STORY

added value of STORage in distribution sYstems

Deliverable 4.2
Input to BRIDGE co-operation

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Project STORY - H2020-LCE-2014-3

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Input to BRIDGE co-operation (executive summary)

The contribution to BRIDGE co-operation has been delivered through participation from STORY in the Data Management WG. The contribution by STORY happened in accordance with the WG organisation and activities. STORY has coordinated the interoperability issues for the WG and has led the contributions on this topic within the WG. STORY has contributed as a participant to the overall activities in the Data Management WG.

The publicly available document (with a copy in annex) is available at:

https://www.h2020-bridge.eu/working-groups/data-management/

The longer documents (BRIDGE reports) are classified as *restricted to the Working group representatives and to the EC*. They are available on request for these entitled parties.

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ANNEX: Public Data Management report from BRIDGE

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Project STORY - H2020-LCE-2014-3

Main Findings and Recommendations

Of the Data Management 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

EC: Patricia Arsene (DG CNECT), Mariana Stantcheva (INEA)
Chair: Laura Marretta (Enel SpA)
Rapporteur: Olivier Genest (Trialog)

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

EC: Jens Bartholmes (DG ENER), Adas Pangonis (INEA)
Chairs: Lola Alacreu (Grupo Etra), Leen Peeters (Th!nk E), Andrej Gubina (University of Ljubljana)
Rapporteur: Guillaume Lehec (Engie)

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.

EC: Aleksandra Kronberga (DG ENER)
Chair: Takis Ktenidis (TILOS project)
Rapporteurs: Mihai Paun (CRE-Romanian Energy Centre), Aris Evangelos Dimeas (NTUA)

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

EC: Szilvia Bozsoki (DG ENER)
Chair: Konstantinos J. Chalvatzis (UEA)
Rapporteur: Thomas N. Mikkelsen (VaasaETT)

Overview of BRIDGE member projects

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

1. Scope of the Working Group analysis

Data management covers a wide range of aspects ranging from the technical means for exchanging and processing data between interested stakeholders to the definition of rules for exchange, including security issues and responsibility distribution in data handling. Accordingly, the WG has identified three main areas of collaboration around which a mutual exchange of views and discussions have been set:

1. **Communication Infrastructure**, embracing the technical and non-technical aspects of the communication infrastructure needed to exchange data and the related requirements;
2. **Cybersecurity and Data Privacy**, entailing data integrity, customer privacy and protection;
3. **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.

In the course of the three years WG collaboration, projects participating in the WG are called to contribute to the discussion by:

(i) **highlighting the main challenges** and issues encountered / faced by the projects;

(ii) **proposing a set of recommendations** to solve the issues and remove barriers;

(iii) **providing concrete examples** on how the projects could contribute to one or more issues, in line with their results and progresses. This may include a **mapping of the viable alternatives from the participating projects,** according to their architecture vision, which could be discussed in the WG in the years of collaboration.

During the activities of the data management WG, the following deliverables were produced:

- **First Intermediate Report (December 2016**): in the first deliverable, a list of challenges and related issues was identified in relation to collaboration areas abovementioned, together with a preliminary set of recommendations. The challenges raised were mapped over a set of high level use cases on the basis of the scope of the projects participating in the WG and in particular: Demand Response and Energy Efficiency; Advanced Network Management; Flexibility Management. Such areas may include both services to the final customer and between energy players where in any case exchange of data is needed;

- **Technical Requirements for 5G communication networks (April 2017):** technical requirements and guidelines on 5G networks to support energy services were identified and detailed. The report aims in particular at clarifying the requirements needed to support, respectively, applications (market services), mission critical services (e.g. network management and operation, automation, etc.) and business critical services. The EC white paper '5G and Energy' was used as starting point to identify the most relevant communication domains to consider in the analysis and preliminary requirements of reference;

- **Characterization of flexibility services (January 2018):** the report focuses on the evaluation of the effectiveness and efficiency of a flexibility service It summarizes how projects assess on their flexibility services, while at EU wide scale, it will be of utmost importance to create a common understanding of flexibility and its impact. Nevertheless, a common problem in the research of flexibility services for real world implementation is that two events cannot be compared to each other because of different boundary conditions of the system.

Currently, the WG is focusing on **Data Handling related activities**, in order to map how data are managed across the projects, main roles and responsibilities and how interoperability and other issues are addressed in the projects.

2. Main Barriers

The main barriers identified by the Data Management Working Group (detailed in the three reports above mentioned) can be summarized as follows:

(i) **No unique standard for data exchange**. No unique protocol for interactions is a barrier to wide scale deployment. This implies the need to cope with different data models for different applications such as SCADA-DMS, metering, Demand response, Smart Home appliances and local production, together with other various energy services provided by ESCOs.
Currently, a challenge is to cover existing systems and prepare future data services through the same model and no EU standard is available on shelf. Existing standards are not always suitable to provide new services and allow all the messages exchange among different market players (data modelling need to be adapted or extended, integration/adaptation of protocols and standards possibly needed).

(ii) **Lack or limited forwarding of data and information to energy market players**: no single point of contact towards market players that could facilitate competition exists. Data are mainly available for settlement and billing purposes and often available in low resolution and delay (up to 30 days). Smart meters are not rolled out yet in all the EU countries and this is still a challenge in terms of data availability with higher frequency and granularity.

(iii) **Absence/lack of market conditions for new services to be delivered, such in case of storage services:** for demonstrating the benefit of storage systems e.g. in buildings, a challenge is the interaction with grid operator and aggregator. Demand response services are new in EU and it is difficult for a small building to participate to grid services. In principle, demonstration is possible, but DR programs should reduce the constraints for participating to the market.

(iv) **Peer-to-peer energy trading** between micro-grids, DSOs, Suppliers, and ESCOs: there is still a lack of standard solutions and trading semantics to carry out commerce.

(v) **Privacy control**: user data privacy and protection is a key issue when dealing with developments of new services based on data. Appropriate control of data access at various levels, in the respect of country and EU laws, legal contracts and customer wishes, need to be put in place and be supported by appropriate mechanisms.
Current data privacy regulations may hinder efficient DR scenarios as stakeholders / third parties are not always allowed to access data (e.g.: real-time household consumption) needed for implementing smart scenarios.

(vi) **Communication infrastructures should be able to support (future) energy services.** A key question is whether and to what extend the existing telecommunication infrastructure is sufficient to support in mass scale the new business cases and Smart Grid services and which should be the requirements of future networks (such as 5G) to be able to support future energy services both for market applications and network management.

Robustness and reliability in (wireless) use cases are also two barriers (generated messages needs to be successfully delivered within a reasonable time scale). Support of near real-time communications e.g. between metering systems and aggregators, is needed in some cases. Mature (wireless) technologies face difficulties in providing required reliability criteria.

(vii) **Security services provisioning**: a number of basic security services needs to be provided for all aspects of a smart grid application. Modern information ecosystems like clouds and IoT systems are fast becoming a standard solution for a number of applications. The solutions and domains, information systems security wise, are still under heavy development. Reusing the modern information ecosystems in the smart grid domain require holistic understanding of such reuse benefits, drawbacks and possible security issues. Moreover, increasing numbers and types of data sources may slow down security protection approaches, due to the limited

computational capability. This barrier could lead to a future situation in which existing security protection schemes might become invalid for protecting near-real-time smart grid applications.

(viii) **Flexibility is assessed on a case-by-case basis**. There is no standardized methodology and each site or aggregator relies on experts to determine the flexibility potential for a specific installation. No common approach to characterize or measure flexibility performance is currently available. Each project develops in fact its own definitions of flexibility, and the relevant KPIs used to quantify it. The measurement and verification (M&V) generally, and the "baseline" more specifically, determines the magnitude of the resource's flexibility and thus plays an important role in determining the value it has to the electric system. Currently in Europe, there is no common procedure for baseline calculation, which could meet all the requirements related to different characteristics of various resources of flexibilities.

3. Recommendations

Main recommendations and findings in the framework of the Data Management WG activities are summarized in the following:

(i) **To leverage on open standard and protocols and ensure interoperability of systems is key to address a common approach on data exchange across Europe.** The use of solutions addressing interoperability in the field of data management is necessary to maximize the exchange of information between different devices and systems, and between equipment from different vendors. A common format for data exchange could facilitate interoperability, promote competition, address cost mechanisms for accessing data, however the replacement of national format and upgrade of existing systems could be very costly (costs should be assessed versus net benefits) therefore a set of common guidelines / minimum content shall be also considered. Moreover, the process is not straightforward and requires the involvement of industrial players, standardization bodies and regulators.

(ii) **Data accessibility also to third parties** based on interoperable systems /platform with non-discriminatory access is key to overcome the current lack or limited forwarding of data and information to energy market players. This can foster data exchange and allow the development of new services. ICT platforms have been developed and tested in European projects to accelerate data exchange access and to ensure a simple but secure procedure to grant customers consent. Moreover. the creation of a common point of interaction accessible to all players in the EU market could simplify processes to access data and services.

(iii) **Data granularity should be improved and data close to real time available** (data available with low resolution and high delay limits possibility of new services). Raw data can become available in real time. In order to improve granularity, existing smart meters systems might require refurbishments in order to enable new functionalities.

(iv) **To empower households with the possibility to make their information accessible** for stakeholders can contribute to user data privacy and protection requirements, where explicit customer/prosumer consent is necessary when transferring data to players for providing services. Moreover, a number of privacy protection solutions can be developed, ranging from access control mechanisms, cryptographic confidentiality, data sharing and computation mechanisms, protection mechanisms in databases and data analytic processing, etc. An harmonization at EU level to guarantee a common data classification and appropriate measures for the use of those data could benefit.

(v) **Communication infrastructures should be scalable and replicable** (i.e. respectively, able to change its scale in order to meet growing volumes of demand or wider network areas and able to be duplicated at another location, time and under different operating conditions). For supporting new services, communication infrastructures should evolve toward nearly ubiquitous networks capable of handling large amount of new data and highly pervasive, often requiring a combination of communication technologies. The use of interoperable solutions and interfaces for the exchange of information would maximize the potential of use. To increase the interchangeability of equipment (i.e. the ability of one product, process or service to be used in place of another to fulfil the same requirements), national regulation is also key.

With respect to robust and reliable (wireless) use cases to support near real-time communications, the use of emerging ultra-narrowband solutions should be supported in Europe by appropriate regulation. Moreover, time windows aggregation depending on bandwidth requirements and (near) real-time communication channels for specific events need to be defined and an actuation channel developed.

Specific recommendations on 5G networks are detailed in the report earlier mentioned for each of the following domains: External network, Grid Access, Grid Backhaul, Grid Backbone.

(v) **Fast, easily implementable and standardised assessment methodology for flexibility** services (that can be used both aggregators and individual users) should be identified. However, different verification approaches that have already been proven and successfully implemented should be allowed as long as the fundamental requirements are fulfilled.

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More information and to download the full report, please visit https://www.h2020-bridge.eu/