



bridge

HORIZON 2020

**Cooperation between Horizon 2020 Projects in the field
of Smart Grids and Energy Storage**

**Recommendations on Selected
Regulatory Issues from experience and
knowledge**

Regulations Working Group

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Disclaimer: While aiming to consider the new provisions stemming from the Clean Energy Package (CEP), the report may not entirely reflect the new rules. Proposals for follow-up are without prejudice to main short-term priorities decided during the General Assembly of BRIDGE held in March 2019.

Authors of the present report

STORAGE OWNERSHIP AND PROCUREMENT OF STORAGE SERVICES

Coordinator

Name	Organisation	E-mail	Project
Gijs Kreeft	University of Groningen	g.j.kreeft@rug.nl	STORE&GO

Other contributors

Name	Organisation	E-mail	Project
Jonathan Radcliffe	Birmingham University	J.Radcliffe@bham.ac.uk	CRYOHUB
Tracey Crosbie	Teesside University	T.Crosbie@tees.ac.uk	INTEGRIDY
Grietus Mulder	VITO	grietus.mulder@vito.be	NAIADES
Alfonso Damiano	Cagliari University	alfio@diee.unica.it	NETFFICIENT
Evangelos Karf	NTUA	ekarf@power.ece.ntua.gr	NOBEL GRID
Romain Mauger	University of Groningen	r.j.g.mauger@rug.nl	SMILE
Andreas Tuerk	JOANNEUM RESEARCH	andreas.tuerk@joanneum.at	STORY
Egon Troch	Think-e	egon@think-e.be	STORY
Takis Ktenidis	TEIP	takisktnds@gmail.com	TILOS

STORAGE VALORISATION

Coordinators

Name	Organisation	E-mail	Project
Andreas Sumper	Universitat Politècnica de Catalunya	sumper@citcea.upc.edu	INVADE
Andreas Tuerk	Joanneum Research	andreas.tuerk@joanneum.at	STORY

Other contributors

Name	Organisation	E-mail	Project
Jonathan Radcliffe	Birmingham University	J.Radcliffe@bham.ac.uk	CRYOHUB
Odile Garcon	Renault	odile.garcon@renault.com	ELSA
Tracey Crosbie	Teesside University	T.Crosbie@tees.ac.uk	INTEGRIDY
Grietus Mulder	VITO	grietus.mulder@vito.be	NAIADES
Evangelos Karf	NTUA	ekarf@power.ece.ntua.gr	NOBEL GRID
Romain Mauger	University of Groningen	r.j.g.mauger@rug.nl	SMILE
Gijs Kreeft	University of Groningen	g.j.kreeft@rug.nl	STORE&GO
Egon Troch	Think-e	egon@think-e.be	STORY
Takis Ktenidis	TEIP	takisktnds@gmail.com	TILOS
Aris Dimeas	NTUA	adimeas@power.ece.ntua.gr	WISEGRID

SAFETY AND ENVIRONMENT

Coordinators

Name	Organisation	E-mail	Project
Andreas Sumper	Universitat Politècnica de Catalunya	sumper@citcea.upc.edu	INVADE
Andreas Tuerk	Joanneum Research	andreas.tuerk@joanneum.at	STORY

Other contributors

Name	Organisation	E-mail	Project
Jonathan Radcliffe	Birmingham University	J.Radcliffe@bham.ac.uk	CRYOHUB
Pol Olivella-Rosell	CITCEA-UPC	pol.olivella@citcea.upc.edu	INVADE
Grietus Mulder	VITO	grietus.mulder@vito.be	NAIADES
Gijs Kreeft	University of Groningen	g.j.kreeft@rug.nl	STORE&GO
Leen Peters	Think-e	leen@think-e.be	STORY
Egon Troch	Think-e	egon@think-e.be	STORY
Takis Ktenidis	TEIP	takisktns@gmail.com	TILOS

NEW MARKET DESIGN OPTIONS, LEADING TO NEW SERVICES, BUSINESS MODELS AND ROLES FOR SYSTEM OPERATORS, REQUIRING INCREASED COORDINATION BETWEEN SYSTEM OPERATORS

Coordinators

Name	Organisation	E-mail	Project
Zoran Marinsek	INEA	Zoran.Marinsek@inea.si	GOFLEX
Gregory Jarry	ACCENTURE	g.jarry@accenture.com	INTERFLEX
Helena Gerard	VITO	helena.gerard@vito.be	SMARTNET

Other contributors

Name	Organisation	E-mail	Project
Manuel Serrano	Grupo ETRA	mserrano.etraid@grupoetra.com	CROSSBOW
Ricardo Prata	EDP Distribuição	ricardo.prata@edp.pt	INTEGRID
Tracey Crosbie	Teesside University	T.Crosbie@tees.ac.uk	INTEGRIDY
Thorsten Gross	Avacon	Thorsten.Gross@avacon.de	INTERFLEX
Íngrid Munné-Collado	CITCEA-UPC	ingrid.munne@citcea.upc.edu	INVADE
Pol Olivella-Rosell	CITCEA-UPC	pol.olivella@citcea.upc.edu	INVADE
Hannes Munzel	TenneT	hannes.munzel@tennet.eu	MIGRATE
Torsten Rendel	TenneT	torsten.rendel@tennet.eu	MIGRATE
Alfonso Damiano	Università di Cagliari	alfio@diee.unica.it	NETFFICIENT
Mihai Paun	Romanian Energy Center	mihai.paun@crenerg.org	RESERVE
Catalin Chimirel	Romanian Energy Center	Catalin.Chimirel@crenerg.org	RESERVE
Ricardo André	EDP	Ricardo.Andre@edp.pt	SENSIBLE
Aris Dimeas	NTUA	adimeas@power.ece.ntua.gr	WISEGRID/ CoordiNet

SPECIFIC REGULATORY ASPECTS FOR ISLAND CASES

Coordinator

Name	Organisation	E-mail	Project
Tracey Crosbie	Teesside University	T.Crosbie@tees.ac.uk	INTEGRIDY
Romain Mauger	University of Groningen	r.j.g.mauger@rug.nl	SMILE

Other contributors

Name	Organisation	E-mail	Project
Takis Ktenidis	TEIP	takisktns@gmail.com	TILOS
Christina Papadimitriou	NTUA	chpapadi@mail.ntua.gr	WISEGRID

ADDITIONAL TOPICS OF INTERESTS FOR THE PROJECTS AND SYNERGIES FORESEEN

Coordinator

Name	Organisation	E-mail	Project
Takis Ktenidis	TEIP	takisktns@gmail.com	TILOS

Other contributors

Name	Organisation	E-mail	Project
Helena Gerard	VITO	helena.gerard@vito.be	SMARTNET
Mihai Paun	Romanian Energy Center	mihai.paun@crenerg.org	RESERVE
Aris Dimeas	NTUA	adimeas@power.ece.ntua.gr	WISEGRID
Aleksandra Krkoleva	FEEIT	aleksandra.krkoleva@gmail.com	CROSSBOW
Jonathan Radcliffe	Birmingham University	J.Radcliffe@bham.ac.uk	CRYOHUB
Fernando Garcia Martinez	FUTURED	fgarciama@ufd.es	-

Leading team of the BRIDGE Working Group on Regulations

Chairman of the Working Group

Name	Organisation	E-mail	Project
Takis Ktenidis	TEIP	takisktnds@gmail.com	TILOS

Rapporteurs

Name	Organisation	E-mail	Project
Aris Dimeas	NTUA	adimeas@power.ece.ntua.gr	WISEGRID
Mihai Paun	Romanian Energy Center	mihai.paun@crenerg.org	RESERVE

Guidance from European Commission

Name	Organisation	E-mail
Aleksandra Kronberga	DG ENER	Aleksandra.KRONBERGA@ec.europa.eu

Editor

Name	Organisation	E-mail	Project
Coralie Badajoz	DOWEL MANAGEMENT	coralie.badajoz@dowel.eu	INTENSYS4EU



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Introduction to the BRIDGE initiative

Purpose of the initiative

BRIDGE is a cooperation group involving Low Carbon Energy (LCE) Smart-Grid and Energy Storage projects funded under the Horizon 2020 program over the last five years (2014-2018). It aims to foster 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 to gather coordinated, balanced and coherent recommendations to strengthen the messages and maximize their impacts towards policy makers in view of removing barriers to innovation deployment.

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

Regulations

- As regards to **energy storage**, the regulatory framework needs to provide clear rules and responsibilities concerning ownership, competition, technical modalities and financial conditions, for island and mainland cases
- In terms of **smart grids**, regulatory challenges arise regarding the incentives for demand-side response, commercial arrangements, smart meter data, etc.

Customer Engagement

- Customer Segmentation, analysis of **cultural, geographical** and **social** dimensions,
- **Value** systems - Understanding Customers
- **Drivers** for Customer **Engagement**
- Effectiveness of Engagement Activities
- Identification of what triggers **behavioral 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
- The development of a **simulation tool** allowing for the comparison of the **profitability of different business models** applicable to smart grids and energy storage solutions is being developed and tested by the Working Group members

Projects involved in the Regulations Working Group



Presentation of the report

The WG on Regulations, is addressing cross-cutting regulatory issues about smart grids and energy storage during the deployment of H2020 RD&I projects. The WG on Regulations has delivered a range of regulatory analyses and recommendations to the European Commission, including some feedback on the Clean Energy Package (CEP) proposals.

CEP Added value of the Regulations Working Group

Contribution of more accurate Energy storage definition

Energy communities included in the energy market design

In 2018, the WG on Regulations revised the issue-oriented approach in order to deliver targeted recommendations addressing specific regulatory issues. The present report presents five issue “blocks”, which are illustrative of the Working Group’s activities so far. For each of the five key issues discussed in this report, recommendations have been formulated by ad-hoc subgroups of the WG on Regulations, coordinated by one or several members of the WG.

Between mid-2018 and May 2019, the WG on regulation has developed and identified additional axes of work so as to identify topics of interest for the projects.

Main Findings and recommendations

Storage ownership and procurement of storage services

Energy storage is not explicitly addressed under the unbundling rules of the current European legal framework (Third Energy Package from 2009). As a result, Member States' approaches to the unbundling of energy storage differ.

A first issue is, therefore, to define a clear ownership regime for storage which provides sufficient legal certainty and, where necessary, flexibility. This was one of key issues addressed by the Clean energy package proposed by the Commission.

Article 36 (ownership by DSO) and Article 54 (ownership by TSO) of the provisionally agreed¹ recast of the Electricity market directive provide for sufficient clarity: exemption from unbundling principle is possible in case of fully integrated network components or where tendering procedure did not deliver the necessary result and storage facilities are not used to buy or sell electricity in the electricity markets. Best practices to ensure fair tendering procedures is something worth discussing by the Regulatory WG.

A second important issue is that network operators should be sufficiently incentivised to buy storage services from third parties, for example to solve congestion. Given the benefits of storage for grid operation, especially in an environment with high shares of intermittent RES, the new legal framework will specify that network operators should be incentivised to procure services required for optimum operation of electricity systems, including storage services. Member States are therefore called upon to ensure ambitious implementation of the provisionally agreed rules in the recast of the Electricity Market Directive. Regulatory working group is looking for positive examples in this respect.

Storage valorisation

For the moment, there exist some regulatory limitations blocking the potential of storage to provide new flexibility services:

Self-consumption: The aim of storage for self-consumption is to maximize the usage of self-produced energy. That means to store energy production during periods of low electricity consumption at building level. Some detected barriers are economic fees in case of installing photovoltaic systems with batteries in some countries. Such obstacles will have to be removed in view of the recast of the Renewable Energy Directive adopted in 2018. Some countries have already adopted needed legislative changes: e.g. sun tax in Spain has been recently removed, thus recognising citizens' right to self-consume power with no extra charge on power that does not go through the grid. Other countries are invited to follow quickly, before the legal deadline requires so.

Technical and regulatory provisions are lacking when it comes to prosumers creating electric islands during black-outs.

Multi-building storage sharing: It applies when using the main grid or not. Multi-building storage sharing will be an important first step towards wider behind-the-meter models that will emerge in the next years. In a few European countries storage sharing behind the meter is already allowed based on recent legal changes such as in Switzerland and Germany that even allows linking neighboring buildings. In Austria a policy process leading to a new legislation allowing direct cables to neighboring buildings has been started. Other EU countries such as Slovenia or Luxembourg have started

¹ Trilogue of 18-19 December 2018



consultation/policy processes on multi-building storage. These emerging models are being closely followed and insights shared within the working group.

This is in line with philosophy underlying the CEP provisions on renewable energy/citizens' energy communities even if these provisions do not go in such detail.

Balancing and ancillary services: Energy storage can support electricity networks by ensuring security and quality of supply through provision of balancing and ancillary services. However, access to ancillary service markets is variable across European countries. In some markets, e.g. Italy, providing frequency response is mandatory for generators, and so not separately valued. A more common approach across the EU proposed under the Clean Energy Package will open up the market opportunity for energy storage technologies (along other flexibility means) and increase the deployment potential. BRIDGE community should look for possibilities to promote good practices during the transition period, before the new rules become binding.

RES and storage complementary: BRIDGE community recommends that Member States, in collaboration with the Commission² where appropriate, clarify to what extent facilities that benefit(ed) from RES incentive schemes can be combined with storage and on which conditions.

Safety and environment

Safety regulations are defined as regulations that deal with the safety of humans, either personnel involved in the installation, maintenance, operation etc. of the storage installation or the public (e.g. people living in the neighbourhood) as well as environmental safety.

Most projects are using existing, mature storage technologies. Thus, regulation is 'aware' of these technologies and hence integration of these storage systems is not blocked by safety regulations.

Still, a safety guideline could be developed and should relate to well-known systems (e.g. compare a battery system to a transformer) to facilitate practical implementation and trust. This guideline should contain practical information, e.g. how to fight a fire.

With regards to less mature technologies as Power-to-gas, Compressed Air Energy Storage (CAES) and Second-life EV batteries, regulatory adaptations would be welcome in order to facilitate the deployment of such promising storage technologies. Under current EU environmental legislation, a power-to-gas plant is treated as "chemical industry" instead of "energy industry" which leads to overly burdensome authorization procedures. A pragmatic approach to solve this issue is to be explored.

For new energy storage products such as CAES, it may be prudent to subject the completed storage assembly to a process of type approval. This allows an approved third part certification body to demonstrate fitness for purpose at the extremes of the operational envelope and thereby foster confidence from owners, investors, underwriters and regulatory health and safety bodies.

Second-life batteries: when taken out of the car, lithium-ion batteries are currently classified as "dangerous waste", making transport and logistics complex and costly. Furthermore, the battery producer remains officially responsible for the battery although it can not necessarily track where and how it is used in a second-life application. There should be an option to shift the responsibility from the initial producer to the professional "second-life operator". Standardization must focus on ways and methods to evaluate the ageing of batteries, which is relevant both in the context of 1st and 2nd life batteries.

² DG Competition



Other issues, like the issues arising in the context of use of single-phase batteries in a 3-phase set need to be also addressed in the context of safety. STORY project has also investigated safety issues related to Li-ion batteries in residential buildings, and THINK-E (STORY member company) has set up a Flemish funded project due to the learnings from STORY, to enable several parties to present guidelines on battery safety and correct set-ups.

New market design options, leading to new services, business models and roles for system operators

Changes in the energy landscape (i.e. increase of RES at the distribution grid, bi-directional flows, increased variability, increased participation of smaller companies and end consumers to the energy market, electric vehicles...) have created a new market context. In particular, the participation of resources, connected to the distribution grid, is driving innovations in the energy system. Future market design and regulatory framework should:

- take into account local grid constraints and energy transfer costs (losses),
- allow resources connected to the distribution grid to participate to the market, directly or via an aggregator, as foreseen by the CEP,
- make sure that the possibility of exemption from unbundling rule (cf. DSO with < 100.000 customers) is used carefully to avoid possible abuse of power in case of conflict of interests in emerging local market,
- support the development of local concepts such as microgrids, local/citizens' energy communities and renewable energy communities,
- facilitate acquisition of the flexibility coming from active grid users. In this context the roll-out of smart meters and dynamic pricing for electricity and grid infrastructure are important preconditions for augmenting the amount of flexibility from this source.

All of this is either possible or even mandated under the CEP.

Within this new market context, new services are developed and offered to or by system operators. In order to guarantee an efficient provision of new services, roles of system operators should be enlarged. In particular, the evolving role of the DSO is relevant for the emergence of certain services and related business models:

- The DSO could support the TSO during the *prequalification* process,
- The DSO could also support the TSO in the organization of an overarching flexibility market.
- DSO may provide new services to other market players (e.g. aggregators, microgrids or local energy communities) - operation and maintenance of the grid, back-up power, administrative support, etc. as long as in line with new market design rules.
- The DSO could provide *metering data to third parties* (e.g. aggregators) subject to agreement of consumers,
- The *improved observability of the distribution grid* will also lead to new services for market players.
- DSO should be allowed to contract flexibility via market-based mechanisms. Network remuneration fees should treat the procurement of energy flexibility at the same level as alternative solutions such as network reinforcements. It is proposed that the remuneration should be based on the avoided costs (e.g. the cost of avoided network reinforcements).

In addition, coordination and cooperation between system operators should be increased in the context of network planning and network operation to make use of new services in an efficient way:

- Network remuneration fees for system operation should be designed to foster a coordinated procurement of ancillary services which would be based on the principle of system-wide cost optimization,
- TSOs and DSOs should implement functionalities and provide information on the state of the grid to remove inefficiencies in network operation. The sharing of relevant data with each other

and with other market players should be done according to a transparent framework and should be supported by infrastructure and standards. This implies also a revision of privacy and cybersecurity aspects, back-up systems for communication and new procedures for remote monitoring and control.

This coordination and cooperation should be further strengthened also in the context of emergency situations and restoration.

New market design (in particular, TSO/DSO Collaboration and development of new system services for network operators in a world with high RES) is a topic where further work is particularly important. This stems from conclusions of the BRIDGE General Assembly held during 12-13 March 2019.

Specific regulatory aspects for island cases

An energy island is an area in which the local community benefits environmentally, socially and economically from the operation of largely autonomous smart energy and transport systems. An energy island's energy system tends to include local renewable energy generation, smart distribution network assets and energy storage.

From a regulatory point of view, the interpretation of the 5% criterion³ is now more central as it determines whether an energy island qualifies as a 'small connected system' (SCS) or as a "small isolated systems" (SIS). Such classification can lead to exemptions from a number of liberalised market rules.

Therefore, it is recommended to agree on best practices of its calculation (over a 5-year period for example) and by covering the notion of peak demand.

Additional topics of interests for the projects and synergies foreseen

On top of the recommendations defined regarding specific topics, additional topics of interest have been recently proposed. These topics are e.g. related to:

- Network Codes;
- Citizens/Renewable Energy Communities to foster synergy with the Island topic (LEC.EU site is under development);
- Collaboration with the ETIP SNET on regulatory sandboxes;
- Digitalization of the energy sector;
- EVs smart charging.

As mentioned above, new market design (in particular, TSO/DSO Collaboration and development of new system services for network operators in a world with high RES) is an existing topic requiring particular effort from the Regulatory WG.

Simultaneously, already started reflection on safety and certification of BESS is worth continuing in one or another fora.

Some more possible questions for discussion have been suggested by the Commission:

- How to define in practice the border-lines of non-discriminatory grid charges for storage? What would BRIDGE propose based on project experiences? (N.B the rules provisionally agreed prohibit both negative and positive discrimination).

³ 5% threshold related to the annual consumption through interconnection



- Any positive examples with dynamic grid charges in some of BRIDGE demos and relevant regulatory national approach?
- What alternatives can there be to so called de-rating of batteries?
- Recently also the topic of revenue stacking becomes important. In the new Electricity Market Directive soon to be adopted nothing prevents revenue stacking. E.g. storage and EV owners can participate in all markets. But how this could be managed in practice? How risks can be assessed and reflected in proportionate and fair penalties for non-delivery rather than exclusivity clauses?

The above subjects worth exploration are without prejudice to the short-term work priorities decided during the General Assembly of BRIDGE in March 2019.

Synergies with other WGs will be sought on:

- Storage: addressed also in the Business Models Working Group;
- New market design: addressed in the Business Models and Customer Engagement Working Groups;
- Data Handling / Digitalisation: addressed in the Data Management, Customer Engagement and business Models Working Groups;
- Citizens/ Renewable Energy Communities: addressed in the Business Models Working Groups; participation in the new Task force, which was decided during the March 2019 General Assembly of BRIDGE, to be considered.
- Demand Response: addressed in the Business Models, Customer engagement and Data Management Working Groups.

Once, again short-term work priorities decided during the General Assembly of BRIDGE in March 2019 take priority.

Finally, two WG Projects RESERVE and SOGNO discussed with stakeholders the scenario of gradually increasing the penetration of renewables into the power system up to 100%, as well as a series of technical and regulatory challenges that may follow in the future. This was followed by a joint policy brief by two projects.



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