJENOSNOG SUSTAVA DOO (Croatia)
- NEZAVISNI OPERATOR SISTEMA U BOSNII HERZEGOVINI (Bosnia and Herzegovina)
- OPERATORI SISTEMIT TE TRANSMETIMITOST – SHOQERI ANONIME (Albania)
- FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS (Spain)
- BUDAPESTI MUSZAKI ES GAZDASAGTUDOMANYI EGYETEM (Hungary)
- UNIVERSITATEA POLITEHNICA DIN BUCURESTI (Romania)
- SVEUCILISTE U ZAGREBU FAKULTET ELEKTROTEHNIKE I RACUNARSTVA (Croatia)
- SMART WIRE GRID EUROPE LIMITED (Ireland)
- SCHWEITZER ENGINEERING LABORATORIES ESPANA, SL (Spain)
- STUDIO ELEKTRONIKE RIJEKA DOO (Croatia)
- EUROPEAN DYNAMICS LUXEMBOURG SA (Luxembourg)
- MONITEC GMBH (Germany)
- CINTECH SOLUTIONS LTD (Cyprus)
- INNOVATIVE ENERGY AND INFORMATION TECHNOLOGIES LTD (Bulgaria)
- SOFTWARE COMPANY EOOD (Bulgaria)
- MOBILITY ENERGY INNOVATIONS KFT (Hungary)
- C & G SKUPINA, INVESTIRANJE IN SVETOVANJE DOO (Slovenia)
- WEATHER2UMBRELLA LTD (United Kingdom)
- TECH INSPIRE LTD (UNITED Kingdom)
- HOLDING SLOVENSKE ELEKTRARNE DOO (Slovenia)
- UNIPER HUNGARY ENERGETIKAI KFT (Hungary)
- BULGARSKA NEZAVISIMA ENERGIJNA BORSA EAD (Bulgaria)
- BORZEN, OPERATER TRGA Z ELEKTRIKO, D.O.O. (Slovenia)
- HUPX MAGYAR SZERVEZETT VILLAMOSENERGIA-PIAC ZARTKORUEN MUKODO RESZVENYTARSASAG (Hungary)

Project Description

Context. FARCROSS is a four-year demonstration driven project that develops a comprehensive platform of tools and metrics for establishing smart grid flexibility operation and maximizing cross-border flows. FARCROSS supports the increased interconnectivity between neighboring systems which will bring additional integration of RES in large amounts into the grid and lower energy costs for the EU consumers.

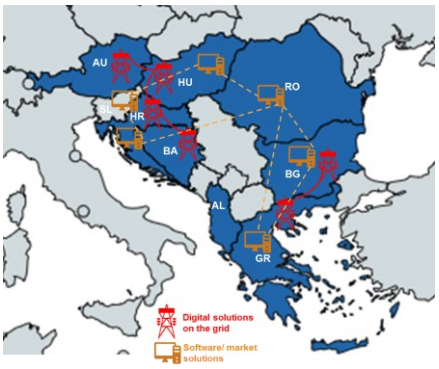
Scope. FARCROSS aims to connect major stakeholders of the energy value chain and integrate hardware and software solutions to 'unlock' resources for cross-border electricity flows and regional cooperation with the following objectives:

- Ensure that the technologies developed in FARCROSS can be used by plant and system operators to operate successfully in modern power markets;
- Provide an implementable framework that will help operators and producers to access ancillary services revenue streams;
- Increase cross-border network transfer capacity with the use of advanced power flow system;
- To increase power system security in scenarios with increasing share of renewables, enhancing fault detection capabilities at regional level.

Technical description and implementation.

FARCROSS strategically focuses on the following areas of interest (thematic areas):

- **Smart grid innovations to increase cross-border capacity**: state-of-the-art technologies enhance exploitation/ capacity/ efficiency of transmission grid assets, either on the generation or the transmission level.
- **Regional system operations**: regional level forecasting solutions that predict renewable energy production and demand side resources at a regional level, supporting wholesale, intra-day, real time markets and system daily operation will be deployed.
- **Capacity allocation for regional cross-border trading**: FARCROSS innovation tools investigate issues like (i) optimizing the usage of the available cross-border capacity for reserve procurement while transitioning from Available Transfer Capacity to Flow-Based mechanism, (ii) simultaneous interconnector reservation for energy and balancing capacity to enable reserve market coupling and (iii) state-of-the-art ICT technologies to materialize market coupling exchange platforms.



Impact. *Replicability:* FARCROSS allows the standardisation of hardware solutions (such as static series synchronous compensators and dynamic line rating systems) to exploit the full potential of power corridors. It increases regional electricity flows and improves grid stability through greater observability.

Socio-economics: FARCROSS enables the Increase of interconnectivity between neighbouring systems which is a critical enabler to successfully integrate large amounts of renewable generation and lowering energy costs for European consumers.

Environment: FARCROSS accelerates decarbonisation of the EU electricity sector, impacting climate change and the environment, by increasing the ability to manage flows of RES-generated electricity to load centres. The project has environmental benefits, such as reducing the need to develop new infrastructure corridors through greenfield areas by better utilisation of existing assets.

Market Transformation: FARCROSS creates new market opportunities, new economic opportunities, new avenues to prosperity through the enhancement and demonstration of emerging network technologies, and the open approach to sharing data. It increases competitiveness in the EU, in particular in the procurement of system services and within electricity markets, by increasing cross-border coupling and giving TSO's access to a wider range of options for flexibility.

Policy: FARCROSS applies relevant standards in each field, building on those standards to define and test new common services and data models.

H2020 call: LC-SC3-ES-2-2019 - Solutions for increased regional cross-border cooperation in the transmission grid

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TRINITY

TRansmission system enhancement of regIoNal borders by means of IntelligenT market technologY

TRINITY enhances cooperation and coordination among the Transmission System Operators of SEE in order to support the integration of the electricity markets in the region, whilst promoting higher penetration of clean energies.

From 2019	Project total cost	EU contribution	Website
To 2023	13.1 M€	9.8 M€	http://trinityh2020.eu/

Technologies and services deployed

Technologies for consumers	✓ Demand response
Grid technologies	✓ Network management and control tools
Large-scale storage technologies	✓
Distributed storage technologies	✓ Batteries
Generation technologies	✓ Wind Turbine , PV
Market	✓ Electricity market ✓ Ancillary services

Project partners' countries

Coordinator: ETRA INVESTIGACION Y DESARROLLO SA (Spain)

Other partners:

- JOINT STOCK COMPANY ELEKTROMREZA SRBIJE BELGRADE (Serbia)
- CENTAR ZA KOORDINACIJU SIGURNOSTI SCC DOO BEOGRAD-VOZDOVAC (Serbia)
- RTE INTERNATIONAL (France)
- ELEKTROENERGETSKI KOORDINACIONI CENTAR DOO (Serbia)
- SEEPEX JOINT STOCK COMPANY BELGRADE (Serbia)
- CENTRUL ROMAN AL ENERGIEI - CRE (Romania)
- INSTITUTE OF COMMUNICATION AND COMPUTER SYSTEMS (Greece)
- BERZA ELEKTRICNE ENERGIJE DOO PODGORICA (Montenegro)
- CRNOGORSKI ELEKTROPRENOSNI SISTEM AD PODGORICA (Montenegro)
- NEZAVISNI OPERATOR SISTEMA U BOSNII HERZEGOVINI (Bosnia and Herzegovina)
- KONCAR - INZENJERING ZA ENERGETIKUI TRANSPORT DD (Croatia)
- OPERATOR NA ELEKTROPRENOSNIOT SISTEM NA MAKEDONIJA AKCIONERSKO DRUSHTVO ZA PRENOS NA ELEKTRICHNA ENERGIJAI UPRAVUVANJE SO ELEKTROENERGETSKI (Bulgaria)
- ELEKTROENERGIEN SISTEMEN OPERATOR EAD (Bulgaria)
- UNIVERSITY ST KLIMENT OHRIDSKI BITOLA (Hungary)
- HUPX MAGYAR SZERVEZETT VILLAMOSENERGIA-PIAC ZARTKORUEN MUKODO RESZVENYTARSASAG (Hungary)
- BULGARSKA NEZAVISIMA ENERGIJNA BORSA EAD (Bulgaria)
- TERNA ENERGY AE (Greece)
- INSTITUT MIHAJLO PUPIN (Serbia)

Project Description

Context. The adoption of a single and unified electricity market is one of the main challenges faced by Europe today. Northern and Western Europe have already made some progress during recent years towards the achievement of this objective. However, South-Eastern Europe (SEE) is still to tackle substantial barriers in order to catch up with the more experienced EU regions. TRINITY will address this challenge in order to improve the current situation and facilitate the interconnection of South-Eastern electricity markets - among themselves and also within the current Multi Regional Coupling area (MRC).

Scope.

TRINITY aims to develop a set of solutions to enhance cooperation and coordination among the transmission system operators of SEE in order to support the integration of the electricity markets in the region, whilst promoting higher penetration of clean energies.

The main objectives of the project are:

- Enhanced cross border trading and balancing energy exchange.
- To ensure electricity market integration.
- Increased share of Renewable Energy Sources (RES) in SEE (South-Eastern Europe).
- Improved security of system operation in the context of increased RES.
- Better coordination, interaction and communication.

Technical description and implementation. This strategic goal is driven by end-users (6 TSOs, 5 NEMOS. 1 RCC and 3 RES promoters) and will be achieved through the deployment in the region of four independent, but complementary, TRINITY products:

- T-COORDINATION PLATFORM: TRINITY develops a modular ICT platform which would serve for RSC-TSOs and TSO-RES producers communication and coordination. The product predicts relevant situations to coordinate in different time horizons, coordinate those operations and ex-+post analysis and reporting.
- T-MARKET COUPLING FRAMEWORK: TRINITY delivers a framework to enhance cross-border cooperation and ensure electricity market integration in SEE. Starting from the already on-going agreements to facilitate the coupling of day-ahead markets, the project proposes coordinated intra-day and capacity markets between countries in the region, considering EU and non-EU countries.
- T-SENTINEL TOOLSET: TRINITY delivers a regional management and operation toolset to enhance security and reliability of the existing regional structures. The T-SENTINEL toolset intends to enable remedial action optimization at regional level, as well as develop novel algorithms for improvement of Reliability Margins calculation, which will facilitate the accommodation of more RES in the region.
- T-RES CONTROL CENTRE: This tool will be deployed within SEE with the objective of optimizing the management and operation of renewable energy generation plants, facilitating their participation in the different electricity markets through specific mechanisms to track and certificate the clean origin of the energy (certificates based on blockchain).

Those technologies are demonstrated in 8 different SEE countries: Serbia, Greece, Montenegro, Bosnia and Herzegovina, Croatia, North Macedonia, Bulgaria and Hungary.

Impact.

Replicability: TRINITY interconnects TSOs from 6 different countries and analyses its replication potential across SEE.

Socio-economics: TRINITY intends to affect the growth of the employment rate of SEE countries. The project is expected to create 226,912 (direct and indirect) jobs related to RES promotion in five years after TRINITY commercialization.

Environment: TRINITY may expect to increase the RES production in the SEE countries over the next 5 years of the project by 14,951 GWh, increasing in 3 % the RES production in Europe. This increase in the RES production will entail CO_2 reduction of 10,6 million Tn CO_2eq, considering an emission factor of 0,708 Tn CO_2/MWh , which represents a reduction of 3.2 % in CO_2 emissions.

Market Transformation: TRINITY fosters the own electricity capacity resources of the SEE countries by fostering the local production of renewable energies while increasing the interconnection between these countries for reducing the energy imports from non-EU countries.

H2020 call: LC-SC3-ES-8-2019 - European Islands Facility - Unlock financing for energy transitions and supporting islands to develop investment concepts

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NESOI

New Energy Solutions Optimised for Islands

NESOI mainstreams green energy investments to EU islands to give them the opportunity to implement energy technologies and innovative approaches in a cost-competitive way. Starting with a broad survey gathering EU islands' needs, NESOI develops transparent technical, social, economic and environmental criteria to select, via two competitive calls, energy transition projects for customised direct support. Selected islands benefits from specific project structuring Technical Assistance provided directly by NESOI's professionals. It is supplemented by local contractors financed thanks to NESOI's cascade mechanism. Moreover, other capacity building information and toolkits are provided via a digital platform and training workshops.

From 2019	Project total cost	EU contribution	Website
To 2023	9.9 M€	9.9 M€	www.nesoi.eu

Technologies and services deployed

- Technologies for consumers
- Grid technologies
- Large-scale storage technologies
- Distributed storage technologies
- Generation technologies
- Market

NESOI is technology agnostic. Islands projects will be selected through two rounds:

- Round 1 will be mainly, but not only, focused on "plug-and-play" projects: projects more mature in terms of technology and/or economics and/or financing
- Round 2 will be mainly, but not only, oriented to innovative technologies in order to prove their worthiness and to serve as an example of a large spectrum of energy transition projects and relative investment concepts.

Project partners' countries

Coordinator: Sinloc - Sistema Iniziative Locali SpA (Italy)

Other partners:

- R2M SOLUTION (France)
- RINA CONSULTING SPA (Italy)
- ZABALA INNOVATION CONSULTING, S.A. (Spain)
- FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS (Spain)
- ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS (Greece)
- E.ON SOLUTIONS GMBH (Germany)
- WOLF THEISS RECHTSANWALTE GMBH & COKG (Austria)
- DELOITTE ADVISORY SL (Spain)
- ELLINIKI ETAIREIA ENERGEIAKIS OIKONOMIAS (Greece)

Project Description

Context. Funds are available to finance energy efficiency and renewable energy projects. Many islands are engaged in energy transition; however, most of them haven't the expertise to concretely launch investments, access finance and kick start the projects. NESOI aims at filling this gap through a hands-on approach allowing to get the expected financial leverage towards the effective implementation of islands' energy transition plans.

Scope. NESOI is based on the following key differentiators & value drivers:

- **DRIVER 1: EU is strongly promoting EU Islands transition via policies and supporting actions**. NESOI is a deliberate policy-to-business action. NESOI aims to transform lessons learnt, policies and plans into effective investment concepts thanks to technical assistance support.
- **DRIVER 2: Green energy is worldwide considered a successful investment: investors are ready to fund!** Thanks to its consortium expertise and network of investors, NESOI brings credible investments concepts and support them turn into tangible funding allocated to EU islands.
- **DRIVER 3: Islands can be a test bench for new technologies to strengthen EU leadership in RES sector.** Energy in islands is EXPENSIVE; POLLUTING; INEFFICIENT; DEPENDENT FROM EXTERNAL SUPPLY. EU islands have to work together towards stable, cheaper, cleaner energy, to promote self-sufficiency and fight against climate change.

All these challenges are tackled by NESOI Facility's three souls: ADVISORING – TRAINING – COOPERATION (among islands and with EU industries), all competing towards mainstreaming knowledge, policies and best practices to launch concrete investments on EU islands. NESOI's main objective can therefore be summarized as follows:

To act as facilitator and stimulating platform to support access to finance for the energy transition of islands by providing them both a PHYSICAL and a DIGITAL platform offering knowledge sharing, capacity building and technical assistance to prepare cost-efficient, investible, executable and replicable energy transition projects.

Technical description and implementation. Starting with a broad survey gathering EU islands' needs, NESOI provides a platform where islands can access both indirect and direct support:

1) Provided through a tailor-made digital platform, the indirect support consists in training material, best case examples, toolkit for technical and economic best practices and a cooperative space for islands, investors and technology developers.

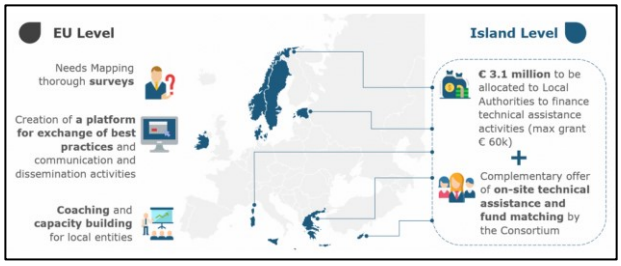
2) Based on transparent technical, social, economic and environmental criteria, NESOI selects projects for customised direct support from consortium experts and from external ones for local aspects thanks to a cascade mechanism.

NESOI supports projects at different stages of development, starting from early stage ones requiring a high-level technical & economic assistance, to more advanced ones asking for specific and detailed contributions on various fields (technical, legal, financial), putting forward a reality-check mindset, to make islands focus on solid projects with the potential to attract investors. NESOI implements capacity building and coaching activities to ensure raising awareness and capacity of public authorities' staff for developing investible projects with the aim to empower Local Communities in a success pursuit of the energy transition.

Impact. The objective of NESOI is to contribute to the energy transition on islands by mobilising at least 100M€ from public and private investors.

Replicability: NESOI partners are strongly connected to investors, island communities and the energy innovation ecosystem, and intend to develop a sustainable business model for NESOI platform. NESOI intends to remain active beyond the end of the EU-funding period in 2023, by defining a long-term sustainable business model allowing to maintain services independently.

Socioeconomics and Environment: Thanks to NESOI, EU Islands will show the way towards LOW-CARBON ISLANDS with CIRCULAR ENERGY SYSTEMS which will benefit to local island population and result in job creation, economic growth, encouraging tourism and at the same time preserving the environment.



H2020 call: DT-ICT-10-2018-19 - Interoperable and smart homes and grids

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InterConnect

Interoperable Solutions Connecting Smart Homes, Buildings and Grids

InterConnect proposes effective energy management using a resilient and practical ecosystem that is user-centric and market-driven. The project involves a range of specialised stakeholders, including advanced technology actors, manufacturers, providers and energy users. Via seven pilots, they will showcase an effective digital market for ensuring energy-efficiency at reduced costs that is beneficial to end-users.

From 2019	Project total cost	EU contribution	Website
To 2023	35.8 M€	29.9 M€	https://interconnectproject.eu/

Technologies and services deployed

Technologies for consumers	✓Demand response ü Smart appliance , Smart metering
Grid technologies	✓Network management and control tools , Micro-grid
Large-scale storage technologies	✓
Distributed storage technologies	✓Batteries Electric Vehicles ✓ Thermal Energy Storage
Generation technologies	✓
Market	✓Electricity market ✓Ancillary services

Project partners' countries

Coordinator: INESC TEC - INSTITUTO DE ENGENHARIADE SISTEMAS E COMPUTADORES, TECNOLOGIA E CIENCIA (Portugal)

Other partners:

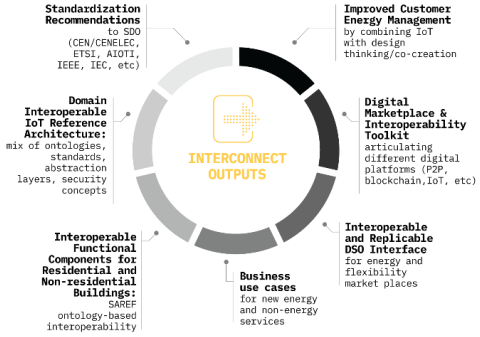
- EEBUS INITIATIVE EV (Germany)
- NEDERLANDSE ORGANISATIE VOOR TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK TNO (Netherlands)
- VLAAMSE INSTELLING VOOR TECHNOLOGISCH ONDERZOEK N.V. (Belgium)
- EDP DISTRIBUICAO ENERGIA SA (Portugal)
- FONDACIJA VIZLORE LABS (Serbia)
- TH!NK E (Belgium)
- FUNDINGBOX ACCELERATOR SP ZOO (Poland)
- WINGS ICT SOLUTIONS INFORMATION & COMMUNICATION TECHNOLOGIES IKE (Greece)
- SONAE MC - SERVICOS PARTILHADOS, SA (Portugal)
- FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V. (Germany)
- VOLKERWESSELS ICITY B.V. (Netherlands)
- PLANET IDEA SRL (Italy)
- GRIDNET S.A. (Greece)
- YNCREA MEDITERRANEE (France)
- ATHENS UNIVERSITY OF ECONOMICS AND BUSINESS - RESEARCH CENTER (Greece)
- ELEKTRO LJUBLJANA PODJETJE ZADISTRIBUCIJO ELEKTRICNE ENERGIJE D.D. (Slovenia)
- THERMOVAULT (Belgium)
- TRIALOG (France)
- DOMOTICA SGTA GESTAO TECNICA E AUTOMACAO LDA (Portugal)
- SCHNEIDER ELECTRIC PORTUGAL LDA (Portugal)
- VRIJE UNIVERSITEIT BRUSSEL (Belgium)
- INTERUNIVERSITAIR MICRO-ELECTRONICA CENTRUM (Belgium)
- DUCOOP (Belgium)
- 3E (Belgium)
- CORDIUM CVBA (Belgium)
- STICHTING VU (Netherlands)
- IRON THERMOILEKTRIKI ANONYMI ETAIREIA (Greece)
- COSMOTE KINITES TILEPIKOINONIES AE (Greece)
- ENEDIS (France)
- ENGIE (France)
- SENSINOV (France)
- WHIRLPOOL EMEA SPA (Italy)
- RICERCA SUL SISTEMA ENERGETICO - RSE SPA (Italy)
- POLITECNICO DI MILANO (Italy)
- CYBERGRID GMBH & CO KG (Austria)
- REALDOLMEN NV (Belgium)
- EUROPEAN DISTRIBUTION SYSTEM OPERATORS FOR SMART GRIDS (Belgium)
- OPENMOTICS (Belgium)
- KEO GMBH (Germany)
- ABB OF ASEA BROWN BOVERI (Belgium)
- UNIVERSITAET KASSEL (Germany)
- DEUTSCHES FORSCHUNGSZENTRUM FUR KUNSTLICHE INTELLIGENZ GMBH (Germany)
- Fachhochschule Dortmund (Germany)
- BOSCH THERMOTECHNIK GMBH (Germany)
- BSH HAUSGERATE GMBH (Germany)
- MIELE & CIE KG (Germany)
- WIRELANE GMBH (Germany)
- VAILLANT GMBH (Germany)
- DAIKIN EUROPE N.V. (Belgium)
- KNX ASSOCIATION CVBA (Belgium)

Project Description

Context. Over the last few years several projects and technology providers have come up with solutions that allow every energy user to have awareness and control over his appliances, but there has always been a major issue with interoperability. End-users should be able to choose and change their technology providers, without having to replace their installation, every time they feel this need and still be able to adopt sustainable behaviour and benefit from technological advances.

Scope. In the energy sector, a steep move towards digital is occurring and becoming tremendously user-centric and market-driven. The main goal of InterConnect? Bringing efficient energy management within reach of the end-users by interoperable Solutions Connecting Smart Homes, Buildings and Grids.

Technical description and implementation. The solutions developed within the scope of InterConnect will allow a digitalisation of homes, buildings and electric grids based on an Internet of Things (IoT) architecture. By including digital technologies (artificial intelligence, blockchain, cloud and big data) based on open standards, such as SAREF, it will guarantee the interoperability between equipment, systems and privacy/cybersecurity of user data. Energy users in buildings, either residential or non-residential, manufacturers, distribution grid operators and the energy retailers will have the opportunity to take advantage of these solutions. The InterConnect project focuses on eight major domains: standardisation, ontology, digital platforms, IoT, cloud, electric grid, big data and cybersecurity.



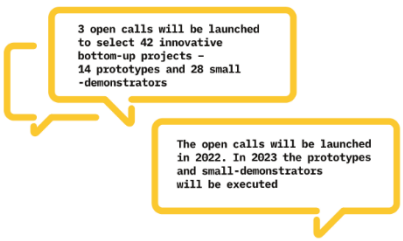
Impact. *Replicability*: The replication of innovative solutions in different domains, regions and setups allowing to move from single solutions to an integrated management at a higher scale, while focusing on interoperable and competitive solutions, is the main focus of the project.

Socio-economics: The exploitation plans of partners will accelerate the uptake of InterConnect results. It will contain the assessment of the socio-economic impacts and the factors that would influence their exploitation (ex.: standardisation, regulatory aspects). Also, the project is focused on generating economic and social benefits by stimulating behavioural change in energy consumption. Moreover, an economic, social and environmental analysis of the participation of energy communities in the DSF will be performed.

Environment: The overarching objective of the project pilots is to demonstrate a EU digital market environment with the integration of demand side flexibility, reducing operational and investment costs that will benefit energy end-users and the grid and contribute to the EU energy efficiency goals. The project will generate environmental benefits, by maximizing the use of RES and helping reducing energy poverty.

Market Transformation: In the energy sector, a steep move towards a user-centric and market-driven digitalization. InterConnect aims at providing toolboxes for interoperability towards the creation of marketplaces, for energy and non-energy services, to be used by third parties, integrating them with the project digital platforms, devices and existing services. InterConnect vision is to link multisided platforms in multidomain to address market needs, supporting the EU Digital Single Market, adopted in May 2015, that leads Europe a step further in IoT developments.

Policy: Recommendations and measures to policy makers will be identified to foster decentralised energy market and RES use. The methods that will be used within the scope of the InterConnect project will provide contributions to standards, regulation, policy recommendations and practical tools. Specific spaces will be created in the project community for regulators and policy makers, to share the best practices and the societal impact that results from the project.



H2020 call: DT-ICT-11-2019 – Big data solutions for energy

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BD4OPEM

Big Data for OPen innovation Energy Marketplace

BD4OPEM develops an open innovation marketplace where, through an analytic toolbox that integrates solutions based on artificial intelligence, products and services to improve the monitoring, operation, maintenance and planning of electrical distribution grids are made available to stakeholders.

From 2020	Project total cost	EU contribution	Website
To 2023	9.8 M€	8 M€	www.bd4opem.eu

Technologies and services deployed

Technologies for consumers	✓ Demand response ✓ Smart appliance ✓Smart metering
Grid technologies	✓ Network management and control tools ✓ Micro-Grid
Large-scale storage technologies	✓
Distributed storage technologies	✓ Batteries ü Electric vehicles
Generation technologies	✓Wind turbine ✓PV Micro-generation
Market	✓ Electricity market ✓ Ancillary services

Project partners' countries

Coordinator: UNIVERSITAT POLITECNICA DE CATALUNYA (Spain)

Other partners:

- WE PLUS SPA (Italy)
- Odit-e (France)
- ATOS SPAIN SA (Spain)
- INSTITUT JOZEF STEFAN (Slovenia)
- INTRACOM SA TELECOM SOLUTIONS (Greece)
- NUVVE DENMARK APS (France)
- OSMANGAZI ELEKTRIK DAGITIM ANONIM SIRKETI (Turkey)
- VRIJE UNIVERSITEIT BRUSSEL (Belgium)
- ESTABANELL Y PAHISA ENERGIA SA (Spain)
- ELEKTRO CELJE D.D. (Slovenia)
- SUSTAINABLE INNOVATION I SVERIGE AB (Sweden)

Project Description

Context. Energy power systems face important challenges to cope with the requirements and needs of an ever-increasing number of distributed generation and consumption devices in an interconnected world. Energy systems have seen a natural evolution, moving from the analogue world to the current digital interconnected real-time IoT world. Now, huge amounts of energy systems data are available, most of which are unused or underused. The appropriate monitoring, acquisition and processing of this data can boost innovative tools and services.

Scope. The BD4OPEM strategy is to share data and to provide data analytics services in an Open Innovation Marketplace. It should be like an "energy supermarket" where users find the solutions they need using the services provided by different specialized companies. In this "market place", several solutions serve the DSO's and other stakeholders for a better management of their networks. This project extracts more value from the available data providing new big data solutions for the operation, planning and maintenance of highly complex networks, including services like grid topology identification, observability, predictive maintenance, fraud detection, smart houses, buildings and industries energy management, blockchain transactions and flexibility aggregation for demand-response.

Technical description and implementation. The Open Innovation Marketplace is based on well-known and proven open big data reference architectures, and relying on an underlaying analytics toolbox. The analytic toolbox ensures secure data flows from data providers to solution providers, always compliant with GDPR requirements, so that asset management is enhanced, consumer participation in energy balancing is promoted and new data-driven business models are created. Solutions are based on artificial intelligence techniques including supervised learning, deep learning, data mining, among others.

The project aims to demonstrate these features at 5 pilot sites (Spain, Turkey, Slovenia, Belgium and Denmark) with distributed energy generation, such as photovoltaic, storage infrastructure, EV and charging infrastructure, hydro, wind and geothermal generation.

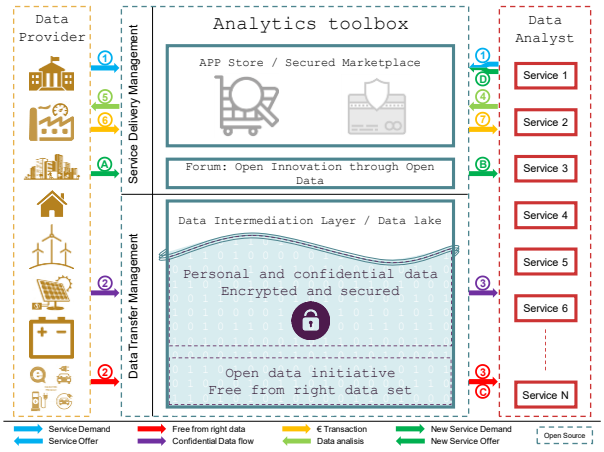
Impact. *Replicability:* Data are collected from legacy systems and stored in a public data lake. This structure enables new and existing players to link their platforms to the lake. The platform ensures replicability and scalability, fully compatible and open to everyone.

Socio-economics:
BD4OPEM creates growth possibilities for the project members, for the energy sector in general, the European IT market and the European Sustainable Innovation Ecosystem. It results in the creation of highly qualified jobs in the ICT and energy sectors. Also, it reduces the technology gap between countries. The project intends to facilitate a technology convergence and promote innovative big data solutions for energy in countries where there is less data and technology available.

Environment: BD4OPEM encourages a more efficient use of energy resources and the penetration of renewable energy, leading to a reduction in greenhouse gas emissions and promoting a more effective and smart usage of energy through flexibility and storage.

Market Transformation: BD4OPEM is a clear example of interaction between different stakeholders. Exploitation and dissemination tasks aim to facilitate the extension of this model to the European Sustainable Innovation Ecosystem.

Policy: The topics addressed within BD4OPEM are consistent with European and international standards, policies and initiatives, aiming to develop the next generation technologies. Furthermore, the project is dedicated to advancement and enrichment of these efforts. Due to BD4OPEM scalability, interconnectivity and replicability in specific countries and markets, it has the potentiality to become a reference tool in the Energy sector so it can also become an efficient way to facilitate the introduction of regulations and standards advancing towards the Energy Union.



H2020 call: DT-ICT-11-2019 - Big data solutions for energy

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PLATOON

Digital PLAtform and analytic TOOls for eNergy

PLATOON develops a COSMAG Compliant reference Platform with flexible capabilities in (1) Interoperability, to deal with a wide spectrum and heterogenous data sources, formats, interfaces and enable data exchange between platforms, (2) Data Governance & Security to answer multiple data owners and providers, digital sovereignty challenges, (3) Data Analytics Toolbox and Edge Computing for data processing and analysis in batch and real time.

From 2020 To 2022	Project total cost	EU contribution	Website
	11.5 M€	10 M€	http://platoon-project.eu/

Technologies and services deployed

Technologies for consumers	✓Demand response ✓Smart appliance ✓Smart metering
Grid technologies	✓HVAC Network management control tools ✓Micro-grid
Large-scale storage technologies	✓ Hydro storage
Distributed storage technologies	✓Batteries ✓Electric Vehicles ✓ Thermal energy storage
Generation technologies	✓Wind turbines ✓PV Micro-generation
Market	✓ Ancillary services

Project partners' countries

Coordinator: ENGIE (France)

Other partners:

- FUNDACION TECNALIA RESEARCH & INNOVATION (Spain)
- RHEINISCHE FRIEDRICH-WILHELMS-UNIVERSITAT BONN (Germany)
- FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V. (Germany)
- ENGINEERING - INGEGNERIA INFORMATICA SPA (Italy)
- CLUSTER DE ENERGIA (Spain)
- VRIJE UNIVERSITEIT BRUSSEL (Belgium)
- INSTITUT MIHAJLO PUPIN (Serbia)
- GIROA SOCIEDAD ANONIMA (Spain)
- TECHNISCHE INFORMATIONSBIBLIOTHEK (TIB) (Germany)
- POLITECNICO DI MILANO (Italy)
- ROMA CAPITALE (Italy)
- SISTEPLANT SL (Spain)
- SAMPOL INGENIERIA Y OBRAS S.A. (Spain)
- POSTE ITALIANE - SOCIETA PER AZIONI (Italy)
- MANDAT INTERNATIONAL (Switzerland)
- FUNDINGBOX ACCELERATOR SP ZOO (Poland)
- INDRA SOLUCIONES TECNOLOGIAS DE LA INFORMACION, SL (Spain)
- COMSENSUS, KOMUNIKACIJE IN SENZORIKA, DOO (Slovenia)
- UDG ALLIANCE (Switzerland)

Project Description

Context. Nowadays electricity covers almost 20% of global energy consumption and it is expected to rise exponentially during the next decades both in absolute and relative terms. This growth is mainly driven by three factors: 1) world population increase, 2) need for greener energy sources to fight global warming 3) the disruption of new technologies such as electric transportation and digital technologies.
The electricity sector is shifting towards decentralization and decarbonization. The rise of renewable energy sources demands algorithms to predict and help avoid the disturbances into the grid. However, a new system is needed, in order to efficiently manage Energy flexibility. On the other hand, up to now, power systems have been designed to meet infrequent peaks in demand and to comply with excessive safety margins which, in many cases, has resulted in costly and underutilized infrastructure. In this sense, smarter consumption of electricity and condition monitoring of the assets, could deliver significant savings by improving the utilization of the existing infrastructure.

Scope. PLATOON (digital PLAtform and analytical TOOls for eNergy) is presented as a breakthrough COSMAG compliant reference platform with flexible capabilities covering a wide number of challenges and solutions:

- Interoperability: to deal with a wide spectrum and heterogenous data sources, formats, interfaces.
- Data governance and security: to answer multiple data owners and providers,
- Digital Tools Easy to use by energy domain experts without deep mathematical knowledge: The toolbox will provide “out of the box” mathematical techniques like statistical characterization, classification, prediction, optimization, to the energy sector needs: predictive maintenance and life extension of energy assets, distribution grids optimum management, peak power avoidance and demand side response, efficient end use of energy.

Technical description and implementation. The project defines and promotes a COSMAG-compliant reference architecture, designs and develops an open, vendor-independent data governance scheme based on IDS principles which guarantees data sovereignty and privacy for all the stakeholders. Partners develop a specific interoperability layer that enables heterogenous, bulky and high speed-data transfer from the pilots to the PLATOON platform.
It develops, deploys, integrates and validates a data analytics toolbox easy to be used by energy experts and customized to solve the specific needs of the energy infrastructures operators and data owners. Finally, it designs and implements local real time processing capabilities in the edge to provide local smartness and alleviates the data transfer to the PLATOON components deployed in the cloud.

Impact. *Replicability:* PLATOON develops an interoperability layer using open APIs and open data models based on existing standards that facilitate data sharing, exchange and integration amongst different platforms. This enables future replicability and use and reduces market acceptance risks.

Socio-economics: PLATOON provides environments which are both secure and aware of the sovereignty of digital data, while stressing the ability to exchange them with confidence and to develop economic services which will have an impact on social processes in the fields of energy use and renewable energies.

Environment: PLATOON contributes to increasing the use of renewable energy and increased energy efficiency based on optimised energy asset management, offering access to cheaper and sustainable energy for energy consumers and maximising social welfare.

Market Transformation: PLATOON creates new data-driven business models, opportunities and innovative energy services & Increasing consumer participation.

Policy: PLATOON promotes emergence of sustainable ecosystems around digital platforms and strengthened links with other programmes and initiatives, supported by regional, national and European policies and funds.

H2020 call: DT-ICT-11-2019 - Big data solutions for energy

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SYNERGY

Big Energy Data Value Creation within Synergetic energy-as-a-service applications through trusted multi-party data sharing over an AI big data analytics marketplace.

SYNERGY introduces a novel framework and reference big data architecture that leverages data, primary or secondarily related to the electricity domain.

From 2020	Project total cost	EU contribution	Website
To 2023	14,1 M€	9,9 M€	https://www.synergyh2020.eu/

Technologies and services deployed

- **Technologies for consumers**
  - ✓ Demand response , Smart appliance , Smart metering
  - ✓ Network management and control tools
- **Grid technologies**
- **Large-scale storage technologies**
- **Distributed storage technologies**
- **Generation technologies**
- **Market**

Project partners' countries

Coordinator: ETRA INVESTIGACION Y DESARROLLO SA (SPAIN)

Other partners:

- DIACHEIRISTIS ELLINIKOU DIKTYOU DIANOMIS ELEKTRIKIS ENERGEIAS AE (Greece)
- INSTITUTE OF COMMUNICATION AND COMPUTER SYSTEMS (Greece)
- FORUM VIRIUM HELSINKI OY (Finland)
- Teknologian tutkimuskeskus VTT Oy (Finland)
- MONTAJES ELECTRICOS CUERVA S.L. (Spain)
- COBRA INSTALACIONES Y SERVICIOS S.A (Spain)
- SUITE5 DATA INTELLIGENCE SOLUTIONS LIMITED (Cyprus)
- SISTEMAS URBANOS DE ENERGIAS RENOVABLES SL (Spain)
- FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS (Spain)
- GIOUMPITEK MELETI SCHEDIASMOS YLOPOIISI KAI POLISI ERGON PLIROFORIKIS ETAIREIA PERIORISMENIS EFTHYNIS (Greece)
- CAVERION SUOMI OY (Finland)
- INDEPENDENT POWER TRANSMISSION OPERATOR SA (Greece)
- ETAIREIA PAROHIS AERIOU ATTIKIS - ELLENIKI ANONYMI ENERGEIAS FYSIKO AERIO - ELLENIKI ETAIREIA ENERGEIAS (Greece)
- PONIKVE EKO OTOK KRK DOO ZA KOMUNALNE DJELATNOSTI (Croatia)
- MAGGIOLI SPA (Italy)
- KNOWLEDGEBIZ CONSULTING-SOCIEDADE DE CONSULTORIA EM GESTAO LDA (Portugal)
- KONCAR - INZENJERING ZA ENERGETIKUI TRANSPORT DD (Croatia)
- UNIVERSITY OF CYPRUS (Cyprus)
- ELIN VERD ANONYMI ETAIRIA AEIFORONPROIONTON KAI YPIRESION (Greece)
- ENERGIE GUSSING GMBH (Austria)
- EUROPAISCHES ZENTRUM FUR ERNEUERBARE ENERGIE GUSSING GMBH (Austria)
- GECO GLOBAL IVS (Denmark)
- ENERGY SERVICES HANDELS- UND DIENSTLEISTUNGS GMBH (Austria)

Project Description

Context. The European electricity sector is undergoing a huge shift away from traditional monitoring and control approaches that have been applied exclusively over the transmission and distribution networks, since the smart electricity grid era is pushing sensing, control and data collection at the edge of electricity networks, which needs to be further re-defined due to the wide penetration of Distributed Energy Resources (DERs), such as renewable energy sources (RES), smart home devices and appliances (IoT-enabled), distributed storage, smart meters and electric vehicles (EVs). Consequently, the need for "end-to-end" coordination between the electricity sector stakeholders, not only in business terms but also in exchanging information between them is becoming a necessity to enable the realization of the high level objective of increasing electricity networks' stability and resilience, while satisfying individual operational optimization objectives and business case targets of all stakeholders in the electricity sector.

Scope. SYNERGY introduces a highly effective, innovative and scalable reference architecture and implementation for a Big Energy Data Platform and Analytics Marketplace, accompanied by big data-enabled domain specific applications to help the electricity value chain stakeholders to enhance their data reach, improve their internal intelligence and optimize operations and benefits, while introducing themselves into novel business ecosystems based on data (intelligence) sharing / trading, for further intelligence and benefits enhancement, provision of new and innovative energy-related services and creation of new revenue streams out of the data and the intelligence they produce. The real value of the SYNERGY framework stems from the benefits it will generate for all involved electricity sector actors, through the provision of bundle of innovative (analytics-based) applications and services, addressing their emerging business and optimization needs and facilitating the realization of a data sharing-based energy economy with profound benefits, as further analysed below.

Technical description and implementation. SYNERGY bears 5 Core Data Services Bundles:

- Data Collection Services Bundle (Data Ingestion, Curation, Mapping, Linking and Update);
- Data Security Services Bundle, that is responsible for safeguarding and securing any data asset (and app);
- Data Sharing Services Bundle handling the adopted sharing / trading mechanisms, the effective remuneration approach and the multi-party data contracting lifecycle;
- Data Matchmaking Services Bundle (a demand-driven mentality as opposed to the typical supply-driven operation of the data marketplaces);
- Data Analytics Services Bundle that essentially allows for exploratory data analysis, designing and executing analytics workflows, and running pre-trained analytics to generate new insights and knowledge.

Impact. *Replicability:* SYNERGY provides high replicability across different contexts, energy systems and market conditions as well as tested and validated in real-life settings in 5 large-scale demonstrators in Greece, Spain, Austria, Finland and Croatia.

Socio-economics: SYNERGY Improves buildings' energy performance and energy cost reduction with significant energy costs savings for energy consumers and facility managers and easy and transparent participation of prosumers in energy markets.

Environment: SYNERGY Increases penetration and integration of Renewable Energy Sources, Optimizes operational and asset management of RES plants, supports the booming of VC investments in green tech and contributes to decarbonisation.

Market Transformation: SYNERGY enhances operational stability, network availability, power quality and resilience of energy networks, allows advanced observability and monitoring of energy performance over entire districts and cities and facilitates urban planning processes towards realizing smart city commitments in the short- and mid-term. It creates new business opportunities for electricity retailers and new revenue streams for energy prosumers and local aggregators.

Policy: SYNERGY increases compliance of electricity utilities to Energy Efficiency Obligations imposed by the EU and national regulatory authorities and EU support to entrepreneurship.

H2020 call: DT-ICT-11-2019 - Big data solutions for energy

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BD4NRG

Big Data for Next Generation Energy

A cross-stakeholder energy-centered value chain open and interoperable framework for big data-driven AI-based analytics energy services

From 2021	Project total cost	EU contribution	Website
To 2023	11.88 M€	9.99 M€	https://www.bd4nrg.eu

Technologies and services deployed

Technologies for consumers	✓ DR ✓ Smart Appliances
Grid technologies	✓ Microgrid ✓ Network mgmt. tools
Large-scale storage technologies	✓
Distributed storage technologies	✓ Batteries ✓ EVs ✓ Power to heat
Generation technologies	✓ PVs
Market	✓ Electricity market ✓ Cross-value chain block market

Project partners' countries

Coordinator: ENGINEERING INGEGNERIA INFORMATICA (ITALY)

Other partners:

- NATIONAL TECHNICAL UNIVERSITY OF ATHENS (Greece)
- RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (Germany)
- EUROPEAN DYNAMICS SA (Luxembourg)
- INTERNATIONAL DATA SPACES EV (Germany)
- EUROPEAN NETWORK OF TRANSMISSION SYSTEM OPERATORS FOR ELECTRICITY AISBL (Belgium)
- PANEPISTIMIO DYTIKIS ATTIKIS (Greece)
- ATOS SPAIN SA (Spain)
- FUNDACION CARTIF (Spain)
- UNIVERZA V LJUBLJANI (Slovenia)
- ENEL X SRL (Italy)
- REN - REDE ELECTRICA NACIONAL SA (Portugal)
- CENTRO DE INVESTIGACAO EM ENERGIA REN - STATE GRID SA (Portugal)
- UNINOVA-INSTITUTO DE DESENVOLVIMENTO DE NOVAS TECNOLOGIAS-ASSOCIACAO (Portugal)
- ENERCOUTIM - ASSOCIACAO EMPRESARIALDE ENERGIA SOLAR DE ALCOUTIM (Portugal)
- FIWARE FOUNDATION EV (Germany)
- CENTRICA BUSINESS SOLUTION (Belgium)
- NEDERLANDSE ORGANISATIE VOOR TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK TNO (The Netherlands)
- ASM TERNI SPA (Italy)
- VIDES INVESTICIJU FONDS SIA (Latvia)
- COMSENSUS, KOMUNIKACIJE IN SENZORIKA (Slovenia)
- HOLISTIC IKE (Greece)
- INTERUNIVERSITAIR MICRO-ELECTRONICA CENTRUM (Belgium)
- TERRASIGNA SRL (Romania)
- UBIMET GMBH (Austria)
- ELEKTRO LJUBLJANA PODJETJE ZADISTRIBUCIJO ELEKTRICNE ENERGIJE D.D. (Slovenia)
- BORZEN, OPERATER TRGA Z ELEKTRIKO,D.O.O. (Slovenia)
- AJUNTAMIENTO DE SANT CUGAT DEL VALLES (Spain)
- ELES DOO SISTEMSKI OPERATER PRENOSNEGA ELEKTROENERGETSKEGA OMREZJA (Slovenia)
- E-LEX - STUDIO LEGALE (Italy)
- OSMANGAZI ELEKTRIK DAGITIM ANONIM SIRKETI (Turkey)
- VEOLIA SERVICIOS LECAM SOCIEDAD ANONIMA UNIPERSONAL (Spain)
- STICHTING EGI (The Netherlands)
- CINTECH SOLUTIONS LTD (Cyprus)
- EMOTION SRL (Italy)

Project Description

Context. The rising decentralization of the energy system is unveiling an enormous opportunity for energy stakeholders to leverage on big data & AI technologies to improve decision making. Moreover the Energy system progressive decarbonisation and decentralization and the EC Green New Deal policy towards an integrated energy system are pushing for cross-stakeholder multiple value chain use cases, data-driven applications, platforms, architectures and services, facilitated by Open Energy –centered Cross-sector Digital Platforms. There are however some barriers hampering the exploitation of this potential, such as the lack of standardized big data architectures for smart grids and regulatory frameworks not facilitating data sharing.

Scope. The overall BD4NRG service analytics reference framework and the underlying technology enablers will be deployed and validated in 12 large-scale demo-sites across 9 countries. Rationale of pilot applications is to address in a combined way two of the major challenges actually hindering big data analytics value capturing in smart energy grids, i.e. i) nurturing the shifting towards Predictive/prescriptive analytics and ii) enabling multiple data source (cross –functional and/or cross-contexts and/or cross-domain) analytics for multiple applications

Technical description and implementation.

BD4NRG will i) deliver a reference architecture for Smart Energy, which aligns BDVA SRIA, IDSA and FIWARE architectures, SAREF standard to enable B2B multi-party data exchange, while providing full interoperability of leading-edge big data technologies with smart grid standards and operational frameworks ii) evolve and upscale a number of technology enablers, such as scalable sovereignty-preserving hybrid DLT/off-chain data governance, big data elastic pipeline orchestration, IoT/edge AI-based federated learning and multi-resource sharing tokenized marketplace, loosely integrate and deploy them within the BD4NRG framework iii) deliver a TRL8 open modular big data analytic toolbox as front-end for one-stop-shop analytics services development by orchestrating legacy and/or third party assets (data, computing resources, models, algorithms) iv) validate such framework through the delivery of predictive and prescriptive edge AI-based big data analytics on 12 large scale pilots, deployed by different energy stakeholders (TSOs and DSOs power network operators, aggregators, storage/renewable assets operators, local energy communities, ESCOs, power market operators, municipalities, financial institutions and ENTSO-E), fully covering the energy value chain v) setup a vibrant data-driven ecosystem, which will federate new energy data providers, attract SMEs for novel energy services provisioning through cascading funding and validate a hybrid energy/industry value chain supporting B2B joint digital platforms

Impact. *Replicability:* the large geographical coverage of the pilot sites aims to support the large-scale EU-wide replicability and market take-up of services and solutions in different socio-economical contexts to maximize the impact of BD4NRG services across Europe.

Socio-economics: the data-driven BD4NRG analytics toolbox and services will enable the significant changes which are expected in the energy industry thanks to the adoption of new disruptive processes aimed at integrating different energy resources at local level. ICT technologies allow the usage of new market logic able to propose innovative customer-centric more decentralized business models exploiting the potential of digitalization. Tokenized DLT/Blokchains/smart contract marketplaces on the other hand will facilitate local-community level trade and exchange of heterogeneous assets, including energy surplus, social services, share of computing resources, hence contributing to the improved social welfare of local communities.

Environment: The solutions proposed in BD4NRG will clearly bring a significant positive benefit on the environmental footprint of the grid operation and on the decarbonisation of the overall energy systems. As matter of fact, using flexible demand optimized mobilization, via BD4NRG optimized small scale DER flexibility assets management, and leveraging on enhanced integration of asset management and grid operation, BD4NRG will contribute to reduce peak loads, improve the efficiency of the utilization of the electricity network, postpone any unnecessary investment in grid capacity reinforcement and minimize the necessity to turn on the emergency peaking plants (which are much less efficient than the baseload power plants that normally power the grid). In addition to this, BD4NRG will increase the local consumption of locally generated electricity, which heavily contributes to reduce network losses reduction, due to the reduced need of long-distance electricity transportation. Hence the environmental footprint of the grid operation during peak load times will be greatly reduced.

Market Transformation: Thanks to the deployment of near real time data driven analytics services , BD4NRG will slightly contribute to open up and redesign the energy value chain and the way through which energy and beyond-energy stakeholders will interact one each other, contributing to more liquid and competitive energy marketplaces, and to lowering transaction costs and energy price for the consumers The latter ones, on the other way around, will be brought center stage as new relevant actors of the energy value chain, whose profile and preferences will be taken into due consideration to achieve a fair, effective, consumer-entered energy system

Policy: The vision pursued and the big data-driven analytics technologies deployed by BD4NRG will slightly contribute to further nurture some of the most relevant EC policies, ranging from EC Data Strategy, to the Green New Deal, and the Energy Digitization Plan , while at the same time offering increased accessibility of energy-centered local community social services hence contributing to energy poverty mitigation.

H2020 call: LC-SC3-EC-3-2020 – Consumer Engagement and Demand Response

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ACCEPT

ACtive Communities & Energy Prosumers for the energy Transition

The EU-funded ACCEPT aims to design a digital toolbox that will enable the delivery of compound Demand Response services to prosumers within Energy Communities and at the same time enable their participation in energy markets through the formulation of community-based Virtual Power Plants.

From 2021	Project total cost	EU contribution	Website
To 2024	7.57 M€	5.86 M€	www.accept-project.eu

Technologies and services deployed

Technologies for consumers	✓ Demand Response ✓ Smart Metering
Grid technologies	✓Micro-grid
Large-scale storage technologies	
Distributed storage technologies	✓Batteries ✓Electric Vehicles ✓Power to heat
Generation technologies	✓ PV
Market	✓Ancillary Services ✓Electricity 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: The ACCEPT project will deliver a digital toolbox that allows Energy Communities to offer innovative digital services and access revenue streams that can financially support their operations and secure their sustainability and effectiveness. The ACCEPT framework will be demonstrated and validated in four pilot sites in Greece, the Netherlands, Spain and Switzerland involving more than 3000 people and 750 residences directly and indirectly.

Scope: The key objectives of ACCEPT are:

- To deliver an integrated tool-chain to bootstrap the transition of energy communities to full players of the energy & flexibility markets.
- To deliver a secure and interoperable digital solution compatible with the majority of residential building systems used across the EU.
- To analyse the incentives and drivers of citizens and energy communities and create a citizen engagement methodology that stimulates citizen participation in the energy system and community flourishing.
- To design compound (energy & non-energy) service offerings and business models that enable the participation of the residential sector in demand response markets/services.

Technical description and implementation: ACCEPT involves three activity lines developed around energy communities:

- The development of an **integrated Digital Toolbox** that enables:
  - Compound Demand Response service offerings (energy & non-energy) to community members.
  - Energy/ flexibility exchange through community p2p trading.
  - Formulation of community-based VPPs to offer aggregated residential demand flexibility potential to electricity/ flexibility markets.
- The stipulation of a **Citizen Engagement Methodology** to evaluate prosumer acceptance and benefits to an energy community.
- The definition of new **market models** for flexibility valorisation and new **business models** that unleash value stacking perspective for prosumers as members of energy communities.

Impact: The ACCEPT solution will be validated in real-life conditions including citizens and energy communities in four Member States (GR, ES, NL, CH).

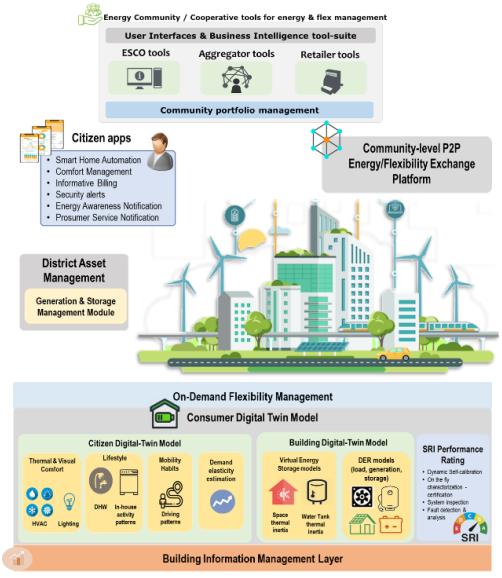
Replicability: The tools of ACCEPT will be demonstrated in diverse contexts regarding energy community structure/ composition/ objectives, regulation frameworks, DR monetization opportunities, etc. to validate their replicability across Member States.

Socio-economics: ACCEPT will deliver socio-technical solutions that enable citizens to understand the energy transition impact in their daily life and adapt their energy behaviour accordingly as well as to support energy communities as an organization instrument for the achievement of the energy transition objectives.

Environment: ACCEPT intends to increase vRES-based self-sufficiency at energy community level above 30% reducing CO_2 emissions accordingly.

Market Transformation: ACCEPT aims to investigate acceptance of forward-looking services (e.g., Heating-as-a Service) during pilot demonstrations and extrapolate the findings to assess commercialisation routes.

Policy: Investigation of feasible ways to incentivise citizens to embrace the energy transition lie at the core of ACCEPT. These will also lead to policy recommendations to drive legislation toward acceptable and efficient solutions.



H2020 call: LC-SC3-EC-3-2020 – Consumer Engagement and Demand Response

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BRIGHT

Boosting DR through increased communIty-level consumer engaGement by combining Data-driven and blockcHain technology Tools with social science approaches and multi- value service design

A participatory process to bring individual consumers center stage to deliver community-centered DR, combining social-science-driven user experience design with innovative technologies

From 2020	Project total cost	EU contribution	Website
To 2023	5.88 M€	4.66 M€	https://www.brightproject.eu/

Technologies and services deployed

Technologies for consumers	✓ DR ✓ Smart Appliance
Grid technologies	✓ Microgrid ✓ Network mgmt. tools
Large-scale storage technologies	
Distributed storage technologies	✓ Batteries ✓ EVs ✓ Power to heat
Generation technologies	✓ PV
Market	✓ Electricity market ✓ Ancillary Services

Project partners' countries

Coordinator: ENGINEERING INGEGNERIA INFORMATICA (ITALY)

Other partners:

- UNIVERSITATEA TEHNICA CLUJ-NAPOCA (Romania)
- INTERUNIVERSITAIR MICROELECTRONICA CENTRUM (Belgium)
- COMSENSUS, KOMUNIKACIJE IN SENZORIKA (Slovenia)
- SONCE ENERGIJA (Slovenia)
- ISKRAEMECO, MERJENJE IN UPRAVLJANJEENERGIJE (Slovenia)
- EMOTION SRL (Italy)
- NEDERLANDSE ORGANISATIE VOOR TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK (Netherlands)
- CENTRICA BUSINESS SOLUTIONS BELGIUM (Belgium)
- ASM TERNI SPA (Italy)
- DUCOOP (Belgium)
- CYBERETHICS LAB SRLS (Italy)
- DOMX IDIOTIKI KEFALAIOUCHIKI ETAIREIA (Greece)
- ASOCIATIA PRO CONSUMATORI (Romania)
- WATT AND VOLT ANONIMI ETAIRIA EKMETALLEYSIS ENALLAKTIKON MORFON ENERGEIAS (Greece)
- SUNCONTRACT OU (Estonia)

Project Description

Context. The increasing electrification of heat and transport coupled with larger RESs deployment of decentralized RESs is disclosing new additional opportunities for demand response. However, DR potential has been exploited so far to a very limited extent at end consumer residential level, due to technologies immaturity, regulatory fuzziness, distorted business framework preventing end consumers to capture an appropriate value. To cope with the above challenges, BRIGHT will leverage on a participatory co-creation process to bring individual consumers center stage to deliver a multi-layered community-centred cross-domain adaptable multi-timescale DR supporting framework. This framework will combine social-science-driven user experience design -for user behavior motivations and monetary/non-monetary incentive design-, Digital Twins models -for improved consumer predictability-, multi-layered P2P DLT/blockchain/ smart contracts based semi-decentralized VPPs -for capturing intra-community interaction dynamics, value stacking flexibility management algorithms and other AI data-driven energy and-non energy services at the interplay among energy (power, heat, gas), mobility, health (comfort), smart home (AAL, personal safety).

Scope. The proposed approach and the underlying enablers will be deployed and validated in 4 demo-sites across 4 EU countries in Blegium, Italy, Slovenia and Greece, where around 1000 mostly residential consumers will be engaged along a variety of different community configurations (LEC, CEC, Virtual Energy Communities, Communities on the Move)

Technical description and implementation.

BRIGHT will develop and deploy an ensemble of leading-edge digital technologies, by leveraging on IoT, AI-based big data, DLT/Blockchain, to support new community-enabled ways for engaging consumers in DR. In doing so, BRIGHT will provide the means to enact energy cooperatives, Local Energy Communities and peer-to-peer sharing/trading mechanisms, whose effectiveness will be validated along the proposed field pilots.

BRIGHT will combine leading technology enablers from relevant H2020 projects to develop social and technological tools for hybridizing DR and other energy and non-energy services, which builds on around 2000 end consumers out of which 670 directly involved in pilots and recruited through awareness workshops. BRIGHT will upscale and validate Digital Twins models for electricity residential and non-residential (tertiary, commercial, industrial, self-consumption of locally generated renewable energy) individual and community consumers which couple data-driven AI-based ML models for end user community with flexibility assets data-driven models along a different dimension to increase consumption predictability.

Impact. *Replicability:* the co-creation approach will explicitly design user experience, identify end user behavioral change motivations and will put end user in a community and social context, with a view to identify the most important social dimensions, hence designing end user incentive as well as the magnitude of such incentive. In doing so, BRIGHT will identify replicable patterns for incentive design, where the context (location, climate, sex, gender, and other levers) under which a given incentive could be working in other similar situation, hence guaranteeing a larger replication of the best practices as well.

Socio-economics: the local aggregation mechanisms and tools will allow to mitigate energy poverty of some members at community level by leveraging on a voluntary energy demand shift or reduction by other members, which gain “immaterial” benefits, aka token, which could be used to offset energy bills and other energy services cost, through tokenized cross-domain neutral sharing marketplace. This decentralized mechanism will allow to link effect of increased DR mobilization with increased accessibility of energy services for people exposed to energy poverty.

Environment: the ensemble of data-driven AI-based energy services will include energy efficiency and flexibilization optimized mobilization

Market Transformation: data-driven mechanisms will provide commercial operators with more reliable estimation of electricity consumption. Appropriate models for home or residential buildings will enable aggregators to develop effective services for the valorization exploitation of the available flexibility.

Policy: the privacy-preserving self-enforcing smart contracts in order to manage appropriately the risk for insufficient data protection and consumer privacy infringement due to data breach and incidents.

H2020 call: LC-SC3-EC-3-2020 – Consumer Engagement and Demand Response

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HESTIA

Holistic dEmand response Services for European residenTIAl communities

HESTIA aims to develop a cost-effective solution for the next-generation demand-side response services. The key will be to encourage residential consumers to engage in flexibility sharing and grid balancing. According to HESTIA, user-personalized services will help lay the foundation for an open marketplace and new grid reality

From 2020	Project total cost	EU contribution	Website
To 2023	7.5 M€	5.9 M€	www.hestia-eu.com

Technologies and services deployed

Technologies for consumers	✓ Demand response ✓ Smart metering
Grid technologies	✓ Network management and control tools
Large-scale storage technologies	✓
Distributed storage technologies	✓ Batteries ✓ EVs
Generation technologies	✓ PV ✓ Micro-generation
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. Ensuring secure and affordable energy supply to EU citizens is a top priority and purpose of an integrated energy market. This is especially true in a world that is becoming increasingly connected, and where energy consumers demand innovative technologies. It is within this energy ecosystem that HESTIA project is developing a cost-effective solution for the next-generation demand-side response services. The key will be to encourage residential consumers to engage in flexibility sharing and grid balancing. According to HESTIA, user-personalised services will help lay the foundation for an open marketplace and new grid reality.

Scope. HESTIA aims to provide a cost-effective solution for the next-generation DR services which will leverage the consumer engagement, energy and non-energy services, while dealing with both energy supply and demand side in a holistic manner. HESTIA intends to engage with residential consumers, while enabling them to play an active role in flexibility sharing and grid balancing. HESTIA will be demonstrated in 3 different residential pilot setups, in Italy, Netherlands and France, with different infrastructural, climatic, market and regulatory contexts, enabling different business models and levels of provided energy services, across different social categories of consumers.

Technical description and implementation. HESTIA will enable residential DR services through:

- exploitation of energy demand flexibility by engaging the consumers in demand-side management activities,
- valorisation of energy efficiency in multi-carrier energy dispatching and optimal operation of building systems.

HESTIA will exploit the consumer engagement as part of cooperative DR strategy at the community level. HESTIA will involve the residents in the designing of the solution through participatory co-design processes. In addition, HESTIA will exploit the aggregated energy resource flexibility at the demand-side, in terms of cumulative energy consumption, distributed energy generation and storage, to better manage the disparity between energy demand, RES availability and grid requirements. User-personalized services will be delivered via a fully service-oriented, flexible ICT platform, underpinned by agent-based concepts, consumer digital twin and non-intrusive data analytics. This way, HESTIA will set the foundation for an open marketplace and a new grid reality, while steering consumer engagement according to the grid requirements and promoting RES and sustainable behaviour.

Impact. *Replicability:* This will be achieved by leveraging the agent-based concepts. The underlying optimisation approach is also suitable for multi-user scenarios enabling the identification of optimal interaction between the users**.** These concepts will contribute directly to high scalability and replicability potential, while creating the opportunities for fast up-take of services within the residential sector. Moreover, this will be facilitated owing to the truly non-invasive solution provided by HESTIA.

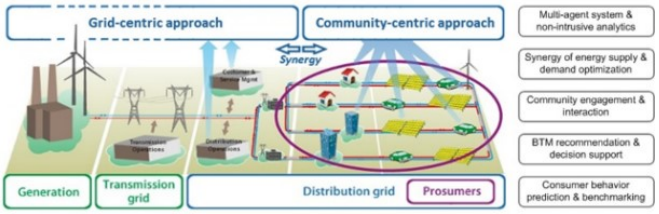
Socio-economics: HESTIA is aiming to transform residential customers from static consumer into active participants in the energy sector. The vision is to establish an open flexibility marketplace where community residents can trade and share their energy and flexibility.

Environment: HESTIA will be dedicated to reduction of GHG and air pollutants emission while delivering the proposed energy services for residential communities. Leveraging the multi-objective optimisation approach as one of its core services, HESTIA will embed the emission reduction as one of its objectives under the optimisation.

Market Transformation: Under the cooperative DR strategy, HESTIA will enable sharing of produced energy and demand flexibility among the residents**.** This will be achieved by establishing the open flexibility marketplace, deployed on top of the distributed ledger LES platform which will enable automated DR settlements and interaction of prosumers.

Policy: HESTIA will analyse, also within the BRIDGE initiative, the current regulatory frameworks to lift any barriers lifted to steer the necessary evolutions or to avoid potential hurdles at national level.

Social: HESTIA will create 20-50 skilled jobs during the project, increase social benefits related to energy cost reduction, and improve health by integrating assisted living services.



H2020 call: LC-SC3-EC-3-2020 - Consumer engagement and demand response

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iFLEX

Intelligent Assistants for Flexibility Management

The project aims at developing the iFLEX Assistant, a novel software agent that acts between consumer(s), and their energy systems, various stakeholders and external systems helping them to achieve mutual benefits through local energy management and Demand Response.

From Nov 2021	Project total cost	EU contribution	Website
To Oct 2024	6.3 M€	5.0 M€	https://www.iflex-project.eu

Technologies and services deployed

Technologies for consumers	✓ Demand response ✓ Smart Homes
Grid technologies	
Large-scale storage technologies	
Distributed storage technologies	✓ Electric Vehicles
Generation technologies	✓ PV
Market	✓ Incentives

Project partners' countries

Coordinator: VTT - Teknologian tutkimuskeskus VTT Oy (Finland)

Other partners:

- SMART COM DOO INFORMACIJSKI IN KOMUNIKACIJSKI SISTEMI (Slovenia)
- EMPOWER IM OY (Finland)
- INSTITUT JOZEF STEFAN (Slovenia)
- ATHENS UNIVERSITY OF ECONOMICS AND BUSINESS - RESEARCH CENTER (Greece)
- INTRACOM SA TELECOM SOLUTIONS (Greece)
- ELEKTRO CELJE D.D. (Slovenia)
- CAVERION SUOMI OY (Finland)
- IN-JET APS (Denmark)
- ECE D.O.O. (Slovenia)
- IRON THERMOILEKTRIKI ANONYMI ETAIREIA (Greece)
- OPTIMUS ENERGY S.A (Greece)
- ZVEZA POTROSNIKOV SLOVENIJE DRUSTVO (Slovenia)

Project Description

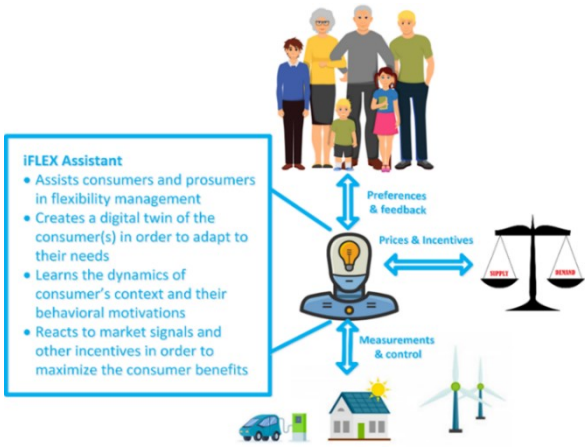
Context. The consumption and production in energy systems must be in balance at all times. In the European energy system, this balance is mainly managed by controlling power generation so that it matches the power demand. However, this status quo is gradually changing due to the increase of renewable energy sources (RES) deployed across the European energy system. The generation of RES such as photovoltaics (PV) and wind turbines is typically highly variable and difficult to forecast. Additionally, RES generation cannot be controlled in the same way as traditional power plants, which means that the demand-side becomes increasingly important for balancing the European energy system.

Scope. Consumers have a key role as they control a large share of flexible resources that can be used for balancing the European energy system with Demand Response (DR) programs and various aggregation methods. Recent advances and increasing popularity of automation and Information and Communication Technologies (ICT) have opened new possibilities for empowering consumers with innovative flexibility management services. Advances in Artificial Intelligence (AI) technologies such as deep learning (DL) in turn enable development of autonomous systems that adapt to consumers by learning their behaviour and dynamics of energy systems. Together these advances make it possible to develop intelligent assistants for consumer flexibility management that optimize the comfort, energy costs and environmental footprint on consumers behalf and according to their wishes, while at the same time offering the flexibility for power grid management purposes. The development and validation of such intelligent assistants for flexibility management, referred to as iFLEX Assistants, is the main goal of the iFLEX project.

Technical description and implementation. An innovative concept of software agent that facilitates consumer participation in demand response will be designed, implemented and packaged as a general-purpose software framework. The iFLEX Framework is a collection of libraries, tools and configuration scripts that provide the means for developing application-specific iFLEX Assistants that learn consumer behaviour and the dynamics of relevant energy systems in order to optimize and personalize flexibility management.

iFLEX in a nutshell aims to:

- Enable consumers/prosumers to become key market actors by providing solutions for automating and personalizing demand response and holistic energy management.
- Enable secure, private and interoperable data exchange for demand response, following the principles of privacy and security by design and by default.
- Design sustainable business models for energy utilities, aggregators, technology providers and facility managers that enable consumers/prosumers to become key market players in the European energy system.
- Validate the iFLEX Assistant, associated innovations, and incentive models through active end-user engagement in multi-site demonstrators.
- Promote and facilitate the adoption of the iFLEX Assistants as the next-generation user-centric flexibility management solution within and beyond the EU.



Impact. The project develops iFLEX Assistants that will be core components in empowering end-users in a variety of DR and holistic energy management services demonstrated in operational environment (TRL7) via pilots in Finland, Greece and Slovenia. The common iFLEX Framework and the application-specific iFLEX Assistants will be developed by building on top of existing baseline solutions that start from TRL5-TRL9

H2020 call: LC-SC3-EC-3-2020 – Consumer Engagement and Demand Response

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ReDREAM

Real consumer engagement through a new user-centric ecosystem development for end-users' assets in a multi-market scenario

ReDREAM
change your energy

The energy market is rapidly transforming and so is the role of the consumer. Yesterday's passive consumers are central actors in today's energy markets. As new prosumers, energy markets can benefit from their generation, consumption, and storage capabilities. The EU-funded ReDREAM project will enable the effective participation of consumers and prosumers in the energy market.

From Oct 2020	Project total cost	EU contribution	Website
To Sept 2023	7,2M€	5,99 M€	www.redream-energy-network.eu

Technologies and services deployed

Technologies for consumers

- ✓ Variety of user services and engagement through adaptive interfaces, e.g. demand response, energy advisor to improve energy efficiency, social interaction, and gamification.
- ✓ ✓Virtualisation of consumers: consumer twin.

Power to heat technologies

- ✓ Heat pumps, immersion heaters, building temperature control, electric radiators.

Distributed storage technologies

- ✓ Batteries, EV, hot water storage (tanks, swimming pools), air storage (buildings), water storage (swimming pools), storage in industrial processes.

Generation technologies

- ✓ Optimal integration and virtualization of local and national renewables.

Electricity Markets

- ✓ Participation and virtualisation of DSO and TSO markets e.g. avoiding constraints and helping in the balancing of the electricity system.

Project partners' countries

Coordinator: UNIVERSIDAD PONTIFICIA COMILLAS (SPAIN)

Other partners:

- STEMY ENERGY (Spain)
- TIME.LEX (Belgium)
- ENERGETICA S COOP (Spain)
- SOULSIGH DESIGN STRATEGY SL (Spain)
- CIVIESCO SRL (Italy)
- ASSOCIAZIONE BIO-DISTRETTO DELLA VIA AMERINA E DELLE FORRE (Italy)
- RIMOND ENGINEERING PROCUREMENT AND CONSTRUCTION MANAGEMENT SRL (Italy)
- ZELENA ENERGETSKA ZADRUGA ZA USLUGE (Croatia)
- BATH & WEST COMMUNITY ENERGY LIMITED (United Kingdom)
- NATIONAL TECHNICAL UNIVERSITY OF ATHENS - NTUA (Greece)
- COMMUNAUTE D'UNIVERSITES ET ETABLISSEMENTS UNIVERSITE BOURGOGNE- FRANCHE - COMTE (France)
- OMI-POLO ESPANOL SA (Spain)
- EUROPEAN SCIENCE COMMUNICATION INSTITUTE gGmbH (Germany)
- OLIVOENERGY CONSULTING SL (Spain)

Project Description

Context The European Union (EU) is aiming at transforming the energy systems towards a sustainable, low-carbon, and climate-friendly economy, putting consumers at its centre. Buildings play a key role in this transition as they are responsible for approximately 40% of energy consumption and 36% of CO_2 emissions in the EU and, on the other hand, for the potential engagement of consumers through demand response (DR) mechanisms.

To enable this transformation, distribution grids will face new paradigms in the ways they operate, relying more on flexible smart grids with the capacity to safely host more renewable energy sources (RES) and integrate new loads, such as the power to heat/cold, the power to gas/liquid and new technologies, as well as electric vehicles (EVs) while advancing in the security of supply and affordability. This global picture asks for the generation of a new concept of a connected ecosystem between energy system players and consumers.

Scope. The ReDREAM project consortium is developing a user-centric ecosystem, which not only will enable the effective participation of the consumers/prosumers in the energy market but also drive a profound change turning traditional company's value chain into a value generation chain, based on the revolutionary **Service-Dominant Logic** paradigm.

As a result, ReDREAM will gain the following competitive advantages, compared to its competing solutions:

- New user-centric ecosystem
- Consumer-engagement through a holistic methodology
- Open co-creation approach
- Open services and virtualization capabilities.

This avant-garde solution will be exhaustively tested in 4 large-scale pilots: located in Castilla y León (Spain), Lazio (Italy), Varaždin (Croatia), and Bath & North East Somerset (UK) and involving **3 climate areas, 744 users and 3.7 GWh/year**.

Technical description and implementation. ReDREAM's approach will change the current paradigm by maximizing the UX to effectively reach all types of consumers. To achieve this, a new ecosystem will be deployed using previous developments of Stemy Energy and RIMOND.

The ecosystem will rely on ***5 structural layers:***

- Consumer engagement strategy
- Open co-creation
- Energy 'social network'
- Virtualisation and Digital Twins
- Open service pool with the catalogue of tools and services for the consumer.

ReDREAM`s approach entails different actors, highly heterogeneous data sources, dimensions, backgrounds, goals and multifunctional effects for the underpinning energy system encouraging a new role for the consumers. The viability and universality of the concept will be demonstrated in several distinct environments, comprised of different types of consumers, climate areas and energy loads. All demo sites cover the overarching goal of putting the consumer at the centre of the energy system through the validation of the full version ReDREAM ecosystem.

Impact. *Replicability:* The consumer engagement strategies, ecosystem, and tools and services will be tested and realised to ensure the potential and replicability of the solution across Europe. After the end of the project, the solution will be replicated in two ways:

- by engaging the remaining members of the demo cooperatives, and involving cooperative's networks such as RESCoop, which will gather alone **over a million users**
- by engaging new users following the exploitation strategy and the envisioned business plan prioritizing the countries involved in the project and according to the status of each country in terms of legislation.

It has been estimated that in 5 years after the project, ReDREAM could sell **11,211 licenses for householders**, **4,086 for the tertiary sector** and **1,449 for industries**.

Socioeconomics: The ReDREAM ecosystem will provide different tools capable of combining functionalities in terms of energy efficiency, demand response and other services which impact the daily life of the consumer, ranging from energy to non-energy services, related to:

- Mobility
- Health
- Comfort

It is expected that the combination of the two types of services (energy and non-energy) has a take-up rate of 80%. Furthermore, ongoing collaboration with local actors will study how to determine and deal with **energy poverty**.

H2020 call: LC-SC3-EC-3-2020 – Consumer Engagement and Demand Response

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SENDER

Sustainable Consumer Engagement and Demand Response

SENDER develops energy service applications for proactive demand response, home automation, convenience, and security in a co-creation process with customers.

From 2020	Project total cost	EU contribution	Website
To 2024	6,759 M€	5,837 M€	www.sender-h2020.eu

Technologies and services deployed

Technologies for consumers	✓ Demand response ✓ Smart appliance ✓ Smart home
Grid technologies	✓ Micro-grid management and control tools ✓ Digital twins
Large-scale storage technologies	
Distributed storage technologies	✓ EVs ✓ Thermal Storage
Generation technologies	✓ PV
Market	✓ Electricity market ✓ Ancillary services

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. As the EU moves towards sustainable energy, co-creation processes are the future for the design of energy service markets. This entails a shift in the balance of power, turning customers into a new generation of collaborators and putting them at the heart of the energy sector. The EU-funded SENDER project will develop energy service applications for proactive demand response (DR), home automation, convenience, and security mechanisms. By engaging customers in a co-creation process, the project will shift DR from a reactive to a proactive approach. Consumer data will be collected and processed to identify typical consumption patterns, mirror them by digital twins (DTs) based on artificial intelligence technologies and aggregate the DTs' supply/demand characteristics.

Scope. The SENDER project is focused on:

- Developing innovative DR and smart home solutions by placing consumers at the centre of the project using a co-creation approach.
- Integrating more renewables into the electricity system by applying innovative DR tools.
- Using consumer data to improve behaviour predictions to create consumer DTs and DR tools.
- Establishing interoperability of system components by testing them in a virtual lab prior to implementing DT and DR tools at three pilot sites targeting mainly households.
- Developing sustainable business models and a roadmap for the deployment of the solution after the project lifecycle using a replicability study approach.

Technical description and implementation. The developments being performed cover two specific areas:

- ICT innovations based on artificial intelligence and machine learning as well as peer-to-peer trading options will lead to an active involvement of new actors, notably household consumers, in local energy markets.
- Business-related innovations will strengthen the consumer role and foster their improved cooperation with DSOs/aggregators in a co-creation process to design, develop and implement a new local energy market.

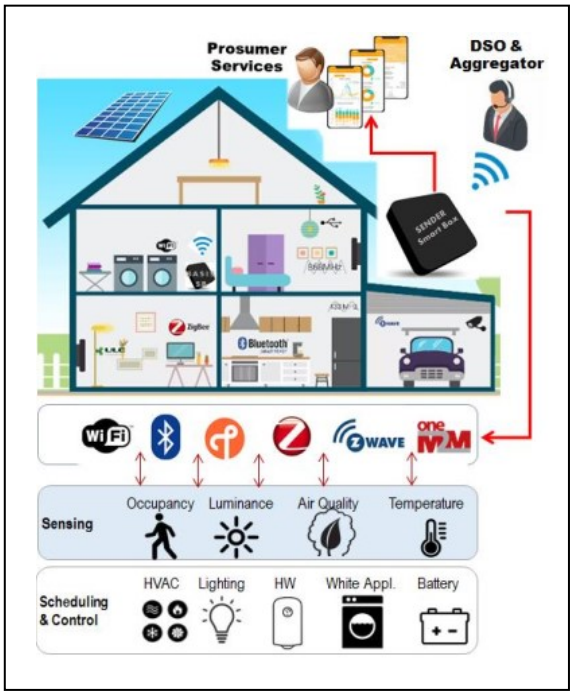
Impact. *Replicability:* SENDER applies the project solutions at three demonstration sites with highly diverse characteristics. This strongly increases the replicability potential of the solution all over Europe.

Socio-economics: SENDER puts consumers at the centre of the electricity market by applying consumer engagement strategies. A dedicated co-creation steering group with consumer integration has the potential to increase the number and types of consumers engaged in DR across Europe.

Environment: The customizable, user-specific home automation bundle product developed by SENDER combines DR with energy efficiency applications. The close cooperation with DSOs during the project lifecycle allows for the provision of flexibility to the grid and increases the hosting capacity for RES.

Market Transformation: SENDER strengthens the market role of consumers based on their higher market integration; so far segmented DR and smart home automation applications are bundled into one integrated product.

Policy: SENDER actively supports smart grid standardization activities and provides recommendations to national and EU regulatory and political decision bodies



H2020 call: LC-SC3-EC-3-2020 Consumer engagement and demand response

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TwinERGY

Intelligent interconnection of prosumers in positive energy communities with twins of things for digital energy markets

TwinERGY will introduce a first-of-a-kind Digital Twin framework that will incorporate the required intelligence for optimizing demand response at the local level without compromising the well-being of consumers and their daily schedules and operations

From 2020	Project total cost	EU contribution	Website
To 2023	7.1 M€	5.9 M€	https://www.twinergy.eu/

Technologies and services deployed

Technologies for consumers	✓ Demand response ✓ Smart appliances ✓ Smart metering
Grid technologies	✓ Micro-grid
Large-scale storage technologies	
Distributed storage technologies	✓ Electric Vehicles ✓ Batteries
Generation technologies	✓Wind Turbine ✓ Micro-generation ✓Solar thermal ✓PV
Market	✓ Electricity market ✓ Ancillary services

Project partners' countries

Coordinator: PANEPISTIMIO PATRON (GREECE)

Other partners:

- STAM SRL (Italy)
- TECHNISCHE HOCHSCHULE OSTWESTFALEN-LIPPE (Germany)
- UNIVERSIDADE NOVA DE LISBOA (Portugal)
- IES R&D CORDIS NAME (Ireland)
- COMUNE DI BENETUTTI (Italy)
- UNIVERSITY OF BRISTOL (United Kingdom)
- KNOWLE WEST MEDIA CENTRE LBG (United Kingdom)
- SUITE5 DATA INTELLIGENCE SOLUTIONS LIMITED (Cyprus)
- ETRA INVESTIGACION Y DESARROLLO SA (Spain)
- WORLD ENERGY CONSORTIUM PLC (Malta)
- MYTILINAIOS ANONIMI ETAIREIA (Greece)
- BRISTOL CITY COUNCIL (United Kingdom)
- EUROPEAN DYNAMICS LUXEMBOURG SA (Luxembourg)
- STADT STEINHEIM CORDIS NAME (Germany)
- IDEAS 3493 SL (Spain)
- ARTHUR'S LEGAL BV (Netherlands)
- SMART ENERGY EUROPE (Belgium)

Project Description

Context. The main idea behind the conception of the TwinERGY project lies on the interest of the project partners to exploit the new business opportunities that project implementation delivers and increase the relevance of the Demand Response optimization tools and strategies in the new generation of energy management systems. By coupling mature practice for citizen engagement with service innovation through the lenses of public value, TwinERGY will ensure that a wide range of interests and especially of consumers/ prosumers will be represented and supported in the energy marketplace.

Scope. TwinERGY will develop, configure and integrate an innovative suite of tools, services and applications for consumers, enabling increase of awareness and knowledge about consumption patterns, energy behaviours, generation/ demand forecasts and increase of local intelligence via properly established Digital Twin-based Consumer-Centric Energy Management and Control Decision Support mechanisms that locally optimize demand response. Key use cases will be trialed across 4 pilot regions making use of cutting-edge methods and tools. Special focus will be given on standardization and policy & market reform as key enablers for the successful commercialization of the TwinERGY results.

Technical description and implementation. The TwinERGY interoperable infrastructure (ecosystem) will constitute the backbone for all demonstrators' support and will assure the replicability and scalability potential of the proposed solution. TwinERGY comprises of:

- A Components and Communication layer, which provides the means to collect data being generated by the employed sources of TwinERGY architecture
- An Information layer, at the heart of which lies the Core Data Management Platform (CDMP). This layer brings into the TwinERGY platform the content of the multiple data sources
- A Function layer, that will act as a virtual working space for the different tools and applications of the architecture, to consume datasets through the CDMP and run according to the functions envisioned in the different use cases and the offered services
- A Business layer, that will allow for the first time the creation of a decentralized mass market structure on a large scale to actually compensate prosumers for participating in energy markets in a local level, which also will solve grid problems and create sustainable outcomes for the benefit of consumers and the society at large
- A vertical Cyber-Security/ Data Privacy layer, that assures end-to-end secure data exchange and manipulation

Impact. *Replicability:* TwinERGY's primary targets are residential and tertiary consumers/ buildings around the EU (including office buildings, university campus and retail stores) that represent over 99.9% of the European building stock. Hence, TwinERGY open, modular and plug and play solution, presents not only a high replicability potential but also a huge business opportunity if appropriate engagement strategies are applied.

Socio-economics: Nearly 11% of the EU's population is in a situation where they are not able to adequately heat their homes at an affordable cost. TwinERGY will contribute to effectively tackling this situation, both directly during the project (in demo countries), but also indirectly through the definition of a targeted exploitation strategy, considering energy poverty-affected countries as a primary target.

Environment: Energy consumption in households constitutes a considerable amount of the total energy in use. Changing energy consumption behavior within the household has a great potential to preserve environmental resources, especially if executed collectively.

Market Transformation: In TwinERGY Consumers will be encouraged and empowered to form tribes with one another, exchange views or co-create with firms thus, transforming symbolic systems in the energy market. These new "logics" will change the role of individuals within energy systems 'from the rather passive and individualistic notion of an 'energy consumer', towards a more participative and communitarian notion of an ''energy citizen.

Policy: TwinERGY aims at significantly contributing to the short-, mid- and long-term EU energy policy targets and facilitate the realization of multiple benefits mainly focusing on: i) the significant reduction of Green House Gas emissions, ii) the decrease of electricity prices, iii) better electricity market integration, iv) enhanced security of supply and independence from energy imports and v) more democratized energy markets.

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

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CREATORS

CREATing cOmmunity eneRgy Systems

CREATORS is an EU H2020 project that aims at supporting local initiators and local service providers in initiating, planning, implementing and operating a professional Community Energy System (CES) by supporting technical, financial and social processes.

From Sept 2020	Project total cost	EU contribution	Website
To Oct 2023	7.24 M€	5.35M€	https://www.creators4you.energy/

Technologies and services deployed

Technologies for consumers	✓ smart metering, application CES-as-a-service, flexibility services
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, consumers/ ✓ vation

Project partners' countries

Coordinator: CORDEEL NV (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. Although they're generating a lot of interest, smart energy community models are still experimental. Reaching perhaps 0,01% of the current energy market through pilots with less than 100 members, & covering usually only one energy vector at the time.

To move a step forward in the development of CES, it is required to move from inventor-driven to a more dynamic and accessible model for integrators and local energy providers and thus, overcome the barriers of scalability, replicability, reliability and viability.

CREATORS aims to accelerate the integration across Europe by supporting local actors throughout the entire life cycle of a CES and bring "CES-as-a-service" models to a commercial readiness level.

Scope. Enable energy communities and local energy service providers across Europe

- Accelerate the integration of CES across Europe
- Enhance commercial readiness of CES
- Unlock local renewable energy generation
- Increase flexibility and local grid balancing
- Activate and empower consumers and prosumers

Technical description and implementation. CREATORS will deliver a set of applications and service packages to support local initiators in the deployment of CES.

- The applications and service packages provided will be developed and demonstrated in four pilot sites located in Belgium, Estonia, Slovenia and Spain and later tested in six following sites under different market conditions.
- The services will deliver 60% preparation and operational costs reduction
- 20-35% CAPEX reduction
- 5-10% local energy price reduction
- Creation of 2 fte jobs in each CES
- The application will mature from TRL 6 to TRL8-9
- Move from CRL 2 to CRL 3

Impact. *Replicability: Since the tool will be demonstrated in 4 projects and replicated in 6 following sites, it will cover different energy community types and different regulatory frameworks, setting the basis for future replicability*

Socio-economics: it will empower consumers and prosumers and activate around 15-20% of them in the market

Environment: Unlock local RES generation and improve the efficiency of the local energy system. Reduction of potentially 1,8 Mton of CO2 per year.

Market Transformation: CREATORS will incentivise the creation of energy communities by delivering easy-to-use tools into a CES-as-a-service package. This tools will be tested in 10 sites and it expects to create market pull effect

Policy: CREATORS will try to contact and engage with local key stakeholders for the creation of CES. Some of these key stakeholders are energy agencies, energy regulators and DSO-TSO, and thus it might impact the energy policy of the different CREATORS' countries and create a suitable environment for CES development..

H2020 call: LC-SC3-2018-2019-2020: Integrated local energy systems (Energy islands)

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eNeuron

GreeN Energy HUbs for Local IntegRated Energy COmmunities optimisatioN

eneuron
optimising local energy communities

eNeuron project intends to develop innovative solutions for the best design and performance of local energy communities, integrating distributed energy resources and multiple energy carriers at different levels under the energy hub concept.

From 2020	Project total cost	EU contribution	Website
To 2024	6.3 M€	5.7 M€	https://eneuron.eu/

Technologies and services deployed

Technologies for consumers	✓ Demand response ✓ Smart appliances ✓ Smart metering
Grid technologies	✓ Network management, tools ✓ Micro-grid
Large-scale storage technologies	
Distributed storage technologies	✓ Batteries ✓ Electric Vehicles ✓ Thermal Energy Storage
Generation technologies	✓ Wind turbine ✓ PV ✓ Solar thermal ✓ Micro-generation
Market	✓ Electricity market ✓ Ancillary services

Project partners' countries

Coordinator: ENEA (Italy)

Other partners:

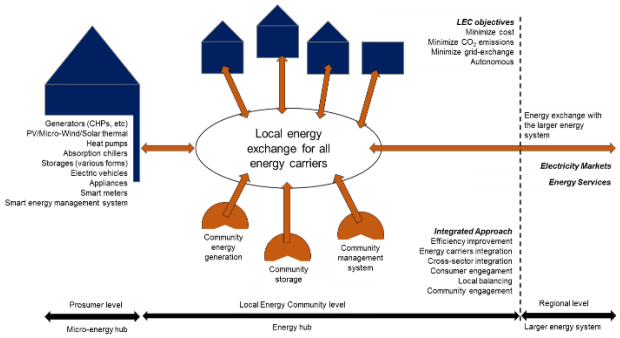
- Technical Coordinator: UNIVERSITY OF CYPRUS (Cyprus)
- INSTYTUT ENERGETYKI (Poland)
- FUNDACIO INSTITUT DE RECERCA DE L'ENERGIA DE CATALUNYA (Spain)
- SINTEF ENERGI AS (Norway)
- FUNDACION TECNALIA RESEARCH & INNOVATION (Spain)
- European Distributed Energy Resources Laboratories e.V. (Germany)
- EPRI 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. eNeuron project aims to develop innovative tools for the optimal design and operation of local energy communities (LECs) integrating distributed energy resources and multiple energy carriers at different scales. This goal will be achieved, by having in mind all the potential benefits achievable for the different actors involved and by promoting the Energy Hub concept, as a conceptual model for controlling and managing multi-carrier and integrated energy systems in order to optimize their architecture and operation. In order to ensure both the short-term and the long-term sustainability of this new energy paradigm and thus support an effective implementation and deployment, economic and environmental aspects will be taken into account in the optimization tools through a multi-objective approach.

Scope. eNeuron's proposed tools enable tangible sustainability and energy security benefits for all the stakeholders in the LEC. Local prosumers (households, commercial and industrial actors) stand to benefit through the reduction of energy costs while leveraging local, low carbon energy. Developers and solution providers will find new opportunities for technologies as part of an integrated, replicable operational business model. Distribution system operators (DSOs) benefit from avoiding grid congestion and deferring network investments. Policy makers benefit from increasingly sustainable and secure energy supply systems. eNeuron is a high TRL project and proposes innovative approaches and methodologies to optimally plan and operate integrated LECs through the optimal selection and use of multiple energy carriers and by considering both short- and long-run priorities.

Technical description and implementation. eNeuron will develop a cloud-based tool with a web-based user interface for the long-term design optimisation of multi-carrier local integrated energy systems, aiming at identifying the optimal architecture of such systems, in terms of optimised configuration alternatives through a multi-objective approach to account for both technical, economic and the environmental priorities / objectives. The eNeuron tool will also deal with the optimal daily operation of the integrated systems through a stochastic approach and the simulation of peer-to-peer energy trading to investigate the feasibility and convenience of the optimised scheduling strategies from the prosumers point of view in a local real time market employing block chain technology. This integrated approach will allow offering a set of functionalities for LEC (e.g. minimizing CAPEX through optimal investments on RES and other assets), operators (e.g. local congestion management) and prosumers (e.g. activate demand response and energy sharing). The technical solutions developed will be put to the test at four pilot sites in Europe: a city and its major energy nodes (Bydgozecz, Poland), a football stadium and its vicinity (Skagerak, Norway), a naval district with its own distribution grid (Lisbon, Portugal), and a university campus spread over several sites (Ancona, Italy). The ultimate objective is to check the effectiveness of the eNeuron solutions to be replicable and scalable, ready to be adapted to different local contexts in Europe.



Impact. *Replicability:* eNeuron focuses on technology demonstration, as well as on the market viability and the replicability of the developed tools and the targeted subcomponents (products and services).

Socio-economics: eNeuron solutions aim to empower European citizens to consume energy more responsibly and at lower prices, while engaging them in the context of LEC by contributing to energy savings and providing flexibility to the grids.

Environment: Through the multi-objective approach proposed for the optimal design of the integrated LEC, eNeuron takes into account the environmental priority in terms of reduction of CO_2 emissions, thereby ensuring the long-run sustainability of this new energy paradigm.

Market Transformation and Policy: eNeuron will propose new business models based on the LEC concept. Moreover, eNeuron is committed to making a major contribution to the BRIDGE initiative under different prisms as feedback on the ongoing policy developments in areas of local energy communities. eNeuron is also already supported by EERA and will provide insights to ETIP SNET on the energy transition.

H2020 call: LC-SC3-ES-3-2018-2020 Integrated local energy systems (Energy islands)

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RENergetic

Community-empowered Sustainable Multi-Vector Energy Islands

RENergetic aims to demonstrate the improvement of efficiency and energy autarky, the community involvement and the socio-economic viability of the Energy Islands.

From 2020	Project total cost	EU contribution	Website
To 2024	6,6 M€	5,9 M€	http://www.renergetic.eu

Technologies and services deployed

Technologies for consumers	✓ Demand response, smart metering
Grid technologies	✓ HVAC, Micro-grid
Large-scale storage technologies	✓
Distributed storage technologies	✓ batteries, EVs and Thermal Energy Storage
Generation technologies	✓ PV, Solar thermal, Biogas, Micro-generation
Market	✓ Electricity Market and Ancillery Services

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. RENergetic was conceived in the context on the 'The European Green Deal', placing the consumer at the heart of the energy transition. Taking advantage of Citizen Energy Communities' ('CEC') and 'Renewable Energy Communities' ('REC') as legal entities, these communities are actively controlled by their members, with a primary objective to provide environmental, economic and social community benefits. These communities can help to increase (1) the share of renewables in local areas with limited impact on the public grid and (2) the energy efficiency of the local energy systems, e.g. by a combined optimization of different energy vectors (electricity, heat and waste treatment).

Scope. The following main measurable objectives have been identified for RENergetic

- To securely maximize the level of energy autarky of a local energy system (energy island) and its share of renewable energy sources at energy consumption, at the same time.
- To create energy island communities with formal underpinnings and a high level of personal identification that support a high intake of renewable energy sources in autarch energy islands.
- To enhance the economic attractiveness of renewable-based and autarch local energy systems (energy islands).
- To ensure a high replication potential of the RENergetic solution across Europe with a special focus on the opportunities offered by local energy island communities.

Technical description and implementation. RENergetic takes three urban energy islands to demonstrate its viability:

San Raffaele Hospital and its I&R Campus in Segrate Municipality – Milan, Italy, will be working on balancing power and temperature levels of heat and electricity, and their transfer between remote PV plant and campus, and in between campus buildings.

New Docks, a residential area in Ghent – Belgium, will be working on the Integration towards a full and sustainable smart renewable energy system, including PV, waste heat and water recovery, as well as efficient battery storage.

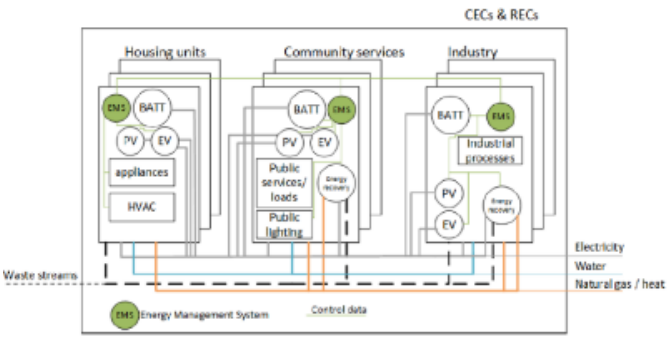
Warta University Campus and Poznan Supercomputing and Networking Center Poznan – Poland, optimising specific and total demand-supply relationships, taking into account smart EV charging and building energy monitoring.

Impact. *Replicability:* RENergetic has a dedicated Work Package for replicability and it will capitalize on the experiences from the project pilot sites, their difficulties, barriers and successes, and will develop a complete replicability package that will serve as a reference for other energy islands implementation initiatives.

Socio-economics: RENergetic will help to engage the local citizens to become active contributors to a clean energy society and to influence other consumers to adopt similar behaviour.

Environment: Using IA-based-energy optimizers will have a great environmental impact, increasing the use of renewables, thus lowering the dependency on fossil fuels energies.

Policy: RENergetic will consider legal viability and propose mitigation measures for identified legal hurdles.



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

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FLEXGRID

A novel smart grid architecture that facilitates high RES penetration through innovative markets towards efficient interaction between advanced electricity grid management and intelligent stakeholders

FLEXGRID will develop advanced mathematical models and algorithms for network-aware market clearing (i.e. clear the market taking into consideration dynamic grid constraints) and market-aware network management (i.e. exploiting available flexibility from energy service providers and aggregators to deal with grid problems such as frequency/voltage control and local congestion management). A novel distribution-level flexibility market (DLFM) concept is introduced as well as ways to integrate these markets in the future EU regulatory framework.

From 2019	Project total cost	EU contribution	Website
To 2022	3.89 M€	3.89 M€	https://flexgrid-project.eu/

Technologies and services deployed

Technologies for consumers	✓ Demand response, ✓ smart metering
Grid technologies	✓ Network management, monitoring and control tools
Large-scale storage technologies	✓
Distributed storage technologies	✓ batteries, ✓ Electric Vehicles
Generation technologies	✓ PV
Market	✓ Electricity market ✓ Ancillary services

Project partners' countries

Coordinator: ICCS (GREECE)

Other partners:

- INSTITUTE OF COMMUNICATION AND COMPUTER SYSTEMS (Greece)
- ETRA INVESTIGACION Y DESARROLLO SA (Spain)
- SMART INNOVATION NORWAY AS (Norway)
- NORD POOL CONSULTING AS (Norway)
- NODES AS (Norway)
- UNIVERSITY OF CYPRUS (Cyprus)
- SVEUCILISTE U ZAGREBU FAKULTET ELEKTROTEHNIKE I RACUNARSTVA (Croatia)
- HRVATSKI OPERATOR PRIJENOSNOG SUSTAVA DOO (Croatia)
- BADENOVA AG & CO KG (Germany)
- DANMARKS TEKNISKE UNIVERSITET (Denmark)
- AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH (Austria)
- BNNETZE GMBH (Germany)

Project Description

Scope. Future smart grids require the effective interaction between energy markets and electricity grid management systems in order to introduce new services and mitigate risks introduced by high RES penetration. FLEXGRID envisages the orchestration and integration of:

- advanced electricity grid models and tools,
- flexibility assets' management tools,
- data analytics and accurate forecasts of the various markets and RES production, in order to guarantee cost-effective and stable electricity grids.

Technical description and implementation. Towards this end, the FLEXGRID project proposes a holistic future smart grid architecture able to accommodate high RES penetration through the advancement, interaction and integration of:

- innovative models that are based on recent advances in game theory in order to quantify and highly improve the trade-off between the various future energy markets' requirements (Real Time, Efficient, Strategy Proof, Competitive, Scalable, Fair and Privacy Protecting) and guarantee, theoretically and in practice, the "fairness" of the equilibrium points that energy markets reach,
- grid system models that use optimization theory to achieve more efficient market clearing and Optimal Power Flow (OPF) algorithms to achieve scalability, in a way that must also be Low Overhead, Multi-period, Robust and Network Upgrade Planning Aware, and
- innovative Business Models through the use of artificial intelligence, which can be exploited by modern Energy Service Providers (ESPs) and RES Producers (RESPs) to achieve economic and operational benefits through their efficient interaction with FLEXGRID's advanced markets and electricity grid models.

FLEXGRID will help:

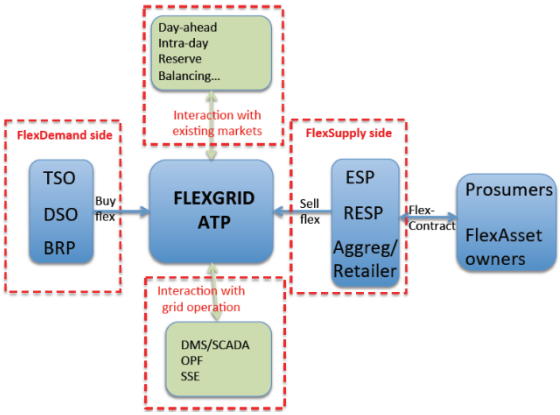
- DSOs/TSOs manage safely and at low cost their electricity grid by interacting with ESPs and ESPs through novel flexibility market procedures,
- modern ESPs become more competitive and sustainable, and
- RESPs optimally compose and exploit their production in a risk-averse manner by making their RES generation dispatchable.

Impact. *Replicability:* FLEXGRID designs a generic Automated Trading Platform (ATP) that brings together stakeholders from both FlexDemand (i.e. DSOs/TSOs) and FlexSupply sides (i.e. ESPs/aggregators). The proposed ATP aims at facilitating the easy, deep and dynamic collaboration between the various energy market stakeholders. The ATP could be operated by an independent local market operator, which operates a novel distribution level flexibility market. As such, FLEXGRID ATP can be a replicable solution for many distribution level areas within Europe, where flexibility assets can have a level playing field to provide flexibility to the system operators.

Socio-economics: FLEXGRID will provide advanced energy services' planning and operation to ESPs/aggregators (i.e. FlexSupplier companies). This is expected to boost RES and FlexAsset penetration. On the other hand, FLEXGRID will develop advanced tools for system operators to dynamically detect frequency, local congestion and voltage problems and solve them in a proactive manner.

Environment: FLEXGRID will help to cater more environmentally-friendly energy and help to regulate the system to reduce energy losses, improve the energy balance and to help reduce the vulnerability of the energy system to undesired impacts.

Market Transformation and Policy: FLEXGRID introduces a novel distribution-level flexibility market concept and proposes ways that this framework can be integrated in the existing EU regulation. The results of the extensive lab testing and system-level simulations within FLEXGRID will serve as useful recommendations in order for EC to derive new policy implications that are related with the development of flexibility markets in EU area.



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

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FlexPlan

Advanced methodology and tools taking advantage of storage and FLEXibility in transmission and distribution grid PLANning

FlexPlan aims at establishing a new grid planning methodology considering the opportunity to introduce new storage and flexibility resources in electricity transmission and distribution grids as an alternative to building new grid elements. It creates a new innovative grid planning tool whose ambition is to go beyond the state of the art of planning methodologies and uses it to analyse six regional cases covering nearly the whole European continent, aimed at casting a view on grid planning in Europe till 2050. In this way, the FlexPlan project tries to answer the question of which role flexibility could play and how its usage can contribute to reduce planning investments yet maintaining (at least) the current system security levels. The project ends up by formulating guidelines for regulators and for the planning offices of TSOs and DSOs.

From Oct 2019	Project total cost	EU contribution	Website
To Sept 2022	4.450 M€	4.450 M€	https://flexplan-project.eu/

Technologies and services deployed (in simulation)

Technologies for consumers	✓ Demand response
Grid technologies	✓PST, HVDC, …
Large-scale storage technologies	✓Hydro power plants
Distributed storage technologies	✓Batteries and other storage technologies
Generation technologies	✓Both conventional and RES
Market	✓Congestion management

Project partners' countries

Coordinator: RSE (ITALY)

Other partners:

- ENEL Global Infrastructure (Italy)
- EKC (Serbia)
- ELES (Slovenia)
- KU Leuven (Belgium)
- N-SIDE (Belgium)
- R&D NESTER (Portugal)
- REN (Portugal)
- SINTEF ENERGI (Norway)
- TECNALIA (Spain)
- TERNA (Italy)
- TU Dortmund (Germany)
- VITO (Belgium)

Project Description

Context

- The current high-speed deployment rate of non-dispatchable Renewable Energy Sources (RES) is making transmission and distribution network planning activities more and more complex.
- Planning activities require greater coordination between transmission and distribution system operators in order to cope with the high level of uncertainty and complexity related to energy transition.
- The long times required to build up a network reinforcement (that can easily overcome 10 years for an important new transmission infrastructure) can prove no longer compatible with the pace at which the electric system is getting transformed, also due to the need to withstand climate change and improve system resilience against extreme climate events.
- Storage and flexibility elements close to RES generation could potentially alleviate grid planning needs

Scope

- Creating a new grid planning methodology analysing transmission and distribution (T&D) grid expansion options while considering the deployment of new storage facilities and grid technologies as well as the activation of flexibility resources (distributed generation and demand side management) located in key places as an alternative to building new lines or reinforcing existing ones.
- Creating a set of tools able to implement the methodology above. These tools should be capable to work on real planning problems (dimensionality problem) and constitute a prototype for a set adoptable by TSOs and DSOs in their activities.
- Validating the set of tools on 6 regional cases covering nearly the whole of Europe. Beyond the validation of the methodology and of the tools, these regional cases should be able to cast a view on the real possibility to deploy flexibility and storage as an alternative to traditional grid expansion, to the timeframes 2030, 2040 and 2050.
- The 6 regional cases above should be able to provide a background for the regulatory guidelines whose elaboration will occupy the last phase of the project development.

Technical description and implementation

- The project starts by analyzing which technologies could be mature to provide flexibility for the system at the target years 2030-2040-2050.
- A new planning tool is developed, able to calculate the optimal expansion path for the tested transmission grids where spatial location of flexibility elements and exploitation of flexibility resources is considered as an alternative or complement to building new lines (best expansion path) in the light of selected optimization criteria.
- Pan-European scenarios are then elaborated for the years 2030-2040-2050 in order to create a coherent set of border conditions for the subsequent development of six regional simulation cases covering nearly all Europe with nodal grid detail. The 6 regions are: Iberian Peninsula, France and Benelux, Germany Switzerland and Austria, Italy, Balkan region, Northern Europe.
- Finally, regulatory lessons are drawn for specific countries as well as at pan-European level, regarding optimal entity and location of flexibility elements, how to exploit flexibility in the most effective way and what type of incentivization policy could be the most opportune for stimulating an optimal flexibility deployment.

Impact.

- *Replicability:* coherently with grid planning subject, the project performs the whole analysis in simulation by constructing real size planning models replicating the ones that could be considered by the System Operators and based on ENTSO-E scenario storylines for 2030, 2040 and 2050. The result provided by the mathematical models are supposed fully replicable in the real world.
- *Socio-economics:* the models are based on a market framework, where the solution, calculated every hour simultaneously for the three reference years (2030, 2040, 2050), is based on the typical merit order logics adopted by the electricity markets.
- *Environment:* environmental externalities (air quality, CO2 lifecycle and landscape constraints) are seen in terms of costs for the society and completely internalized into the target function
- *Market Transformation:* the project creates a full modelling framework able to model in the most correct band efficient way flexibility elements and system storage. FlexPlan doesn't directly market elaborations but its results (in particular, the regulatory guidelines) aim at contributing to the creation of a new more efficient and integrated market for congestion management services
- *Policy:* The final regulatory guidelines aim at contributing to the on-going policy by clarifying: (a) what role flexibility can have in the future as a supporting element to T&D grid planning; (b) which kind of regulation could support the deployment of flexibility element in the most opportune places; (c) which kind of relationship should be put in place between NRAs, SOs and investors I order to foster efficiency and costs reduction for the system

H2020 call: LC-SC3-ES-10-2020 DC – AC/DC hybrid grid for a modular, resilient and high RES share grid development

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HYPERRIDE

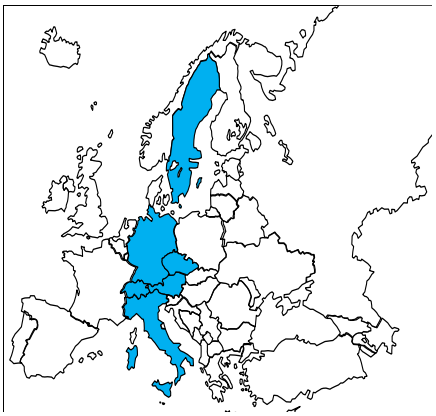
Hybrid Provision of Energy based on Reliability and Resiliency by Integration of Dc Equipment

HYPERRIDE contributes to the field implementation of DC and hybrid AC/DC grids. Grid planning and operation guidelines are developed, and available sizing tools adapted for DC. TRL of enabling technologies will be raised focused on MVDC breakers, sensors and DC measurement units to provide field ready devices for grid automation and protection. Automation algorithms are created, validated and transferred to demo sites. This involves concepts and solutions for cyber security and fault mitigation to avoid cascading effects. Demonstrations in Aachen (DE), Lausanne (CH), Terni (IT) will showcase above-mentioned technologies. Benefits of the solutions are evaluated, especially the integration potential of renewables. Business models are created for products, services and applications.

From 2020 to 2024	Project total cost	EU contribution	Website
	8.2 M€	7.0 M€	www.hyperride.eu

Technologies and services deployed	
Grid technologies	✓MVDC,VDC circuit breakers ✓Protections ✓Network management, monitoring and control tools ✓ Micro-grid ✓ Multi-terminal
Large-scale storage technologies	---
Distributed storage technologies	✓Batteries, Electric Vehicles
Generation technologies	✓ PV
Market	✓Electricity market ✓Ancillary services

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. With increasing contributions from internal direct current (DC) based renewable energy sources, electromobility and battery storages, low-voltage DC grids or DC coupled with AC in a hybrid network could enable more stable, efficient and sustainable electricity distribution at lower costs. The proposed solutions in HYPERRIDE will contribute to

- facilitating planning and targeting investments in the sector;
- increasing resilience of the electricity grid to faults and cyberattacks;
- increasing penetration of renewable energy resources (RES) in the power network;
- increasing the efficiency of the electricity system (system level).

HYPERRIDE project is developing the technologies to make this possible with planned demonstrations in a variety of use cases. All this will be accompanied by business models for the resulting products, services and applications.

Scope. The main objective is to demonstrate MV – LVDC – AC/DC hybrid grid architectures based on a DC underlay grid interconnecting micro/nano-grids on target Technology Readiness Level (TRL) 5-8. This includes i.a. the following further objectives:

- Planning, operation and automation solutions, incl. operation on and separated from main AC grid;
- Development of enabling technologies, i.a. MVDC Circuit Breakers and Sensors, DC Measurement Unit, open interoperable ICT platform, open reliability database, test and validation services;
- Fault management and cybersecurity solutions, incl. protection coordination, stability assessment, and automatic grid reconfiguration;
- Technology demonstrations in three countries by virtually linked demo-sites;
- Effective business models & knowledge transfer, recommendations for standardization and regulation bodies.

Technical description and implementation. Following three demonstrations are planned:

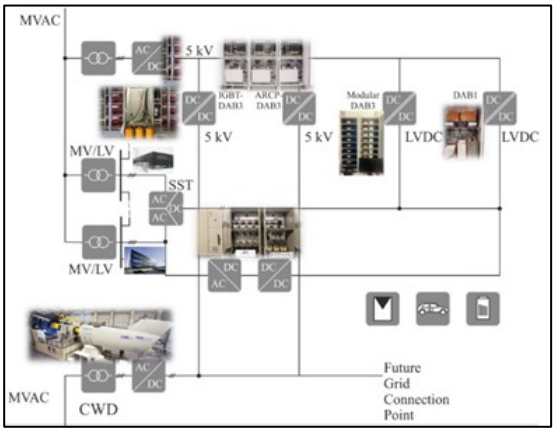
- Demo 1 (Lausanne, CH) and Demo 2 (Aachen, DE): MV – LVDC – AC/DC hybrid campus grids.
- Demo3: LV DC - AC/DC hybrid DSO grids with connection to MVAC grid via AC-transformer in the field.

Impact. *Replicability:* Modular, techno-economic DSO grid planning approach for the transition of AC to AC/DC hybrid grids including a component sizing tool. Interoperable, open ICT platform, data models for interoperability and open reliability information data base. Configurable MV and LVDC components model library for controls, protection, stability assessment considering several use-cases.

Environment: Enhancing energy efficiency on system level as well as application side and sustainable resource usage (CO_2 footprint). DC-Grids enable to connect a higher share of renewables (PV, wind) and DC-based loads (EVs, heat pumps/cooling systems) to the grid.

Market Transformation: Steadily falling prices of semiconductor-based devices and wide band gap components enable new DC use-cases. A cost benefit analysis (CBA) is carried out for most promising use-cases, development of business models for the deployment of new services. Activities are aligned with other developments to increase the replication potential of the developed solutions for smart grids and energy storage applications (e.g., local energy communities).

Policy: Enhancing energy efficiency and sustainability is a key pillar of most policy initiatives. HYPERRIDE will contribute to BRIDGE and in addition organize best practice exchanges and methodology workshops at demonstration sites where use-cases are discussed with local industrial-style stake holders. Comparative analysis of legal and regulatory framework (hybrid AC/DC grids) in the countries of the demo sites including policy recommendations (analysis of barriers for promising use-cases).



Demo2: RWTH Aachen MV/LVDC Campus grid

H2020 call: LC-SC3-ES-10-2020 DC – AC/DC hybrid grid for a modular, resilient and high RES share grid development

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TIGON

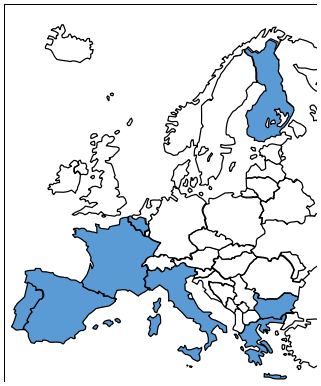
Towards Intelligent DC-based hybrid Grids Optimizing the network performance

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. 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.

From 2020	Project total cost	EU contribution	Website
To 2024	8.0 M€	6.9 M€	https://tigon-project.eu/

Technologies and services deployed	
Technologies for consumers	✓ Demand response ✓ Smart appliance ✓ Smart metering
Grid technologies	✓ HVDC ✓ Protections ✓ Network management and control tools ✓ Micro-grid
Large-scale storage technologies	
Distributed storage technologies	✓ Batteries ✓ Electric vehicles ✓ Power to heat
Generation technologies	✓ Wind Turbine ✓ PV
Market	✓ Electricity Market ✓ Ancillary Services

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. Over the last two decades, the high proliferation of RES together with the increase in DC loads linked to the use of electronics, LED lighting and novel technologies such as electric vehicles and energy storage, has increased the attractiveness of DC grids. The main drivers behind this paradigm shift are related to the increase in energy efficiency, less complex control of power quality and seamless integration of renewable energy and energy storage, thus increasing the sustainability of the energy distribution system. However, the lack of DC microgrids prevents them to evolve from a promising solution for future smart grids to a commercially available technology.

Scope. TIGON has been conceived to design, model and develop innovative DC-technologies aiming to improve their reliability, resilience, and performance in a smart and cost-efficient way. In order to do so, a modular concept of DC-based hybrid grid topology is proposed consisting on a MVDC line connecting the main grid through a Solid-State Transformer (SST) with the LV hybrid grid. Based on this concept, TIGON demonstrators located in France and Spain will integrate in a more efficient way distributed RES, energy storage and a variety of loads including electric vehicles. At the same time, the MVDC line will be exploited by integrating a higher amount of RES and providing ancillary services through energy storage systems and their related operation modes and control strategies.

Technical description and implementation. The novelty of this approach relies on the integration of TIGON main physical and software developments, which are the key enablers for the smart and cost-effective operation of the whole DC-based hybrid grid. The main technologies of TIGON Project are:

- Solid State transformer
- SiC DC/DC converters
- MVDC PV plant
- WAMPAC system
- Smart Energy Management System
- Decision Support System tool
- Cybersecurity Defence System

To be able to validate the performance of the solutions, they will be tested in two real microgrid Demo-Sites located in France and Spain, while additional use cases in the residential and urban railway sectors (Finland and Bulgaria) will act as niche markets for analysing and further solidifying the replication of TIGON developments after the project's end.

In the demo-site in France, one of the main challenges for renewable energies penetration into the grid and specifically for solar power is to reduce drastically the LCOE through reducing CAPEX. The pilot will improve the CAPEX of PV plants, through the reduction of cost of electrical equipment: cables, reduction of components through specific topologies and WBG components through the reduction of passive components size, along with an improvement of reliability on a global scale.

In the demo-site in Spain, the increasing share of variable and unpredictable RES connected to the centre is challenging their electricity grid in terms of reliability, stability and security of supply.

Impact. *Replicability*: TIGON focuses on technology demonstration, as well as on the market viability and the replicability of the TIGON technologies and the targeted subcomponents (products and services).

Socio-economics: The digitalisation of the power system with the deployment of smart grid technologies, upon which TIGON's solutions are built, rises concerns on data security and privacy among both operators and consumers. TIGON will develop a robust defence system to face potential cyberattacks that might damage the system.

Environment: Solutions implemented in TIGON will allow a smoother deployment of DC-based hybrid grid architectures which will transform current and future energy grids in more sustainable, since they improve the energy efficiency of the system and allow for better management and operation of the energy sources thanks also to the reduced number of energy conversion stages. The TIGON emissions reduction is a true benefit and will also serve as motivation for more active engagement in demand-response plans.

Market Transformation and Policy: TIGON will place emphasis in the development of new business models and opportunities will arise due to the dawn of new concepts and systems/tools ideas. Moreover, a dedicated DSS tool facilitating the planning of grid expansions or the development of new hybrid-grids will be developed during the project

LC-SC3-ES-4-2018-2020: Decarbonising energy systems of geographical Islands

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IANOS

IntegrAted SolutioNs for DecarbOnisation and Smartification of Islands

IANOS aims to demonstrate and replicate the symbiotic operation of various energy streams in EU islands, unlocking their great potential to act as Lighthouses of pan-European decarbonization.

From 2020	Project total cost	EU contribution	Website
To 2024	€ 8.8 M€	7.0 M€	https://ianos.eu/

Technologies and services deployed

Technologies for consumers	✓	Demand response
	✓	Smart appliances
	✓	Smart Metering
Grid technologies	✓	Network management
	✓	Monitoring and control tools
Distributed storage technologies	✓	Batteries
	✓	Thermal energy storage
	✓	Flywheels
Generation technologies	✓	PV
	✓	Wind turbines
	✓	Tidal Energy
	✓	Biogas
Market	✓	Ancillary Services
	✓	Electricity Market

Project partners' countries

Coordinator: EDP NEW (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)
- 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 EUROPEENNE DES ENERGIES RENOUVELABLES (Belgium)
- ELLINIKI ETAIREIA ENERGEIAKIS OIKONOMIAS (Greece)
- UBITECH ENERGY (Belgium

Project Description

Context. Almost 3.5% of European citizens live in geographical islands. Although each island has its own characteristics and challenges, most EU islands face specific energy-related challenges which lead to very high energy costs compared to the mainland. However, opportunities can also arise as, compared to the highly complex mainland energy systems, solutions towards RES integration are easier to deploy and have a significant decarbonization impact on islands' ecosystems.

Scope. IANOS aims to demonstrate, under real-life operational conditions, a group of both technological and non-technological solutions adapted to harsh islandic conditions, in two lighthouse islands: Terceira (Portugal) and Ameland (Netherlands). The project covers a multitude of energy supply, storage and end-use vectors on different climatic and socio-economic conditions, while taking the appropriate measures for their replication into three Fellow islands: Lampedusa (Italy), Bora Bora (French Polynesia) and Nisyros (Greece).

Bringing together 34 experienced partners from 9 European countries, the project will adopt an island energy transition strategy focussed on energy efficiency, decarbonisation through electrification and support from carbon-neutral fuels, and the empowerment of local energy communities.

Technical description and implementation.

IANOS will demonstrate an intelligent Virtual Power Plant (iVPP) based on AI which sets up a virtual network of decentralized renewable energy resources, both non-dispatchable such as wind, solar, tidal resources and dispatchable ones such as geothermal and green gas CHP plants as well as Energy Storage Systems integrated as a single unit, providing flexibility services and fostering island renewable energy self-consumption.

Cross-cutting novel technologies will be demonstrated in the 2 Lighthouse islands in 3 different areas:

- Smart Grid (fog-enabled intelligent device, smart energy router, hybrid transformer)
- Storage (flywheel, biobased saline batteries, heat batteries)
- Renewable Energy (tidal kite, auto generative high-pressure digester).

An Island Energy Planning and Transition Suite (IEPT) toolkit will be introduced to assist key island stakeholders in developing an effective renewable energy portfolio and island decarbonisation plan. The toolkit comprises a crowd equity platform; a dedicated Life Cycle Assessment (LCA) / Life Cycle Costing (LCC) toolkit to further assist in the decision-making process; and a grid-oriented optimiser providing detailed modelling and grid scenarios simulations.

Impact. *Replicability:* IANOS ensures a large-scale uptake of validated solutions on the same geographical island and/or on other geographical islands with similar problems. The majority of the elements included in IANOS allows a strong degree of automization and interoperability.

Socio-economics: IANOS will facilitate the creation and/or increase the number of renewable energy communities.

IANOS is supporting the integration of renewables in existing islands' power systems, avoiding and/or limiting expensive and inefficient investments on new grid infrastructures as far as possible.

Environment: IANOS inherently contributes to decreasing the ecological footprint and improving the carrying capacity of islands by reducing energy needs and increasing energy self-sufficiency.

Market Transformation: Enhanced innovation capacity will enable IANOS to identify and assess new market opportunities. The whole approach of making rich data streams available to a wide potential audience of innovators is designed to generate new services to islanders and businesses.

Policy: IANOS will facilitate the development of an island-wide action plan on clean energy that clearly describes the necessary actions, timeline and budget to achieve each island's vision.

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ISLANDER

Accelerating the decarbonisation of islands' energy systems

Islander has the main objective to integrate and operate together heterogeneous storage, electric vehicles and renewables combined in different applications (behind the meter, front the meter, street lighting, …) to decarbonize Borkum Island. The smart IT platform developed along with the demand and supply forecasting algorithms will be key for monitoring and operating assets installed during the project lifespan. Thanks to the work of follower islands and the optimisation tool to be developed in the project, Borkum results will serve as a showcase and will be able to be replicated in other islands to move forward and reach 2030 climate and energy framework objectives.

From Oct 2020 To Sept 2024	Project total cost	EU contribution	Website
	8,2 M€	6,9 M€	https://www.islander-project.eu/

Technologies and services deployed	
Technologies for consumers	✓ Demand response, smart metering
Grid technologies	✓microgrids
Large-scale storage technologies	✓ Hydrogeen
Distributed storage technologies	✓Li-ion batteries, EVs, thermal (district heating)
Generation technologies	✓PV
Market	✓Electricity market. Ancilliary 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 (Croacia)

Project Description

Context. Borkum is an island of about 30 km2 and 5,500 residents, located 20 miles from the north-western coast of Germany. Following concerns of the population regarding air quality due to a new coal fired power plant on the Dutch coast, Borkum started on a path towards renewable energy many years ago. Following several initiatives in that direction including a citizen dialogue and the previous H2020 NETfficient project, the island decided to become emission-free and fully decarbonized by 2030. Yet, the challenges associated with the intermittent nature of power supplied by renewable sources remain: consumption peaks cannot be met readily by solar and wind energy and expensive grid electricity needs to be bought in. Vice versa, peak generation leads to energy exports at unfavourable conditions.

Scope. ISLANDER aims at developing an even more integrated and efficient central energy management platform in order to manage the various energy assets and balance fluctuations between generation and demand, using local flexibility options such as storage technologies and demand response in combination with renewable energy sources. In addition, an innovative concept for heat supply based on a seawater-powered heat pump and a heat storage tank will be installed in a newly built district close to the port of Borkum. A large hydrogen-based storage will also be deployed. Moreover, a Renewable Energy Community will be created in order to engage the citizens of Borkum and strengthen their participation in the island's energy transition. These measures will set the course for the creation of a largely carbon-free energy system on the island of Borkum by 2030.

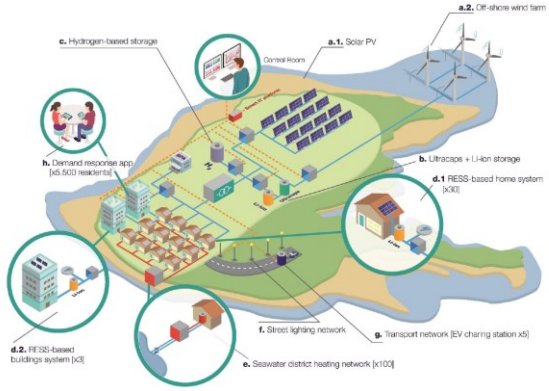
Technical description and implementation. Within this framework, the ISLANDER project will showcase the process of making Borkum a fully autonomous and decarbonised island energy system. Specifically, the project will focus on delivering:

- Distributed RESS systems (Renewable Energy + Small-scale Storage) composed of household and building roof-mounted PV and Li-ion storage, to involve consumers in the active management of the grid.
- Complementary short-to-seasonal, large-scale electricity storage: peak-shaving fast-response storage (Ultracaps), intra-day storage (Li-ion battery) and seasonal storage (H2-based storage).
- Seawater district heating coupled with heat storage for residential units, to make use of the thermal capacity of the North Sea water as a source of heating and cooling.
- Deployment of an EV charging network setting up 5 stations to promote the electrification of the island's transport.
- A smart IT platform conceived to holistically perform the optimal aggregation of all these components while also implementing Demand Response (DR) to further balance the energy grid. Multi-scale forecasting through comprehensive modelling of demand and supply will be key for it.
- An optimisation tool to optimally design zero-carbon island energy systems thanks to advanced modelling and optimisation and which will be distributed as an open-source software tool to all interested islands.

Impact. *Replicability:*

ISLANDER aims to replicate its results to the widest possible adopters. To do so, the project entails a 3-wave replication strategy along with the dissemination measures required to support it: First wave replication in Follower Islands in Great Britain, Greece, and Croatia; Second wave replication in the related archipelagos; Third wave replication in other EU islands by means of the cooperation with the European Islands initiatives.

Market Transformation: The indicators shows that the market potential for the ISLANDER advances exploited as energy services, innovative storage approaches and smart IT platform is very relevant within the EU. Taking full advantage of new business models will require the creation of new companies, the training necessary for the new jobs, and the creation of new regulation.



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MAESHA

DeMonstration of smArt and flExible solutions for a decarboniSed energy future in Mayotte and otHer European islAnds

. The EU-funded MAESHA project will develop smart and flexible methods of storage and energy management as well as modelling tools and technical systems with the aim of promoting the transition towards sustainable energy. Designed with respect to the interests of the local communities, adapted to the market and ready to be disseminated, the new approaches will serve as a demonstration for the future decarbonisation of the Mayotte and other European islands.

From 2020	Project total cost	EU contribution	Website
To 2024	11.79 M€	8.87 M€	www.maesha.eu

Technologies and services deployed

Technologies for consumers	✓Demand response ✓Smart appliances
Grid technologies	✓Inertia ✓Network management, monitoring and control
Large-scale storage technologies	✓Power to gas
Distributed storage technologies	✓Electric vehicles ✓Battery storage
Generation technologies	✓Hybrid system PV production and EV charging station
Market	✓Electricity market

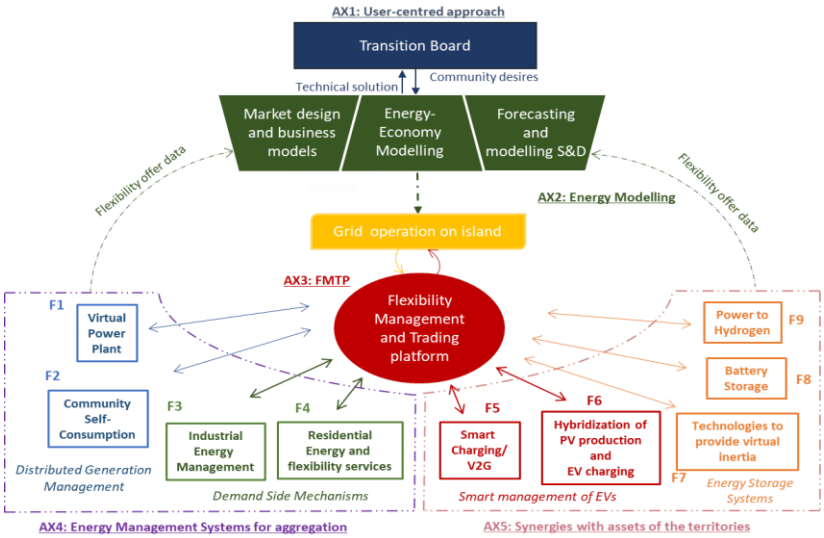
Project partners' countries

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 the 2400 islands of the European Union. Although the features of their environments are very diverse, they all face common challenges regarding energy supply. Indeed, due to their high dependency on imported fossil fuels, their energy sectors are extremely polluting, and the lack of interconnections often impacts the resiliency of their networks. Furthermore, the state of their power plants, often aging and lacking efficiency, results in energy costs that can be up to ten times higher for insular inhabitants than on the mainland. But European island geographical conditions often offer high production potential for either solar, wind or biomass technologies. The large penetration of RES would ensure a higher independence, a better security of supply and better grid stability while reducing the costs of energy for households.

Scope. The MAESHA project will decarbonise the energy systems of geographical islands by fostering the large deployment of RES through the installation of tailored innovative flexibility services based on a close study and modelling of local energy systems and community structures. MAESHA will demonstrate the solutions on the French overseas island of Mayotte and study replicability potential on 5 follower islands representing more than 1.2 million inhabitants spread in geographical Europe and overseas territories.

Technical description and implementation. At the core of the MASHA project, a Flexibility Management and Trading Platform (FMTP) will be developed, where different technologies can offer their flexibility. Such technologies include already existing assets, which must be managed and aggregated to operate in a grid-friendly manner, such as residential and industrial appliances and devices, but also innovative technologies, which will be introduced during the project. These include especially smart EV charging station, combined with PV production, seasonal hydrogen storage, battery storage and technologies to provide virtual inertia. The technical solutions and implementations will be accompanied with an iterative consultation process of representative community members, assembled as a Transition Board.

Impact. The MAESHA project will reduce the GHG emission on geographical island energy system and reduce fossil fuel consumption by triggering synergies of relevant energy sectors with a flexible electricity grid. Establishing supporting regulatory frameworks and markets will incentivize the local population to create Local Energy Communities (LECs), increasing the community's participation and influence in the energy transition. Associated market schemes will decrease the population´s expenditure on energy consumption, freeing up resources for other goods and thereby improving quality of life and development in multidimensional scope.

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ROBINSON

smart integRation Of local energy sources and innovative storage for flexiBle, secure and cost-efficIent eNergy Supply ON industrialized islands

Islands often find it challenging to ensure a clean, secure and cost-effective supply of energy. The key is to decrease dependency on fossil fuels and become energy self-sufficient through a mix of renewable energy generation and storage infrastructure. ROBINSON's main mission is to develop an integrated energy system to help decarbonise islands. The system, which will be demonstrated on the island of Eigerøy, Norway, couples locally available energy sources, electrical and thermal networks and storage technologies, using hydrogen as energy carrier. In order to achieve the target, innovative technologies will be developed, integrated on the island and managed by a novel energy management system that will include non-electrical resources such as biomass gasification, wastewater valorisation and industrial symbiosis.

From Oct 2020	Project total cost	EU contribution	Website
To Sept 2024	8.4 M€	€7M€	www.robinson-h2020.eu

Technologies and services deployed	
Technologies for consumers	✓example: Demand response, smart metering
Grid technologies	✓ EMS
Large-scale storage technologies	✓
Distributed storage technologies	✓PEM electrolyser, H2 storage
Generation technologies	✓CHP, Wind turbine
Market	✓ reduction infrastructure costs

Project partners' countries

Coordinator: ETN (Belgium)

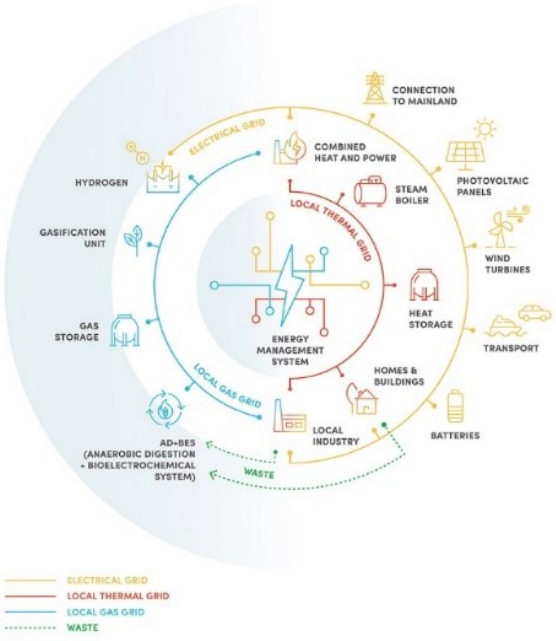
Other partners:

- 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 islands need clean, cost-efficient and reliable solutions tailored to fit their geographical situation, the fluctuating population and the local economy. Combining the intermittent RES with suitable storage, together with other available dispatchable sources such as biomass, along with a variety of operational strategies such as demand side management and management of all the available energy vectors, represents a huge challenge but also an immense business opportunity for the European Island.

Scope. ROBINSON aims to help decarbonise islands through developing an intelligent, flexible and modular Energy Management System (EMS), better integration of Renewable Energy Sources (RES), biomass and wastewater valorisation, industrial symbiosis, and the optimisation and validation of innovative technologies. The integrated ROBINSON energy system will ensure a reliable, cost-efficient and resilient energy supply contributing to the decarbonisation of the European islands by helping to decrease emissions. To support islands' decarbonisation, ROBINSON's EMS will integrate newly developed and/or adapted technologies, such as a small gas turbine based Combined Heat and Power unit (CHP); Anaerobic Digester assisted by BioElectrochemical Systems (AD+BES) to enable the conversion of liquid waste into biomethane; a mobile innovative wind turbine; a gasifier to covert bio-waste; and hydrogen-related technologies (electrolyser and storage system).



The system will be demonstrated on the island of Eigerøy (Norway) and lab-scale level replication studies will be conducted for the island of Crete (Greece) and the Western Isles (Scotland). The user-friendliness and high modularity of the system ensure a great potential for replication on other islands, as well as in remote areas in Europe and beyond. The project will also encourage business opportunities for local communities and open up markets for the developed technologies.

Impact.

Replicability: ROBINSON will demonstrate that a smart and integrated energy system can be crucial in reducing fossil fuel consumption drastically by overcoming intermittency issues usually related to renewables. Replicability will be facilitated by the high flexibility and modularity of ROBINSON.

Socio-economics: In general, the ROBINSON system is expected to be cost-competitive compared to other variable RES and electrochemical storage (i.e. batteries). The lower cost will be achieved by a combination of storage and buffer capacity for the different energy vectors, but mostly by making use of hydrogen as a storage medium.

Environment: ROBINSON will help achieve a faster decarbonisation, enabled by reduction of fossil fuel consumption, increased efficiency, better RES integration, and waste valorisation.

Market Transformation: The combination of local energy generation and longer-term storage in the form of hydrogen, bio-methane and heat developed in ROBINSON will stabilize the local grid. ROBINSON will also allow for self-sustainable operation in cases of no grid connection (smoothing of the grid congestion issues and reverse energy flows).

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VPP4ISLANDS

Virtual Power Plant for Interoperable and Smart isLANDS

VPP4Islands aims to facilitate the integration of renewable systems, accelerate the transition towards smart and green energy and help Islands to exploit energy efficiency potential and innovative storage approaches, foster the active participation of citizens and become self-sufficient in energy, while reducing costs, GHG emissions and reliance on heavy fuel oil to generate power, and creating new intelligent business, growth and local skilled jobs. To reach these goals, VPP4Islands project proposes disruptive solutions based on digital twin concept, Virtual energy storage systems (VESS) and Distributed Ledger technology (DLT) to revolutionize the existing VPP and build smart energy communities. Based on aggregation and smart management of distributed energy resources (DERs), VPP4Islands increases the flexibility and profitability of energy systems while providing novel services.

From Oct 2020	Project total cost	EU contribution	Website
To March 2024	7.2 M€	6.1 M€	www.vpp4islands.eu

Technologies and services deployed	
Technologies for consumers	✓Demand response ✓smart metering ✓Smart contract
Grid technologies	✓Virtual power plant ✓Digital Twin ✓ Forecasting tools
Large-scale storage technologies	
Distributed storage technologies	✓batteries ✓Virtual energy storage system ✓Hydrogen ✓Power to heat
Generation technologies	✓Wind Turbine ✓PV, ✓Fuel cell generator
Market	✓Electricity Market ✓ Ancillary Services ✓P2P marketplace

Project partners' countries

Coordinator: AMU (France)

Other partners:

- algoWatt (Italy)
- Blockchain 2050 BV (The Netherlands)
- Regenera Levante SL (Spain)
- Civiesco SRL (Italy)
- Ingenieria Y Diseno Estructural Avanzado SL (Spain)
- FTK Forschungsinstitut Fur Telekommunikation Und Kooperation EV (Germany)
- TROYA Genc Cevre Dernegi (Turkey)
- Consell Insular De Formentera (Spain)
- Bozcaada Belediye Baskanligi (Turkey)
- Schneider Electric Espana SA (Spain)
- Brunel University London (UK)
- Cardiff University (UK)
- Inavitas Enerji Anonim Sirketi (Turkey)
- RDIUP (France)
- Agencia Estatal Consejo Superior Deinvestigaciones Cientificas (Spain)
- Uludag Elektrik Dagitim Anonim Sirkketi (Turkey)
- Bornholms Varme AS (Denmark)
- Comune di Grado (Italy)

Project Description

Context. As a result of the geographic insularity, the energy systems in Islands are characterized by high investment, installation and exploitation costs, low profitability, limited connection to the energy market, overdependence on fossil fuels, high greenhouse gas emissions level and poor electrical grid quality. Those barriers limit the improvement of the local energy infrastructure and slow down the economic development of the Islands.

Scope. VPP4Islands aims to develop a new concept for energy production, distribution and monitoring dedicated for islands. The new concept will promote RES use and revolutionize the existing small grids and Energy Communities (ECs) in Islands. The proposed flexible VPP will not be considered as a conventional power plant constituted of small distributed energy sources but as a flexible green power plant that can store surplus energy and modify their behaviour and architecture to support unpredictable growth and change of energy demand, climate and market, delivering stability to the grid. VPP4Islands will enhance the innovation capacity and competitiveness of the VPP in Europe based on demand-centred approaches to address the uncertainties and the weakness of the existing VPP.

Technical description and implementation. VPP4Islands is mainly based on three concepts: Digital Twin, Distributed Ledger Technology (DLT) and Virtual Energy Storage System (VESS). The project aims to develop three tools: (1) VPP4I-Platform (2) VPP4I-Node (3) VPP4I-Box. The validation of the proposed solutions will be carried out in three Demo-sites: (1) FLEXIS in United Kingdom, (2) Gökçeada island in Turkey, and (3) Formentera island in Spain. FLEXIS demonstration area is a real-life pseudo island case study which will be exploited to assess and validate the economic benefits of the VESS. In Gökceada and Formentera islands, small RES and storage systems will be deployed in order to ensure the decarbonisation of the Island and increase the flexibility of the Grid. Both islands will become test zones for intelligent smart energy solutions, then new frame conditions for distributed energy resources can be tested too.

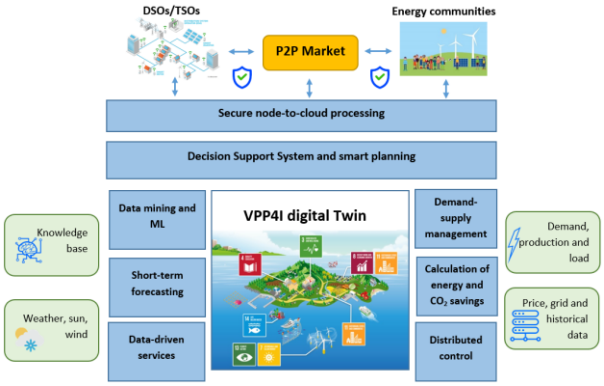
Impact. *Replicability:* During the project, the qualified VPP4Islands solutions will be replicated in 3 follower islands and a replication plan will be proposed.

Socio-economics: VPP4Islands will put citizens in the center of the energy systems and promote the building of sustainable energy communities. The VPP4I tools will increase the awareness of the energy transition and consumers will become more engaged and active. Grid upgrade and manipulation will contribute to create new jobs. Moreover, the dynamic incentive prices solution will help to increase the income and reduce the investment cost compared to conventional energy storage.

Environment: VPP4Islands will contribute to the energy savings thanks to load scheduling via Digital twin optimization, Time of Use, eco-collective action (VPP platform), consumer engagement behaviour through dynamic incentive prices (VESS) and Peak Shaving through the increasing of mix storage systems penetration and controllable loads. Also, VPP4Islands is devoted to 100% renewable energy systems integration and participates considerably in the reduction of CO2 emissions.

Market Transformation: The proposed open technologies (DLT/ Digital Twin/ KB) will unlock the constrained energy market and catalyse the economic potential of the region. The proposed advanced forecasting tool, based on machine learning, will predict transparency and KB precisely when the electricity produced can be traded on the spot markets.

Policy: The Collaborative Knowledge Management (CKM) platform will allow to share best practices and increase users' knowledge and experience for energy management and trading, to develop a vision for applying the VPP4ISLANDS technologies, addressing business and societal demands, and to provide recommendations to policy and decision makers. Moreover, VPP4Islands' exploitation & dissemination efforts collectively aim to support the development of a white paper and policy guidelines.



Architecture of the VPP4I Platform

LC-SC3-ES-5-2020 - TSO-DSO cooperation

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OneNet

One Network for Europe

The world envisioned by OneNet will provide a seamless near real time integration of all the actors in the electricity network across countries with a view to create the conditions for a synergistic operation that optimizes the overall energy management while creating an open and fair market structure. This synergistic process is enabled by open IT architectures that guarantee continental level interoperability.

From 10.2020 To 9.2023	Project total cost	EU contribution	Website
	28 M€	22 M€	https://onenet-project.eu/

Technologies and services deployed

- **Technologies for consumers**
  - ✓Demand Response
- **Grid technologies**
  - ✓Network management and control tools
  - ✓ Micro-grid
- **Large-scale storage technologies**
- **Distributed storage technologies**
- **Generation technologies**
- **Market**
  - ✓Electricity Market
  - ✓Ancillary Services

Project partners' countries

Coordinator: FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V. (Germany)

Other partners:

- EDP DISTRIBUICAO ENERGIA SA (Portugal)
- RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (Germany)
- UBITECH ENERGY (Belgium)
- VLAAMSE INSTELLING VOOR TECHNOLOGISCH ONDERZOEK N.V. (Belgium)
- ENGINEERING - INGEGNERIA INFORMATICA SPA (Italy)
- EUROPEAN DYNAMICS LUXEMBOURG SA (Luxembourg)
- ENERIM OY (Finland)
- ETHNIKO KAI KAPODISTRIAKO PANEPISTIMIO ATHINON (Greece)
- ELES DOO SISTEMSKI OPERATER PRENOSNEGA ELEKTROENERGETSKEGA OMREZJA (Slovenia)
- UNIVERSIDAD PONTIFICIA COMILLAS (Spain)
- EUROPEAN UNIVERSITY INSTITUTE (Italy)
- RTE RESEAU DE TRANSPORT D'ELECTRICITE (France)
- ENEDIS (France)
- REN - REDE ELECTRICA NACIONAL SA (Portugal)
- INESC TEC - INSTITUTO DE ENGENHARIADE SISTEMAS E COMPUTADORES, TECNOLOGIA E CIENCIA (Portugal)
- INSTITUTO PARA LA DIVERSIFICACION Y AHORRO DE LA ENERGIA (Spain)
- OMI-POLO ESPANOL SA (Spain)
- CENTRO DE INVESTIGACAO EM ENERGIA REN - STATE GRID SA (Portugal)
- CEPS AS (Czechia)
- ENERGA OPERATOR SA (Poland)
- POLSKIE SIECI ELEKTROENERGETYCZNE SPOLKA AKCYJNA (Poland)
- NARODOWE CENTRUM BADAN JADROWYCH (Poland)
- NKM ARAMHALOZATI KFT (Hungary)

- EUROPEAN DISTRIBUTION SYSTEM OPERATORS FOR SMART GRIDS (Belgium)
- EUROPEAN NETWORK OF TRANSMISSION SYSTEM OPERATORS FOR ELECTRICITY AISBL (Belgium)
- AKCIJU SABIEDRIBA AUGSTSPRIEGUMA TIKLS (Latvia)
- ELEKTRILEVI OU (Estonia)
- ELENIA VERKKO OYJ (Finland)
- ELERING AS (Estonia)
- AB ENERGIJOS SKIRSTYMO OPERATORIUS (Lithuania)
- FINGRID OYJ (Finland)
- LITGRID AB (Lithuania)
- NORD POOL AS (Norway)
- OPEN UTILITY LTD (United Kingdom)
- AKCIJU SABIEDRIBA SADALES TIKLS (Latvia)
- VATTENFALL AB (Sweden)
- CYBERNETICA AS (Estonia)
- DIACHEIRISTIS ELLINIKOU DIKTYOU DIANOMIS ELEKTRIKIS ENERGEIAS AE (Greece)
- INDEPENDENT POWER TRANSMISSION OPERATOR SA (Greece)
- MYTILINAIOS ANONIMI ETAIREIA (Greece)
- ENERGOINFO GROUP-SCINET DOO BEOGRAD-RAKOVICA (Serbia)
- UNIVERSITY OF CYPRUS (Cyprus)
- DIACHEIRISTIS SYSTIMATOS METAFORAS (Cyprus)
- ARCHI ILEKTRISMOU KYPROU (Cyprus)
- CINTECH SOLUTIONS LTD (Cyprus)
- I-DE REDES ELECTRICAS INTELIGENTESSA (Spain)
- UFD DISTRIBUCION ELECTRICIDAD SA (Spain)
- BUDAPESTI MUSZAKI ES GAZDASAGTUDOMANYI EGYETEM (Hungary)
- CEZ DISTRIBUCE AS (Czechia)
- CEZ ESCO AS (Czechia)
- ELEKTRO CELJE D.D. (Slovenia)
- EG.D AS (Czechia)
- E.ON Energie, a.s. (Czechia)
- ELEKTRO GORENJSKA PODJETJE ZA DISTRIBUCIJO ELEKTRICNE ENERGIJE DD (Slovenia)
- Elektroinstitut Milan Vidmar (Slovenia)
- ELEKTRO LJUBLJANA PODJETJE ZADISTRIBUCIJO ELEKTRICNE ENERGIJE D.D. (Slovenia)
- UNIVERZA V LJUBLJANI (Slovenia)
- GEN-I, TRGOVANJE IN PRODAJA ELEKTRICNE ENERGIJE, D.O.O. (Slovenia)
- MAVIR MAGYAR VILLAMOSENERGIA-IPARI ATVITELI RENDSZERIRANYITO ZARTKORUEN MUKODO RESZVENYTARSASAG (Hungary)
- MOBILITY ENERGY INNOVATIONS KFT (Hungary)
- SCHNEIDER ELECTRIC CZ SRO (Czechia)
- UNICORN SYSTEMS AS (Czechia)
- VYSOKE UCENI TECHNICKE V BRNE (Czechia)
- TRANSITION TECHNOLOGIES SA (Poland)
- E.ON DEL-DUNANTULI ARAMHALOZATI ZARTKORUEN MUKODO RESZVENYTARSASAG (Hungary)
- EPRI EUROPE DAC (Ireland)
- RESCOOP EU ASBL (Belgium)
- ENERGY EFFICIENCY IN INDUSTRIAL PROCESSES ASBL (Belgium)
- ENERCOUTIM - ASSOCIACAO EMPRESARIALDE ENERGIA SOLAR DE ALCOUTIM (Portugal)

Project Description

Context. A new generation of grid services is in the making to enhance the power system. Demand response, storage and distributed generation of energy are key for creating fair, transparent and open conditions for the consumer. However, realizing this vision requires the development of new products and services and the creation of a new IT architecture. The OneNet project is taking on this ambitious endeavour. It proposes innovative mechanisms of platform federation that are key technical enablers, made possible through a strong consortium that includes an impressive list of grid operators as well as key IT actors, leading research institutions and two of the most relevant grid operator associations.

Scope. The OneNet framework aims to create a fully replicable and scalable architecture that enables the whole European electrical system to operate as a single system in which a variety of markets allows the universal participation of stakeholders regardless of their physical location, at every level from small consumer to large producers.

OneNet will provide a framework of data management supporting flexibility markets and monitoring and optimization of the overall European electrical infrastructure, expressed as:

- A clear and open architecture that will enable any player to participate at innovative market structures,
- A smooth integration of the grid and market operation for TSO and DSO in the innovative market structure,
- New customer-centric business models to support next generation service-based markets

Technical description and implementation. OneNet will develop an open and flexible architecture to transform the actual European electricity system, which is often managed in a fragmented country- or area-level way, into a pan-European smarter and more efficient one, where market and network technical operations are reciprocally coordinated closer to real time i) among them, ii) across different countries iii) while maximizing the consumer capabilities to participate in an open market structure.

OneNet will follow a 7-Step process

1. Define new and standardized products and services starting from project experience
2. Identify appropriate market structures in support of the defined products and services
3. Design open IT architecture supported by scalable data management enabling market structures
4. Implement architecture in a reference version to be used as basis for a European deployment
5. Verify in a set of large field tests the concepts and solutions proposed by OneNet
6. Create European level consensus thanks to GRIFOn open forum with all the key stakeholders
7. Push the result of OneNet in the standardization process for a significant market uptake

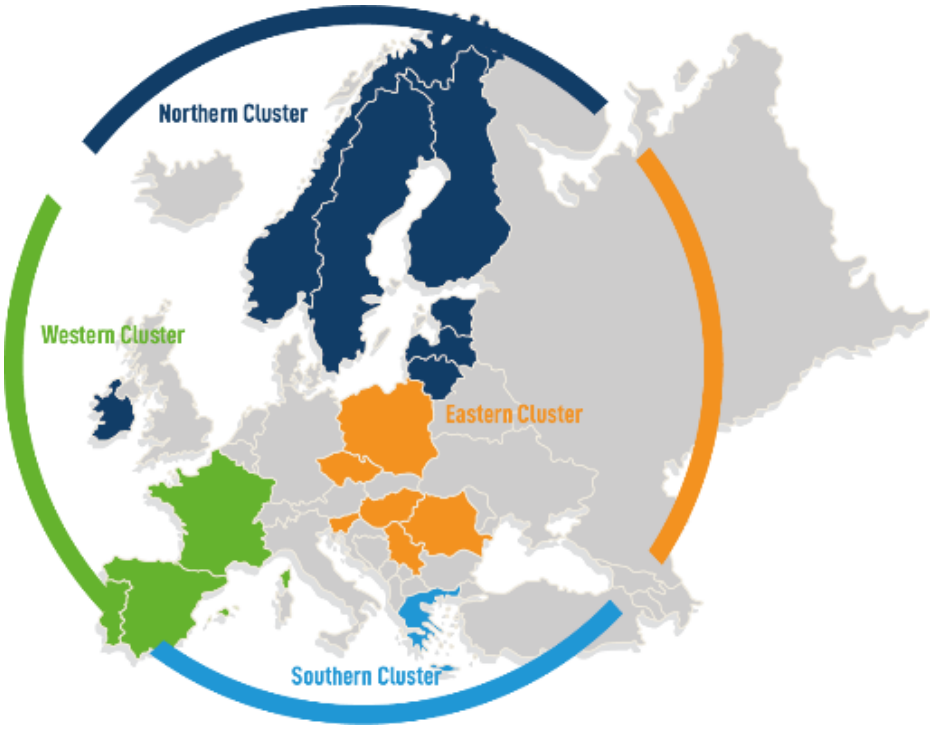
Impact. *Replicability:* OneNet will demonstrate its solution in four large multinational demonstration clusters, so far unreached in size and with an TRL of 8 and higher.

Socio-economics:
The OneNet vision will unlock a new service-oriented market, making the Energy system of Europe the most advanced and open in the world.

Environment: A harmonized pan-European energy market will foster innovation in the energy sector and enable the energy transition.

Market Transformation: Transforming the fragmented European energy markets into one interoperable European energy market – "One Network for Europe". This market will be characterized by standardized market products and energy services.

Policy: Policy and governance will become aware of the opportunities offered by the flexible market proposed by OneNet, which will reach an unseen level of Europe-wide consensus, thanks to GRIFOn.



4. Demonstration sites

The table below provides information about the demonstrations' sites that can be physically visited[5] and/or contacted for knowledge sharing:

Please contact the BRIDGE support team for more information: secretariat@h2020-bridge.eu

4.1 Demonstration sites location and contact

Project	Name of the Demonstration	Country	City	Local contact
LCE-02-2016 - Demonstration of smart grid, storage and system integration technologies with increasing share of renewables: distribution system				
inteGRIDy	Coordinated DR and DSM at academic campus and households with RES and CHP	Cyprus	Nicosia	Venizelos Efthymiou
inteGRIDy	Novel Demand Response & Virtual Energy Storage Schemes	France	St. Jean	Sylvain Berlioz
inteGRIDy	Optimum Distributed Control of RES-enabled Islanded Grids Local Storage	Greece	Xanthi	Symeon Parcharidis
inteGRIDy	Flexible DR at Residential and Tertiary building with Local Storage	Greece	Thessaloniki	Konstantinos Arvanitis
inteGRIDy	Combining Smarter Decentralized MV/LV Automation with Local Coordinated DER-DSO Operation for improving Grid Optimization	Italy	Teni	Massimo Cresta
inteGRIDy	Advanced DG Monitoring Power Flows Forecasting & Topology Optimization	Italy	San Severino Marche	Massimo Fiori
inteGRIDy	DR in Industrial Buildings with PV powered Microgrid & Energy Storage	Portugal	Lisboa	Carlos Varela Raposo
inteGRIDy	Intelligent Energy Demand and Supply Matching feat. innovative simulation & command-control for energy grids	Romania	Ploiesti	Otilia Bularca
inteGRIDy	Smart Grid Integration, self-consumption & enlarged RES penetration factor	Spain	Barcelona	Oscar Camara
inteGRIDy	Smart Grid feat. fast Charging EV Facilities, Demand Side Response & Energy Storage	United Kingdom	Isle of Wight	Jim Faucett
LCE-04-2017 - Demonstration of system integration with smart transmission grid and storage technologies with increasing share of renewables				
EU-SysFlex	Cross-border and cross-sector data management for flexibilities	Estonia	Tallinn	Kalle Kukk
EU-SysFlex	Coordination of flexibilities connected to LV and MV in Distribution Network (DN)	Finland	Helsinki	Suvi Takala
EU-SysFlex	Coordination of flexibilities of multi-resources for multiservices provision	France	Seine-et-Marne	Ye Wang
EU-SysFlex	Coordination of flexibilities connected to HV in distribution grids	Germany	Essen	Carmen Calpe
EU-SysFlex	Coordination of flexibilities connected to MV in DN	Italy	Emilia-Romagna	Simone Tegas
EU-SysFlex	Coordination of flexibilities connected to HV in Transmission Network	Portugal	Venda Nova	Miguel Marques
FLEXITRANSTORE	Increase resilience of the cross-border lines with sensors for de-icing solutions	Slovenia	Slovenia, Logatec, site about 20 km from Ljubljana	Ursula Krisper
LC-SC3-ES-3-2018-2020 - Integrated local energy systems (Energy islands)				
COMPILE	Luče	Slovenia	Luče	Petrol
COMPILE	Križevci	Croatia	Križevci	ZEZ
COMPILE	Crevillent	Spain	Crevillent	ETRA
COMPILE	Lisbon	Portugal	Lisbon	Coopernico
E-LAND	E-LAND Romania	Romania	Targoviste	Dorin Let

[5] This list was provided by the respective BRIDGE projects. Please contact the BRIDGE support team for any modification, removal, or addition.

Project	Name of the Demonstration	Country	City	Local contact
E-LAND	E-LAND Spain	Spain	Huesca	Marcos Rubio
E-LAND	E-LAND Norway	Norway	Fredrikstad	.Tore Lundestad
IElectrix	HELGA	Hungary	Aszófő – Zánka	Adam Toth
IElectrix	HELGA	Hungary	Dombóvár- Hőgyész	Adam Toth
IElectrix	Moew.e	Germany	Friedland Mecklenburg	Ralph Wagenitz
IElectrix	Shakti	India	Delhi	Sylvain Jouhanneau
MERLON	Spanish Pilot Site	Spain	Crevillent	Joaquín P. Mas Belso
MUSE GRIDS	Osimo pilot	Italy	Osimo	Gabriele Comodi
MUSE GRIDS	Oud-Heverlee pilot	Belgium	Oud-Heverlee	Leen Peeters
RENAISSANCE	Kimmeria Student Buildings	Greece	Xanthi	Pantelis Botsaris
RENAISSANCE	Brussels Health Campus	Belgium	Brussels	Thierry Coosemans
RENAISSANCE	Rural Ski Village Manzaneda	Spain	Manzaneda	Gustavo Samartín Vázquez
RENAISSANCE	Eemnes Municipality	The Netherlands	Eemnes	Maarja Meitern
LocalRES	LocalRES Pilot	Spain	Ispaster	Mr. Iñaki Gaztelu
LocalRES	LocalRES Pilot	Austria	Ollersdorf	Mr. Nicolas Pardo-García
LocalRES	LocalRES Pilot	Finland	Kökar	Mr. Niko Korpela
LocalRES	LocalRES Pilot	Italy	Berchida	Ms. Giulia Carbonari
SERENE	Laasby	DK	Laasby	Susanne Skaarup
SERENE	Hylke	DK	Hylke	Susanne Skaarup
SERENE	Aardehuizen	NL	Aardehuizen	Ferdi Hummelink
SERENE	Vriendenerf	NL	Vriendenerf	Ferdi Hummelink
SERENE	Przywidz	PL	Przywidz	Tomas Herbasz
LC-SC3-ES-4-2018-2020 - Decarbonising energy systems of geographical Islands				
REACT	Aran Islands	Ireland	Aran Islands	Federico Seri
REACT	San Pietro island	Italy	San Pietro island	Giulia Carbonari
REACT	La Graciosa island	Spain	La Graciosa island	Carlos Lopez Valdemoro
INSULAE	Unije	Croatia	Unije	Darko Jardas
INSULAE	Madeira	Portugal	Madeira	Diogo Vasconcelos
INSULAE	Bornholm	Denmark	Bornholm	Mattia Marinelli
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				
INTERRFACE	Congestion Management and Balancing, "DSO and consumers alliance"	Italy	Osimo	Gabriele Comodi
INTERRFACE	Congestion Management and Balancing, "Single Flexibility Platform"	Baltic-Nordic region – Finland, Estonia, Latvia	Tallinn	Dagmar Ilp
SU-DS04-2018-2020 - Cybersecurity in the Electrical Power and Energy System (EPES): an armour against cyber and privacy attacks and data breaches				
Energy Shield	Bulgarian Pilot	Bulgaria	Sofia	Nikolay Palov
Energy Shield	Italian Pilot	Italy	Turin	Federico Boni Castagnetti

Project	Name of the Demonstration	Country	City	Local contact
PHOENIX	LSP1 – Multi-utility/Multi-owner RES cyberthreats and data breach detection	Italy	Terni (Umbria) and Puglia regions	Mr.Tommaso Bragatto
PHOENIX	LSP2 – National-wide cooperative remotely controlled HPP	Greece	Arta and Agrinio	
PHOENIX	LSP3 – Collaborative Microgrid-enabled cyber risks mitigation	Slovenia	Ljubljana	Mrs Ursula Krisper
PHOENIX	LSP4 – Collaborative /DSO flexibility vs cybersecurity and privacy	Italy	Terni	Mr Federico Carere
PHOENIX	LSP5 – National vs Pan-European cooperative cyber threat information sharing	Romania	Campina Romania	Mr Paul Lacatus
SDN-MicroSENSE	Investigation of Versatile Cyberattack Scenarios and Methodologies Against EPES	Norway	Trondheim	Vasileios Gkioulos
SDN-MicroSENSE	Massive False Data Injection Cyberattack Against State Operation and Automatic Generation Control	Bulgaria	Sofia	Maria Atanasova
SDN-MicroSENSE	Large-scale Islanding Scenario Using Real-life Infrastructure	Greece		Christos Dalamagkas
SDN-MicroSENSE	EPES Cyber-defence against Coordinated Attacks	Spain		Ramon Gallart Fernandez
SDN-MicroSENSE	Distribution Grid Restoration in Real-world PM Microgrids	Greece		Nikolaos Siaxampanis
SDN-MicroSENSE	Realising Private and Efficient Energy Trading among PV Prosumers	Sweden		Thomman Nellimoottil
LC-SC3-ES-1-2019 - Flexibility and retail market options for the distribution grid				
ebalance-plus	University of Málaga Smart Campus	Spain	Málaga	Manuel Díaz
ebalance-plus	University of Calabria Smart Grid	Italy	Calabria	Anna Pinnarelli
ebalance-plus	University of Calabria Smart Grid	Italy	Calabria	Anna Pinnarelli
ebalance-plus	Denmark summer houses provided by NOVASOL	Denmark	Various	Razgar Ebrahimy
ebalance-plus	Yncrea - Institute Catholic of Lille	France	Lille	Christophe Saudemont
EUniversal	DEMO 1 PORTUGAL	Portugal	several localtions accross Portugal	Mário Teixeira Couto
EUniversal	DEMO 2 GERMANY	Germany	Limbach-Oberfrohna	Carmen Calpe
EUniversal	DEMO 3 POLAND	Poland	Northern part of Poland	Noske Slawomir
FEVER	FEVER-DE	Germany	Hassfurt	Christopher Schneider
FEVER	FEVER-DE	Germany	Wunsiedel	Gerhard Meindl
FEVER	FEVER-ES	Spain	Catalunia Region	Luisa Candido
FEVER	FEVER-CY	Cyprus	Nicosia	Christina Papadimitriou
FLEXIGRID (864048)	Demo 1 Bulgaria	Bulgaria	*TBD*[6]	Boyan Karshakov
FLEXIGRID (864048)	Demo 2 Sweden	Sweden	Gothenburg	Per Löveryd, David Steen
FLEXIGRID (864048)	Demo 4 Turkey	Turkey	*TBD*	Ural Halaçoğlu
FLEXIGRID (864579)	Demo 1 Spain	Spain	Santander	Antonio González
FLEXIGRID (864579)	Demo 2 Greece	Greece	Thasos	Panos Papadopoulos
FLEXIGRID (864579)	Demo 3 Croatia	Croatia	Zagreb	Josko Graso
FLEXIGRID (864579)	Demo 4 Italy	Italy	Bolzano	Marco Baldini
PARITY	PARITY Lachar & Escuzar pilot	Spain	Granada	Jorge Rueda and Mr. Rafael Bahamonde
PARITY	PARITY BFS Facilities pilot	Greece	Athens	Fotis Manesis

[6] TBD : To be defined

Project	Name of the Demonstration	Country	City	Local contact
PARITY	PARITY Malmo Facilities pilot	Sweden	Malmo	Simon Stukelj and Samuel Wingstedt
PARITY	PARITY Lugaggia Innovation Community pilot	Switzerland	north-east suburbs of Lugaggia region (Lugano)	Paolo Rossi
Platone	German Demo	Germany	not decided yet	Benjamin Petters
Platone	Italian Demo	Italy	Rome	Ercole De Luca
Platone	Greek Demo (Mesogia)	Greece	Mesogia	Stavroula Tzioka
X-FLEX	Albena AD	Bulgaria	Albena	Stanev Dimitar
X-FLEX	Xanthi	Greece	Xanthi	HEDNO S.A.
LC-SC3-ES-2-2019 - Solutions for increased regional cross-border cooperation in the transmission grid				
TRINITY	Management and coordination of regional structures pilot scenario	Bosnia and Herzegovina, Montenegro, Serbia, North Macedonia and Bulgaria	*TBD*	Dusan Presic
TRINITY	RES pilot scenario	Serbia, Greece, Montenegro, Bosnia and Herzegovina, Croatia, North Macedonia, Bulgaria and Hungary.	*TBD*	Stjepan Sucic
FARCROSS	Unlocking Cross-Border Capacity with Modular Power Flow Control Solutions (MPFC DEMO)	Greece, Bulgaria	*TBD*	Mark Norton
FARCROSS	Implementation of a Wide-Area Protection, Automation and Control system (WAMPAC) applied to Cross-Border Transmission Systems (WAMS DEMO)	Greece, Bulgaria	*TBD*	Eduardo Martinez Carrasco
DT-ICT-10-2018-19 - Interoperable and smart homes and grids				
InterConnect	French pilot	France	Toulon	Stéphane Vera
InterConnect	Portuguese pilot	Portugal	*TBD*	José Manuel Terras
InterConnect	Local Energy Communities	Belgium	Distributed over Flanders	Leen Peeters
InterConnect	Dutch Pilot	Netherlands	Eindhoven	Wouter Beelen
InterConnect	Italian pilot	Italy	Milan	Stefano Fava
DT-ICT-11-2019 - Big data solutions for energy				
BD4OPEM	Estabanell & Pahisa s.a	Spain	Granollers	Ramon Gallart Fernandez
BD4OPEM	Elektro Celje	Slovenia	Celje	Anton Kos
BD4OPEM	Osmangazi Electric Distribution Inc.	Turkey	*TBD*	Ural Halaçoğlu
BD4OPEM	Vrije Universiteit Brussel	Belgium	Brussels	Maarten Messagie
BD4OPEM	Nuvve	Denmark	Bornholm	Mogens Løkke
LC-SC3-EC-3-2020: Consumer engagement and demand response				
ACCEPT	Aspra Spitia Community - Viotia	Greece	Aspra Spitia	Vavouris Alexander
ACCEPT	Renewable Energy Cooperative Buildings - Murcia	Spain	Murcia	Antonio Soler
ACCEPT	Eva Lanxmeer Community - Culemborg	Netherlands	Culemborg	Gerlach Velthoven
ACCEPT	Motta Massagno District - Lugano	Switzerland	Massagno	Paolo Rossi
BRIGHT	Pilot Site 1	Belgium	Ghent	Chaim De Mulder

Project	Name of the Demonstration	Country	City	Local contact
BRIGHT	Pilot Site 2	Slovenia	-	Gregor Novak
BRIGHT	Pilot Site 3	Italy	Terni	Francesca Santori
BRIGHT	Pilot Site 4	Greece	Thessaloniki, Chalkidiki, Volos	Kostantinos Arvanitis
HESTIA	Berchidda Municipality	Italy	Berchidda	Ms.Marta Arniani
HESTIA	Camille Claudel Eco-District	France	City of Palaiseau	Mr. Mathieu Schumann
HESTIA	Voorhout Village	Netherlands	Voorhout	Mr. Adriaan Harthoorn
iFLEX	iFLEX Finnish Pilot Cluster	Finland	Kerava and Oulu	Mr. Olli Nummelin
iFLEX	iFLEX Slovenian Pilot Cluster	Slovenia	Kozjansko and Savinjska dolina	Mr. Gašper Ravnak
iFLEX	iFLEX Greek Pilot Cluster	Greece	Athens, Thessaloniki and Volos	Ms. Maria Sakali
REDREAM	Spanish Demo	Spain	Valladolid	Mr. RODRIGO JOSE RUIZ GARCIA
REDREAM	Italian Demo	Italy	Gallese	Mr. ANDREA FERRANTE
REDREAM	UK Demo	UK	Mendip Area	Mrs. ALISON TURNBULL
REDREAM	Croatian Demo	Croatia	Varaždin	Mrs. LUCIJA NAD
SENDER	ALGINET	SPAIN	ALGINET	Mrs. Alma Solar
SENDER	WEIZ	AUSTRIA	WEIZ	Mrs. Andrea Dornhofer
SENDER	VTT	FINLAND	ESPOO	Mr. Kari Mäki
TwinERGY	Pilot Demonstration in Germany	Germany	Hagedorn Village, Steinheim, North Rhine-Westphalia	Johannes Üpping
TwinERGY	Pilot Demonstration in Greece	Greece	Athens	Spyros Liarmakopoulos
TwinERGY	Pilot Demonstration in Italy	Italy	Benetutti	Rosolino Sini
TwinERGY	Pilot Demonstration in United Kingdom	UK	Bristol City	Freyia Lockwood
LC-SC3-ES-3-2018-2020: Integrated local energy systems (Energy islands)				
RENergetic	Pilot site 1: Ghent – New Docks	Belgium	Ghent	Lieven DEMOLDER
RENergetic	Pilot site 2: Poznan – Warta Campus	Poland	Poznan	Radoslaw Gorzenski
RENergetic	Pilot site 3: Segrate – Hospital and research campus	Italy	Milan	Daniele Baranzini
LC-SC3-ES-6-2019 - Research on advanced tools and technological development				
FLEXGRID	AIT Pilot	Austria	Vienna	Dr. Filip Pröstl Andrén
FLEXGRID	BNNETZE Pilot	Germany	Freiburg	Dr. Malte Thoma
FLEXGRID	UCY Pilot	Cyprus	Nicosia	Prof. George Georghiou
LC-SC3-ES-10-2020 - DC – AC/DC hybrid grid for a modular, resilient and high-RES share grid development				
HYPERRIDE	HYPERRIDE DEMO 1	Switzerland	Lausanne	Mr. Drazen Dujic
HYPERRIDE	HYPERRIDE DEMO 2	Germany	Aachen	Mr. Shenghui Cui
HYPERRIDE	HYPERRIDE DEMO 3	Italy	Terni	Mr. Massimo Cresta
TIGON	CEA INES platform	France	Le Bourget-du-Lac	Anthony BIER
TIGON				Olivier WISS
TIGON	CIEMAT Centre for the Development of Renewable Energy Sources	Spain	Madrid	Oscar Izquierdo Monge
LC-SC3-ES-4-2018-2020: Decarbonising energy systems of geographical Islands				
IANOS	IANOS - Terceira	Portugal	Terceira	Nuno Marinho
IANOS	IANOS - Ameland	Netherlands	Ameland	Johan Boekema

Project	Name of the Demonstration	Country	City	Local contact
MAESHA	MAESHA pilot	France	Mamoudzou	Camelia Bouf
ROBINSON	ROBINSON Pilot	Norway	Eigeroy	Steinar Aamodt
VPP4ISLANDS	Demo site 1	UK	Neath Port Talbot	Mr Qadrdan MEYSAM
VPP4ISLANDS	Demo site 2	Turkey	GOKCEADA Island	Mr.Mehmet KOÇ

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