

bridge

HORIZON 2020

Main Findings and Recommendations

Of the Business Models Working Group

May 2018

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About BRIDGE

BRIDGE is a European Commission initiative which unites Horizon 2020 Smart Grid and Energy Storage Projects to create a structured view of cross-cutting issues which are encountered in the demonstration projects and may constitute an obstacle to innovation.

The BRIDGE process fosters continuous knowledge sharing amongst projects thus allowing them to deliver conclusions and recommendations about the future exploitation of the project results, with a single voice, through four different Working Groups representing the main areas of interest:

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

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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

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Regulations

- As regards **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.

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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

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Overview of BRIDGE member projects

Distribution Grids	Distributed Storage	Transmission Grids	Large-scale Storage	RES and H&C
<p>2014: 10 projects, 60 M€</p> 	<p>2014: 7 projects, 72 M€</p> 	<p>2015: 4 projects, 82 M€</p> 	<p>2015: 2 projects, 25 M€</p> 	<p>2016: 2 projects, 8 M€</p> 
<p>2016: 7 projects, 90 M€</p> 		<p>2017: 4 projects, 76 M€</p> 		

Introduction

The Working Group related to Business Models (BM WG) aims at:

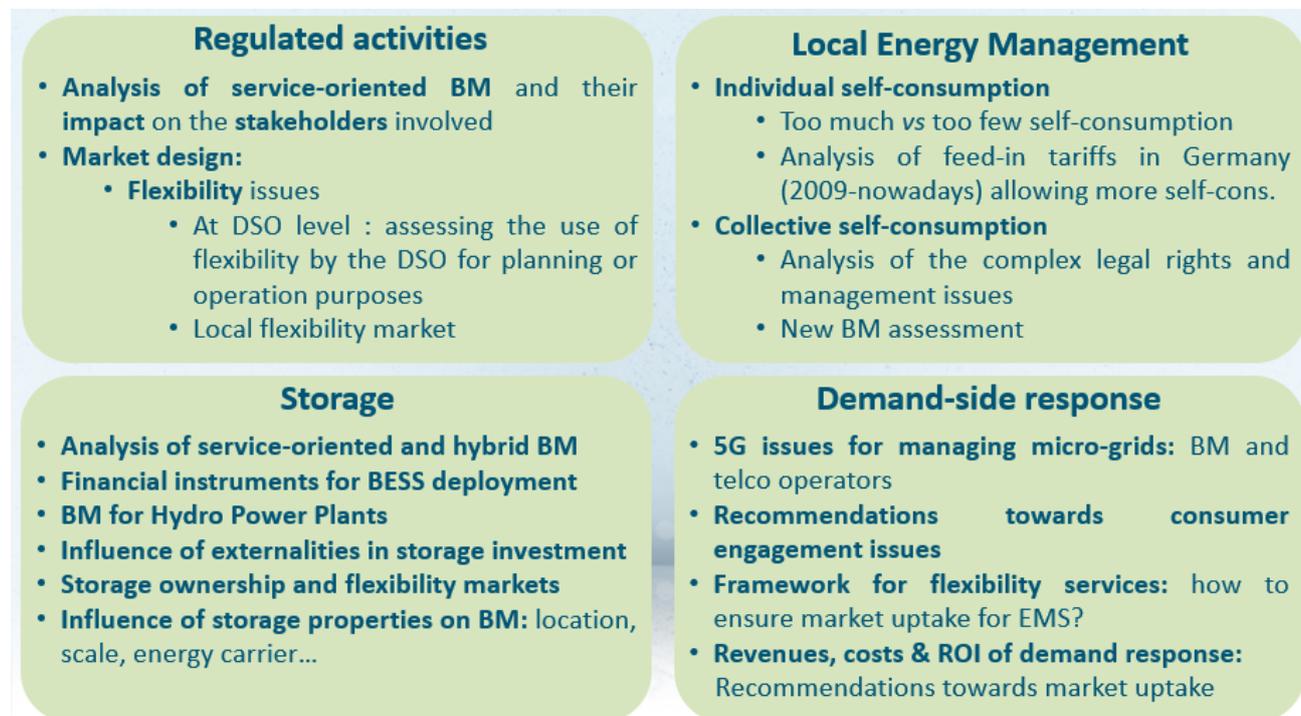
- Defining common language and frameworks around business model description, characterisation and valuation;
- Identifying and evaluating existing and new or innovative business models from the project demonstrations or use cases in order to provide recommendations to remove the barriers or issues identified towards their deployment;
- The development of tools allowing the comparison of the different business models applicable to smart grids and energy storage solutions.

The BM WG is composed by 27 projects (from 36 that compose the BRIDGE initiative) as shown in the scheme below:

Distribution grids	Distributed Storage	Transmission grids	Large-scale storage	RES and H&C
<p>2014: 10 projects, 60 M€</p> 	<p>2014: 7 projects, 72 M€</p> 	<p>2015: 4 projects, 82 M€</p> 	<p>2015: 2 projects, 25 M€</p> 	<p>2016: 2 projects, 8 M€</p> 
<p>2016: 7 projects, 90 M€</p> 		<p>2017: 4 projects, 76 M€</p> 		

Scope of the Working Group analysis

After a first activity report released to the European Commission early 2017 focusing on general concepts related to the elaboration of business models for smart grids and storage, the BRIDGE Business Models Working Group (BM WG) has prioritised four main topics for its 2018 activities. They are briefly described below:



These subjects are in line with the business models topics addressed by the H2020 projects of the BM WG members and they represent important research and innovation axes for the European Commission in which the contributions of the BRIDGE community are expected. Within the BM WG, four Sub Working Groups (SWGs) have been set to tackle each of these subjects in order to provide main findings and recommendations so as to deliver an action plan for each of them for the present year.

The principal outputs of the BM WG are summarized in the following sections of the present document.

1. Main Findings and recommendations

1.1 Business Model aspects in Regulated Activities

The objective of the SWG related to “Business Models aspect in regulated activities” is to assess business model conditions related to regulated grid activities and including: new grid devices and the involvement of flexibilities for grid planning, operation and control. Within the SWG, 5 main issues have been determined, each of them raising a specific challenge.

The first issue deals with the **incentives provided to operators and market players in order to facilitate the development of a positive business case for smart equipment**. The main recommendations defined are based on the work already achieved within the UPGRID project which addresses risks with investment and operation in/of smart technologies. As an example, one recommendation to tackle the risk related to investment in smart technologies is the adoption of a stochastic distribution network planning approach when a recommendation to tackle the risk related to operation of smart technologies is the reduction of operational uncertainty of smart technologies through enhanced testing and trials. During 2018, the main action will be related to the Cost Benefit Analysis conducted by UPGRID within the context of the deployment of these technologies across the distribution system operator (DSO) network of each participating country. It is also stressed that the potential of funneling greater resources available for innovation funding should be considered.

Furthermore, the SWG focused on **market design so as to meet efficiency and scalability demands** considering the different market designs in Europe. The aim is to define a methodology and a tool that will be circulated across the different projects involved to internationalize energy organizations. Along 2018, a methodology will be built to mainly analyse and develop patterns for the energy industry as well as develop education module for practitioners. The work on the tool will be based on the already existing inteGRIDy tool: this tool, aiming at helping the business modelling for future cities and technologies, will be assessed and improved so as to better tackle the issue.

The next challenge of the SWG is linked to **data and financial flow-organization for the different players** (excluding issues related to transitive energy management and data management already dealt in other groups). The main recommendation highlighted is to list and analyse what are the data required to operate a local flexibility mechanism and enable a level playing field between all the flexibilities and aggregators. The action for 2018 will be to disseminate a questionnaire within the projects to provide a matrix of the analysis of the type of data required and to identify the differences between the projects and countries.

Then, the SWG targeted **market design for the use of flexibility by the Distribution System Operator (DSO)** for planning or operation purposes. The main recommendation aims at raising market design questions by interviewing DSOs in different European countries to understand how they deal with them. During 2018, interviews with DSOs will be carried out based on the specific questionnaire developed by the SWG (see part 2.5.3) to provide benchmark between projects and countries.

Finally, the SWG dealt with **local Flexibility Market** related to the previous issue since the DSO is expected to be the main beneficial of this market. The main recommendation is to challenge the project deliverables as well as existing pilots to define clearly the concept of “Local flexibility Market”. The plan for 2018 will be to list and analyse the existing projects describing and demonstrating local flexibility markets. This work will be based on a dedicated list of questions (see part 2.6.3).

In conclusion, the work of the SWG will be based on 3 main actions: **surveys, tool and deliverable challenges between SWG**.

1.2 Business Models for Local Energy Management

The SWG related to “Business models for Local Energy Management” analyses the scope for business models revolving around consuming self-generated electricity (prosumage) in two perspectives: individual and collective self-consumption.

Regarding **Individual self-consumption**, this BM SWG states that in most countries, the cost per kWh of residential systems is lower than the retail price and that taxes and levies on electricity play an important role for prosumage so as financial support is still required towards this aim. Moreover, that technological progress and smart devices (e.g. smart meters, storage devices, smart-home controllers...) are fundamental to optimise prosumage. The SWG emphasizes that not all candidate prosumers judge purely on financial terms; some of them place significant value on their ecological footprint. Something that should be targeted by Governments companies and projects when dealing with those activities.

For instance, findings expressed by this SWG state that benefits from individual self-consumption are important when high retail prices are present, solar irradiation is available, usual demand of buildings exceeds production (i.e. offices) or buildings have temporal overlaps of production and load curves (such as residents with pensioners), etc. Furthermore, when third-party entities can achieve significant cost savings due to economies of scale, such as energy service companies (ESCOs) and renewable ESCOs (RESCO) or these entities are involved in the dimensioning, financing and possibly managing of the excess energy. Last but not least, benefits could be achieved also when production is combined with storage systems (e.g., batteries). It is highly recommended that regulators regularly update supporting policies (e.g., as in Germany) to be cost-efficient and provide the appropriate investment signals, without distorting the market. Furthermore, prosumers would need to participate in a fair manner to the network expansion and management costs, e.g., by introducing capacity-based network tariffs (instead of those that are purely based on energy volume) so as regulated players, like DSOs would need to provide transparent, localized and up-to-date information to facilitate prosumage.

Moreover, the SWG focused on **collective self-consumption**, which is the aggregation of the demand of multiple consumers. In this section we will focus on business models for collective self-consumption in presence of low government support which are characterized by complex legal rights and management issues. Collective self-consumption is characterized by complex legal rights and management issues. In particular, a number of consumers need to agree on the investment (e.g., its viability, technical details etc.) and how the produced energy will be shared. Furthermore, such investments cover a long period (e.g., 20 years) and thus the set of consumers cannot be considered fixed. They conclude that wherever the building is owned by one entity and inhabited by tenants, then policy makers would need to provide clear regulatory frameworks and standards for shared investments. A carefully designed regulation would allow households to become prosumers easily.

During 2018, this SWG foresees to enrich the description and recommendations of the issues related to Local Energy Management enlisted in this document and to identify new issues related to these topics providing recommendations and characterizing these new issues identified.

1.3 Business Models for Energy Storage

The “Business models for Energy Storage” SWG has confirmed that on demand side, storage devices would favour and stimulate self-consumption in countries with high retail prices (such as Germany) without sophisticated business models using virtual power plant (VPP) aggregation and control concepts and related technologies. The development of a clear and favourable regulatory framework encouraging the development of flexible hybrid power plants (renewable energy sources (RES) + storage) on generation side is needed at national and European levels. In this same direction, the financial incentives need to be put in place to stimulate the operators of distributed storage to take part in coordinated schemes (such as VPPs).”

It has been emphasized that information and communication technology (ICT) and technology providers' position must be considered when designing BM dealing with storage applications in connection with RES and DR technologies. In addition, in some cases when multiple storage devices are deployed the role of an ESCO or a third party (e.g. an aggregator, a supplier or a DSO, etc.) would be useful and facilitate the identification of revenue streams.

Regarding battery energy storage systems (BESS), it is recommended that financial instruments (including public subsidy) and regulatory framework would need to evolve to encourage the development of BESS. If a massive deployment of BESS occurs, effective stimulation of battery market would lead on to investment of accompanying technologies (software and hardware), decreasing prices and favouring their market penetration. Lack of investors and "regulated" investment in storage might prevent other type of storage and type of actors to become competitive. Also, the risk for battery storage is the competition of potentially less expensive sources of flexibility (e.g. DR) and of other energy storage using other energy carriers. The SWG highlights that it is important to continue to invest in new technologies at national and European levels, and to define public policies that will facilitate innovative battery technologies to get to the market.

In order to foster the development of a flexibility market, the SWG recommends that centralized batteries shouldn't be allowed to participate in any flexibility market if they belong to or are operated by a regulated entity (e.g. a DSO or a transmission system operator, TSO). If regulated entities own and operate the flexibilities (batteries included), they would be exposed to a moral hazard deterring other investors in the flexibility sources, effectively thwarting development of flexibility market. Competing against a regulated entity, customers and aggregators might have difficulties to get correct return on investment (ROI) and even adequate payment for their services. This issue is analogous to the unbundling in electricity markets where regulated utilities are prohibited from owning generation assets and would need to be right in the centre of the iterations towards the validation of the Winter Package proposals aiming at having the "customer at the centre of the energy system".

With the rising penetration of variable and uncertain RES generation on all voltage levels (HV, MV and LV), the need for flexibility sources including storage is increasing. However, regulatory barriers, new alternative storage technologies, high energy storage costs, etc. pose a risk leading to unclear scenarios for decision makers. To help profitable operation of the storage technologies, the use of decision support tool would be fundamental to test the use cases and improve scenario design in different BMs.

Traditional business models insufficiently consider stakeholder analysis, externalities, and the spatial optimality given the existing electricity grid and gas grid. Therefore, a new generation of business models will need to be developed, capturing all these elements. Indeed, more research is still needed on energy conversion and storage options with respect to variable renewable power production, and in particular on what adjustments in the grid and in appliances may be needed to facilitate energy storage integration.

Finally, life cycle analysis (LCA) and estimation of the socio-economic impacts must be taken into account when assessing business models in general. From storage technologies' perspective, the lack of these analyses may lead to sub-optimal storage investment from societal perspective while the design of a robust cost-benefit model taking into account these externalities in storage systems may provide more elements to value the importance of storage and favours its deployment.

At this stage, this SWG has mostly worked on the characterisation of issues related to storage within the projects of the BRIDGE initiative. More recommendations for Storage BM are to be provided in the next report update by the end of 2018.

1.4 Business Models for Demand Response

The objective of the SWG dealing with demand response (DR) is to assess business models conditions related to a change in the power consumption for a better management of microgrids, by

involving more the end-users and by working on the flexibility services and costs. Within the SWG, 4 main issues have been defined.

The first issue deals with the **allocation of 5G spectrum by telco operators for managing microgrids**. This issue is relevant since it impacts anyone who manages a microgrid e.g. energy cooperatives, energy companies, DSOs, mobile network operators, large local energy consumers (industrial, public services e.g. hospitals, commercial). Independently of the regulatory issues the main recommendation focuses on the need to introduce local micro licensing and allocate spectrum resources for managing smart grids.

Then, the SWG focused on **how to engage consumers?** Experiences from RealValue and SMILE are considered and it is stressed that the greatest risk to engagement is the lack of interest or understanding on the part of consumers and / or lack of willingness to understand. An example of recommendation within the SWG is to gain a thorough understanding of what is required to engage specific consumer categories i.e. gather feedback from large cohorts of consumers from diverse demographics to identify what would be the most efficient. During 2018, specific actions will be taken for the SMILE and RealValue projects (see part 5.3.3). On a higher level, it will be investigated the possibility of organising a stakeholder event at EUSEW involving potential smart loads / small-scale domestic RES/EES appliance manufacturers to study business models/ESCOs / regulation to facilitate the acceptability of the recommendations identified.

The next issue targets the **enabling of a fair and open market framework for flexibility services**. The aim is to address the need for adequate measures to ensure market uptake of innovative technological solutions and services. The issue can be addressed by implementing the Winter Package directives into MS regulation based on dedicated recommendations related to specific dimensions: demand response access to markets, service providers' access to markets, product requirements and measurement and verification, payments and penalties. During 2018, the main actions to be implemented will be focusing on the preparation of an EC/ACER implementation guidelines for different stakeholders (TSO, DSO, BRP, aggregators), the development of an implementation roadmap, the design and monitoring of KPI related to that matter.

Finally, the SWG worked on **revenues, costs & ROI of demand response**. To address this issue, it is reminded that there is a requirement for collaboration with TSOs/DSOs to ascertain higher values for flexibility and provide longer term contracts to encourage more investment and technology adoption. To illustrate this point of view, an example of recommendation is to create a forum of EU DSM players to collectively develop standard guidelines and operational standards. For 2018, the action plan will include several steps: design and develop an industry survey on approaches to revenue budgets and mechanisms for auction / win contracts, conduct the survey to encompass all EU Member States, and disseminate the findings and results.

1.5 Business Models tools

Within the Business Models Working Group, 3 main Business Models tools have been introduced to support the work of the working group:

The **Nobel Grid tool** proposed scenarios for the techno-economic evaluation of innovative smart grid technologies and associated business models. Then, the **Technofi tool** aimed at calculating key performance indicators (KPIs) to shape the socio-economic impacts of use cases/business models of smart grids and energy storage solutions. Two BRIDGE projects, NAIADES and REAL VALUE have tested the Technofi tool and provided relevant outcomes. As an example, NAIADES stressed that the tool would fit the parameters, function and characteristics of the batteries deployed in the project after studying a specific use case aiming at assessing the different costs (i.e. installation) of the batteries used in the NAIADES project compared with those already commercialised by different companies. One of the main recommendation raised by the project is related to the possibility for the tool to provide different charging and discharging hours for the batteries. Finally, the **inteGRIDy tool** which aims at



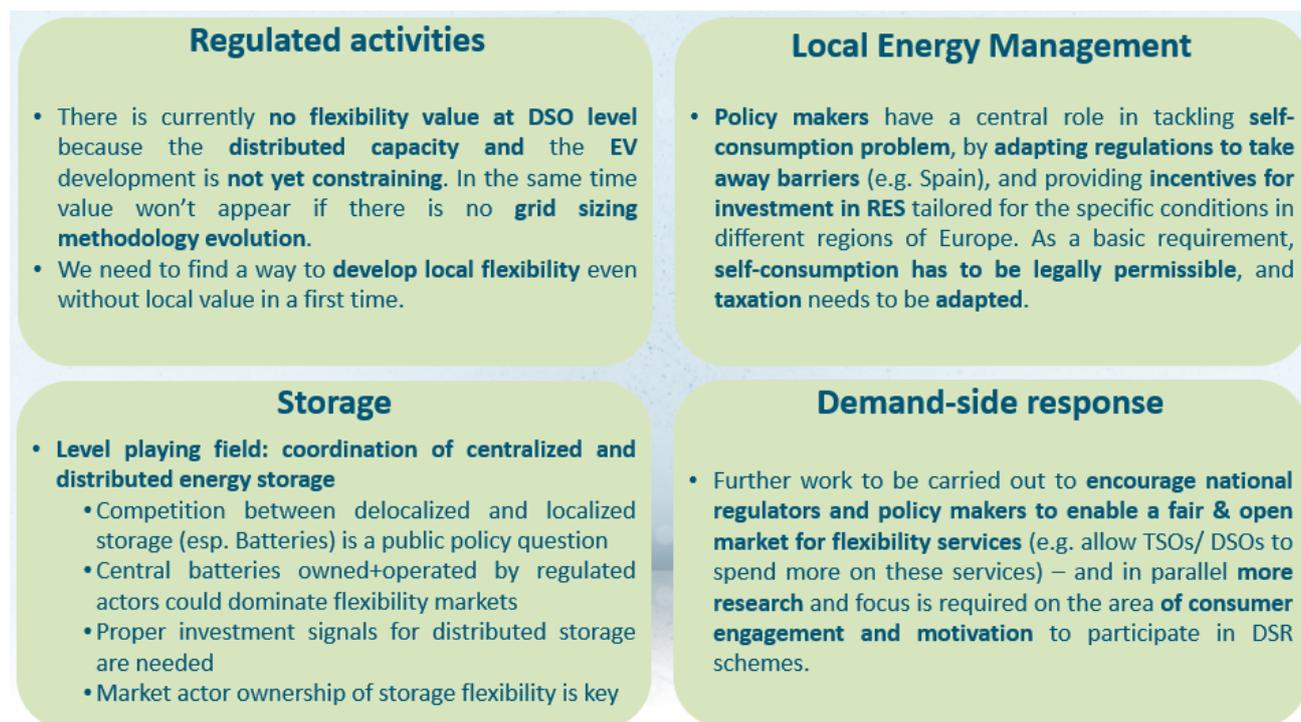
helping the business modelling for future cities and technologies, is already part of the action plan dedicated to the SWG related to Regulated activities.

Collaboration between those 3 tools based on a wider sharing between the different BRIDGE Business Models projects will be further investigated during 2018 so as to better identify potential improvements for each of them.

2. Conclusions

The next step for the BM WG will be to foster synergies between the BM subgroups and the topics they have identified with the other BRIDGE WG (Regulations, Data Management and Customer Engagement) to provide more recommendations in a holistic perspective and a structured view of all the hot topics assessed within the BRIDGE initiative to the European Commission.

The following boxes would summarize the main finding per subgroup within the BM WG:



This synthesis report has been developed by the BRIDGE Business Models Working Group with the support of DOWEL within the INTENSYS4EU Coordination and Support Action (H2020 Grant Agreement n° 731220).

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