# Contribution to the working groups of BRIDGE and other working groups for cooperation between LCE projects - 2nd year
# V1.0

*Deliverable D3.11*

14/12/2018

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# EXECUTIVE SUMMARY

This report presents the outcome of the contribution to the on-going BRIDGE cross project working group activities, including the conclusions of the collective workshops for the second year of the InterFlex project.
It also includes the outcomes of the participation to any new coordination and support action funded in the work programme for the organization/ Continuation of the collaboration among LCE projects.

This deliverable is an update of Deliverable D3.10 which described the BRIDGE activities during the second year of the project and was submitted to the EC at the end of 2017. D3.12 will be submitted next year and will present the final outcomes of InterFlex's contributions to BRDIGE initiative.

The coordination with similar EU-funded projects, to address policy relevant issues - such as regulatory framework, business models, obstacles to innovation - is a key component of InterFlex. Contribution to the on-going BRIDGE cross project working group activities BRIDGE is a cooperation of all smart grid and storage projects supported by DG ENER under H2020. The target is to ensure a continuous exchange of experiences between the different projects, through four different Working Groups representing the main areas of interest: Regulation, Data Management, Customer Engagement and Business Models.

The InterFlex consortium delegated eight experts to contribute to the four existing working groups: Accenture and Avacon for Regulation, RWTH, TNO and Trialog for Data Management, E.ON for Customer Engagement and Enedis and Engie for Business Models.
It is understood that they are the voice of the whole consortium and bring to the working groups data and knowledge, which have been agreed upon by the whole consortium. In order to implement a dialogue on BRIDGE initiative between the WG experts and the rest of the consortium, a BRIDGE consultation process has been set up in 2018. This process is detailed in chapter 3 of the present document.

The document is structured in five main chapters.

1. **BRIDGE initiative:** this section provides an overview of the Bridge initiative and defines the role of the InterFlex project within this initiative.

2. **Outcome of the working groups:** this section presents the different workshops the InterFlex project participated in, including BRIDGE Initiative and formulates the different outcomes of the workshops for the second year

3. **Share on BRIDGE activities between InterFlex members:** this section explains the meetings and process implemented by InterFlex to share on the activities and outcomes of BRIDGE working group with the whole consortium.

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# 1. BRIDGE INITIATIVE

## 1.1. Purpose of the BRIDGE initiative

BRIDGE is a cooperation group involving Low Carbon Energy (LCE) Smart-Grid and Energy Storage projects funded under the Horizon 2020 program. 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.

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: Regulation, Data Management, Customer Engagement and Business Models.

## 1.2. Role of InterFlex within the Bridge initiative

The coordination with similar EU-funded projects (in particular those which are funded under this call) to address policy relevant issues - such as regulatory framework, business models, obstacles to innovation is a key component of InterFlex.

According to the InterFlex General Assembly's vote on February 6th, 2018 the InterFlex consortium delegated eight experts to contribute to the four existing working groups: Accenture and Avacon for Regulation, RWTH, TNO and Trialog for Data Management, E.ON for Customer Engagement and Enedis and Engie for Business Models.

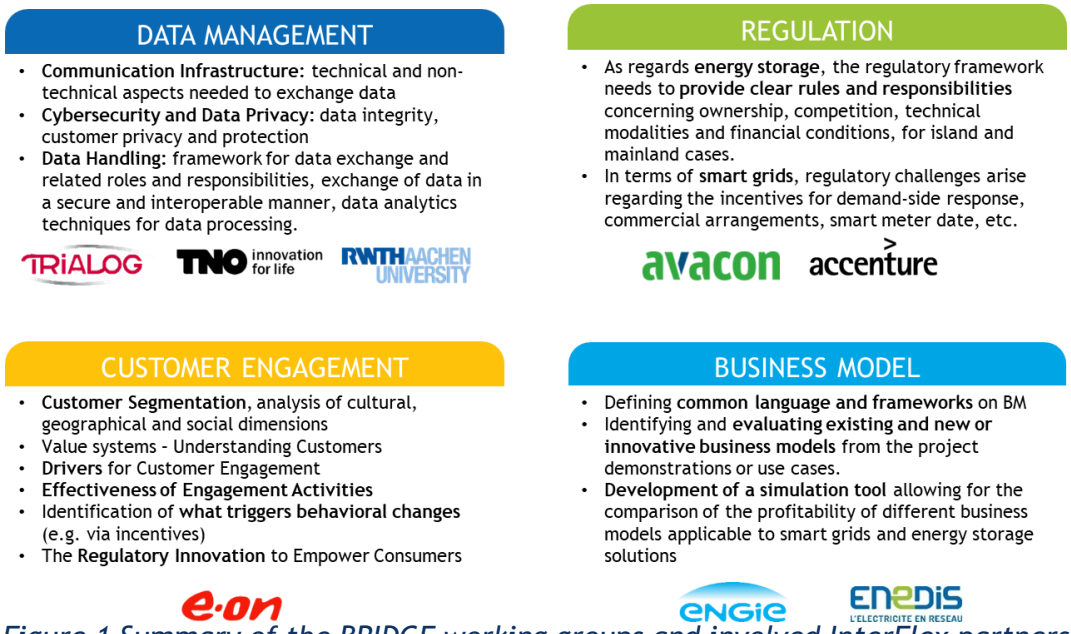



*Figure 1 Summary of the BRIDGE working groups and involved InterFlex partners*

InterFlex highly contributes to the BRIDGE initiative since InterFlex representatives took strong responsibilities inside the different working groups:

- Trialog is rapporteur of the Data Management WG;
- Engie is rapporteur of the Business Model WG;
- AVACON and Accenture lead the "Grid" subgroup in the Regulation WG;
- E.ON is involved in the subgroup on "Customer Engagement Cycle" in the Customer Engagement WG.

InterFlex representatives in BRIDGE are the voice of the whole consortium and bring to the working groups data and knowledge which have been agreed upon by the whole consortium. In order to share on the topics investigated in BRIDGE WGs, InterFlex Project coordination team has implemented a consultation process in 2018. This process is presented in section 3 of the present document.

## 1.3. Benefits and impacts of the BRIDGE initiative

The benefits of contributing to the BRIDGE initiative are multiple.

For the InterFlex project and all the participants:

- Benefit from field experience, feedback and lessons learned by the participating projects when coping with barriers to innovation;
- Shape collective recommendations for policymakers with the aim of removing barriers to the deployment of innovation;
- All projects speak in a single voice, which in turn strengthens their message and maximizes the impact for policymakers;
- Create new contacts for future collaboration with other members of the group.

For the policymakers and regulators:

- Benefit from coordinated, balanced and coherent recommendations from the participating Research & Innovation projects; with a focus on non-technical issues hindering innovation deployment;
- Allows the comparison of non-technical barriers to innovation in different countries and the learnings from the diverse experiences of the most current and relevant EU-funded projects.

# 2. OUTCOME OF THE WORKING GROUPS FOR 2018

## 2.1. Business Models

### 2.1.1. Presentation

The Business Model group aims at:

- 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

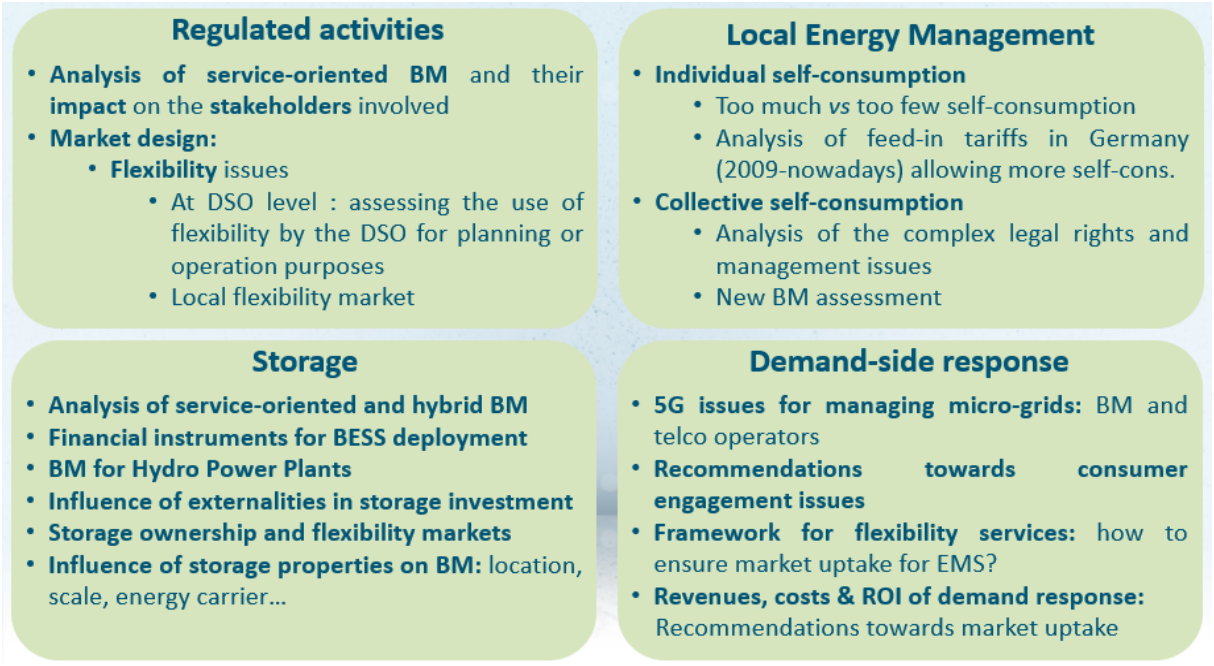
### 2.1.2. Second year outcomes

The Business Model working group is organized with 4 sub-working groups:

- Regulated activities
- Local Energy Management
- Storage
- Demand-side response

ENGIE is rapporteur of this Working Group.

The topics discussed by the different sub-working groups are the following:



The main findings are:

**Regulated activities**

- There is currently **no flexibility value at DSO level** because the **distributed capacity and** the **EV** development is **not yet constraining**. In the same time value won't appear if there is no **grid sizing methodology evolution**.
- We need to find a way to **develop local flexibility** even without local value in a first time.

**Local Energy Management**

- **Policy makers** have a central role in tackling **self-consumption problem**, by **adapting regulations to take away barriers** (e.g. Spain), and providing **incentives for investment in RES** tailored for the specific conditions in different regions of Europe. As a basic requirement, **self-consumption has to be legally permissible**, and **taxation** needs to be **adapted**.

**Storage**

- **Level playing field: coordination of centralized and distributed energy storage**
  - Competition between delocalized and localized storage (esp. Batteries) is a public policy question
  - Central batteries owned+operated by regulated actors could dominate flexibility markets
  - Proper investment signals for distributed storage are needed
  - Market actor ownership of storage flexibility is key

**Demand-side response**

- Further work to be carried out to **encourage national regulators and policy makers to enable a fair & open market for flexibility services** (e.g. allow TSOs/ DSOs to spend more on these services) – and in parallel **more research** and focus is required on the area **of consumer engagement and motivation** to participate in DSR schemes.

Those results were presented in the deliverable produced in February 2018. They have been updated in a new deliverable written in October which is currently reviewed by DOWEL and should be published by January 2019.

ENGIE and ENEDIS as INTERFLEX contributors focused on the regulated activities sub-working group as this group aims at studying the business models linked to the DSO activities which is also the target of InterFlex which aims at studying how the flexibility can bring value to the DSO.

Within this sub-working Group, ENGIE and ENEDIS studied two issues:

- **Data and financial flow organization for the different players:** A questionnaire was designed and sent to DSO and aggregators to define what flow needs to be set up in order to let the market work and propose an organisation (see Annex 5.1);
- **Market design for the use of flexibility by the DSO:** A questionnaire was designed and sent to DSO to understand what their flexibility needs are, what commercial organisation could be set up and how a DSO could use the flexibility provided by the aggregators (see Annex 5.1).

Following the current results, there is now a need for crossing the vision between the different sub-working group and with the other Working Groups in Bridge.

## 2.2. Regulation

### 2.2.1. Presentation

The Regulation Working Group purpose is to compose, during the implementation period of the H2020 Smart Grids & Storage projects, recommendations and consultation for regulation issues based on the experience acquired in the projects for better development of the Smart Grids and Storage in Europe. A parallel objective will be to define issues that will improve and enhance the cooperation between the H2020 Smart Grids & Storage projects resulting in added value.

It addresses the various regulatory issues coming from the H2020 projects:

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

### 2.2.2. Second year outcomes

The regulation Working Group delivered a report gathering a selection of regulatory issues and targeted recommendations to overcome them. The report is available on the BRIDGE website:

https://www.h2020-bridge.eu/wp-content/uploads/2018/10/BRIDGE_REG_short_report_FINAL_Sept18.pdf

The working group adopted an issue-oriented approach in order to deliver targeted recommendations. The regulatory issues were organised in 3 main subgroups:

- New market design options led by InterFlex, GOFLEX, Smartnet;
- Storage ownership, valorisation, safety and environment led by STORE&GO, INVADE, STORY, ELSA;
- Island cases led by INTEGRIDY, SMILE.

InterFlex took a key role in these activities by leading the Grid Subgroup, together with Smartnet and GOFLEX. More particularly, Accenture and Avacon coordinated the work related to "*New market design options, leading to new services, business models and roles for system operators*".

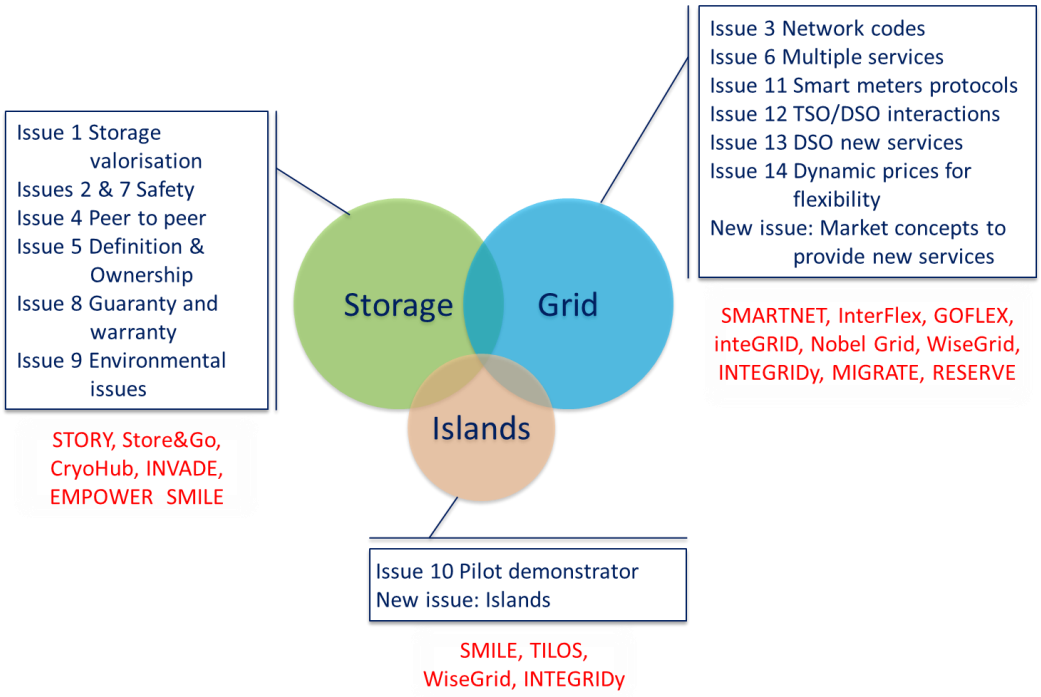



*Figure 2 – Description of subgroups of Regulation WG*

Different physical and virtual meetings were organized during the year to deliver the abovementioned report:

- A face to face workshop organized on 16th May 2018. It had the following agenda :
  - Presentation of new projects joining the Regulation WG
  - Discussion on the key recommendations coming from the projects organized in 3 subgroups: Grid, Island and Storage
  - Organize the work (actions, deadline, owners, …) in order to finalize the Regulation WG 2018 report
- Many additional discussions, with subgroups contributors took place prior and after the workshop in order to elaborate a common vision of the main regulatory issues and define recommendations to overcome them
- Final review of the report was organized with the DG ENER

## 2.3. Customer Engagement

### 2.3.1. Presentation

Customer engagement processes are evaluated through knowledge sharing between H2020 Smart Grids & Storage projects to identify successful strategies and methods in addition to potential barriers related to customer engagement. Hence, the overall goal of the Customer Engagement Working Group (CEWG) consists in formalizing a series of recommendations to the EC in relation to the Customer Engagement field of knowledge.

The Customer groups aims at defining:

- 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 behavioural changes (e.g. via incentives)
- The Regulatory Innovation to Empower Consumers

Experience gained during the first year resulted in a revised co-working process of the CEWG.
Firstly, special care should be brought to projects close to completion that quit the initiative to gather their valuable inputs during their last months within BRIDGE. Upstream, new entrants shall be progressively introduced to the work process of CEWG and to the return on experience of predecessors.
Secondly, to shorten the interaction and knowledge sharing between the individual contributing projects these are allocated into smaller groups to focus on few key topics. This required to segment the domain of knowledge into a few building blocks and to assign projects to these blocks. In this regard, 11 key topics of customer engagement (Q1-Q11) were identified and organized in four thematic clusters, referred to as subgroups A, B, C and D.

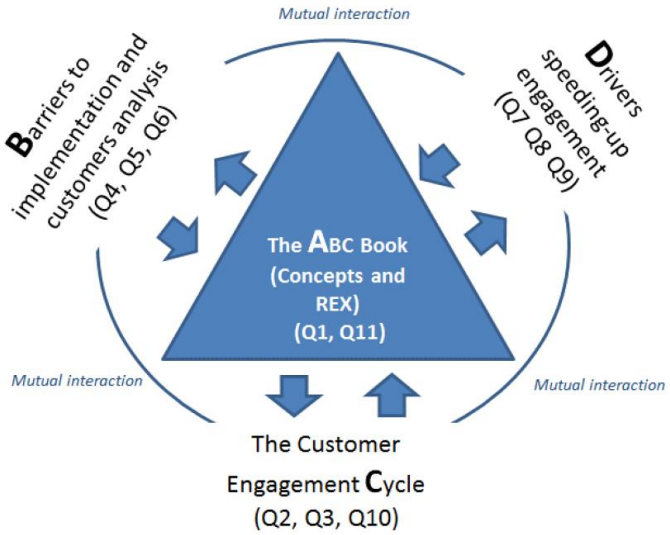



*Figure 3 The four thematic clusters and allocation of eleven key topics (Q1-Q11).*

**[A] ABC Book of Customer Engagement**

This subgroup deals with the overall knowledge management related to the wording and the way valuable knowledge will be stored and retrieved. Definitions and basic terms utilized in the field of Customer engagement are addressed and presented to provide a harmonization of a common terminology that fits well with the market. Also, the feedback and lessons learnt from projects is to be presented in a list of best practices. The expected output will constitute a handbook of Customer Engagement that could be named "ABC book of Customer Engagement".

Key topics addressed:

- (Q1) Definitions of energy customers and consumers
- (Q11) Main learnings from your project in relation to customer engagement

**[B] Barriers to implementation and customers analysis**

The second subgroup deals with understanding the barriers and the specific needs of the wide class of customers in their energy act. Segmentation plays a key role in that understanding, as well as the regulatory context.

Key topics addressed:

- (Q4) Cultural and geographical dimension (segmentation, profiling)
- (Q5) Social dimension (educated customers/vulnerable customers)
- (Q6) Regulatory barriers

**[C] Customer Engagement Cycle**

This subgroup deals with the value chain of understanding customer value, setting goals and measuring them. The aim is to gain a better understanding of what customer values and how it changes over time through e.g. ex-ante and ex-post analysis (KPI).

Key topics addressed:

- (Q2) What customers value (ex-ante)

- (Q3) Effectiveness of the designed approach to engage customers (ex-post)
- (Q10) Performance indicators: price – stability – interruptions, etc.

**[D] Drivers for Speeding-up the engagement**

The projects in this subgroup identifies drivers for customer engagement i.e. how to activate and speed-up the customer engagement cycle.

Key topics addressed:

- (Q7) Enaging customers through information; education & training; and marketing
- (Q8) Main drivers for customer engagement
- (Q9) Raising awareness about customer to engineers – DSOs...

### 2.3.2. Second year outcomes

During the WG meeting in June 2018, each project member of the Customer Engagement working Group was to re-allocate themselves to one of the four subgroups. Interflex was previously allocated to subgroup C but will, for the upcoming CEWG work, contribute to knowledge sharing within subgroup B - Barriers to implementation and customer's analysis.

The Deliverable 3.8.2 Bridge Customer Engagement Working Group - Compiled Report (2015-2018) has been submitted to EC. Following this, a short synthesis report was produced, highlighting the main findings and recommendations of the Working Group collected from 2016 up to April 18th 2018. The main findings and recommendations summarised in this report is outlined in the following sections.

**[A] ABC Book of Customer Engagement**

Terms like user, consumer, customer, citizen, etc. are often used in the EU H2020 funded projects and in the market without a specific analysis or appropriate intentionality. In the report the terms of Consumer and Customer are defined and differentiated as well as terms of Role and Actor. The feedback from lessons learned was categorised into the different phases of the project time-line; during the call text generation and before/during/after customer engagement. In this regard, for the call text generation, customer engagement should be considered and allowed a specific budget. Projects should propose a customer engagement plan including appropriate KPI's and communication actions. There is also value for projects to maintain customer engagement both during and after project life-time.

**[B] Barriers to implementation and customers analysis**

To provide an effective communication and enhance customer engagement it is vital to listen to customers early in the project and to provide simple and visually appealing communication channels. Future projects should take into consideration the end customers' needs or else risk providing less than satisfactory service. Market segmentation (cultural, geographical and social) might provide information on customers' needs and preferences in addition to available marketing resources. However, segmentation should not replace direct ways of interaction and dialogue with customers, but should rather provide a more diversified customer engagement strategy.

As far as regulatory barriers are concerned, BRIDGE recognized the following issues: lack of dynamic tariff systems; no access for small consumers to take part in demand response

programmes; no possibility for selective grid cost pricing; obstacles to accessing consumption data; lack of standardized processes and other/market-related obstacles.

**[C] Customer Engagement Cycle**

The projects identified that main customer values and driving forces are:

- **Energy costs:** in terms of stable prices and the possibility of earning money through participation in energy related projects.
- **Environmental gains:** that projects allow them to contribute to sustainable solutions by making them feel they are part of larger environmental friendly movements.
- **Comfort:** convenient solutions that either bring more comfort or maintain current levels. Customers value technological solutions that are user-friendly.

The projects identified that main customer concerns are:

- **Economic concern:** disengaged end-customers are largely concerned about their energy usage in relation to paying bills.
- **Daily life and comfort:** in particular heating and cooling since these two elements are responsible for the highest share of the energy bill.
- **Reliability of energy supply:** The number one priority amongst customers is to secure a reliable supply of energy.

A simple value chain to create customer engagement was established:

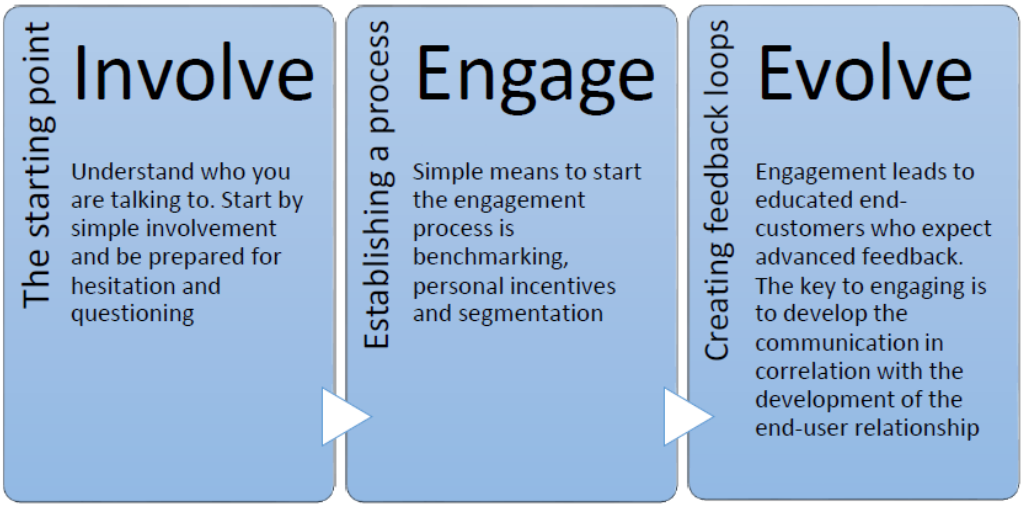



*Figure 4 Value chain of customer engagement cycle created by the working group*

Successful engagement actions identified includes the use of information leaflets, user-friendly solutions with a gradual involvement of customers in the projects and awareness campaigns. Future call projects should have clear definitions of project specific performance indicators KPI's that use mixed approaches and evaluation methods (surveys, interviews etc.).

**[D] Drivers for Speeding-up the engagement**

Four essential elements were identified as main features for driving customer engagement in energy related projects. Mapping and profiling of customers is required to know the

preferences of the end-user. Deploy multiple drivers, as no single driver has the capacity to make a decisive impact. Customer engagement is an ongoing process, which needs to be maintained, hence requiring good planning and management procedures as well as adequate communication and feedback channels.

Below, the five recommendations established by the Customer Engagement Working Group are outlined:

1) **Address Customer Values and Their Context**
   A key learning point and 'best practice' guideline from across all projects, is that a successful business case depends on understanding what constitutes value for the end-customer. In this respect, strengthening the role for social sciences as an integrated part of new funding calls would be highly recommended.

2) **Process for Understanding What Customers Value**
   Customer values become more sophisticated and complex due to their involvement and engagement with a project. Putting in place a process that allows the interactions and engagement strategies with end-customers to evolve should be developed in the early phases of the project.

3) **Classifying / Segmenting Customers**
   The diverse values that end-customers hold and the context in which they live means that they respond differently to the approach adopted by the project. The project should therefore develop a system that can classify or segment end-customers, that goes beyond the identification of basic consumption levels. It is a recurring finding from all projects that segmentation should have been done as part of the project to understand why the same approach can have different outcomes for different customer segments/groups.

4) **Engage End-Customers Early**
   Involve participants in the project at the early stages to explain what is going to happen and how people will be involved. This approach creates better results and can be part of a learning loop, where pilot customers give continuous feedback to the project

5) **Rebalance the Technical Focus of Projects**
   It is observed that the emphasis of the current projects are focused on technical solutions and the installation and running of effective pilots. Not much room has been given for research into different implementation views and the preferences of end-consumers. Space to develop best practice platforms for customer engagement would be highly beneficial.

## 2.4. Data Management

### 2.4.1. Presentation

The Terms of Reference of the Data Management WG define three main themes of cooperation:

- 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

In past years, the WG has published:

- A first report about "Barriers identifications and high level recommendations" (2016).
- A second report about "Smart Grid Technical Requirements from 5G" (2017).

A third report about "Characterization of flexibility services" (2017).

### 2.4.2. Second year outcomes

During year 2018, the Data Management focused on a report on Data Handling, covering:

- Data access and storage
- Interoperability
- Cyber-security

The main deadline for such work was to provide a draft report on September 24th, to be shared with SGTF EG1 and EG3 (presentation on October 1st) and LCE-01 research projects (presentation on October 2nd).

Trialog, as the Rapporteur of BRIDGE Data Management WG, is the leader of this Data Handling topic. Therefore, it contributed to the definition of the approach and methodology for building the Data Handling report. This approach and methodology were drafted during dedicated conference calls and finalized during the WG meeting held in Brussels on June 4th and 5th 2018.

Trialog has then been responsible for the collection of the contribution from all the 18 BRIDGE projects and the writing of the first Data Handling draft report at the end of September 2019, together with the sub-topic leaders, namely ETRA (CROSSBOW project) for data access and storage, UCLL (STORY project) for interoperability and SIVECO (inteGRIDy project). Trialog then presented the results to the SGTF EG1 and EG1 on October 1st.

Trialog, RWTH and TNO, as partners representing the InterFlex project, collected and filled in the Data handling questionnaires for the different pilots in InterFlex:

- A first round, in May 2018, focused on data flows and interoperability. This questionnaire identified the different data flows between the actors and allowed to select the most relevant flows to be studied.
- A second round, in September 2018 focused on aggregator/DSO/prosumer data flows, with more precise questions on interoperability and cyber-security.

In this questionnaire the following information models for data exchanged were mostly identified: CIM, **COSEM**, **USEF**, SAREF, IEC61968, OPENADR, ISO8601, **EFI**, **OCPI**.

With 'standards' for data transfer such as: IEC60870-5-101, IEC60870-5-104, IEC61850, OCCP, MODBUS, **MQTT**, DIGITAL I/O, **OCPI**, **Web services**.

**Underlined** in the text above are the standards covered by InterFlex and to which the delegated experts contributed.

In the Data handling report, the main findings and barriers so far can be divided in three areas:

- Technical / Technological:
  - Due to the heterogeneity of the actors exchanging information and the use that is given to the information, methods should be provided to prevent sensitive information to go beyond the limits where it can legally be used.
  - No common strategy for data management model (in particular shared database model vs message-based integration).
  - The information model is broadly flagged as a serious barrier. "A lot of standards are existing in parallel; and you find a lot of proprietary models".
  - The information communication is enjoying general progress in this domain (e.g. Wi-Fi and 4G being widely available).
  - A secured grid communication infrastructure has a high cost, and lack of common approach between countries/manufacturers.
- Market behavior:
  - The market does not induce equipment vendors to offer up-to-date ICT when the available and really obsolete IT suffices to be competitive.
  - Several countries are facing a strong consumer resistance in installing smart meters due to invasion of privacy.
- Legislation:
  - GDPR requirements will need the systems to be re-designed and data collection and storage approach to be adjusted.
  - Some conflicts appear between current regulation and smart grid needs, e.g.
    - Billing logic vs grid constraints
    - Limit amount of stored data (privacy) vs requirement to keep metering data (regulation)

Currently InterFlex is discussing in one of their InterFlex BRIDGE meetings on 'InterFlex' recommendations and suggestions.

## 2.5. Other working groups

See deliverable D4.4 Proceedings of yearly workshops towards DSOs, regulatory bodies and other stakeholders – 2nd year.
The presentation of InterFlex project during the BRIDGE session at the European Utility Week in November 2018 is detailed in the above-mentioned deliverable.

# 3. SHARE OF BRIDGE ACTIVITIES WITH ALL INTERFLEX MEMBERS

The InterFlex consortium delegated eight experts to contribute to the four existing working groups: Accenture and Avacon for Regulation, RWTH, TNO and Trialog for Data Management, E.ON for Customer Engagement and Enedis and Engie for Business Models. It is understood that they are the voice of the whole consortium and bring to the working groups data and knowledge, which have been agreed upon by the whole consortium.

In order to implement a dialogue on BRIDGE initiative among the WG experts and the rest of the consortium, two main actions were taken in 2018:

- Organization of an internal meeting within the consortium;
- Implementation of a BRIDGE consultation process.

Both actions are detailed below.

## 3.1. Internal meeting within the consortium

On the 27th of November 2018, a consortium meeting was held in Eindhoven in order to share on the BRIDGE activities with the whole InterFlex consortium.

| **27th November 2018**<br>**Venue:** Blue collar hotel, Klokgebouw 10, 5617 AA Eindhoven, https://www.bluecollarhotel.com/en/ | | | | |
|---|---|---|---|---|
| **Time** | | | **Speaker** | **Topic** |
| **Start** | **End** | **Duration** | | |
| *9:00* | *9:30* | *0:30* | *All* | *Welcome coffee* |
| 9:30 | 10:15 | 0:45 | Trialog, TNO, RWTH | Bridge – WG Data Management |
| 10:15 | 11:00 | 0:45 | E.ON | Bridge – WG Customer Involvement |
| 11:00 | 11:45 | 0:45 | Avacon, Accenture | Bridge – WG Regulation |
| 11:45 | 12:30 | 0:45 | Engie, Enedis | Bridge – WG Business Model |
| *12:30* | *13:30* | *1:00* | *All* | *Lunch* |
| 13:30 | 14:15 | 0:45 | Enexis | Presentation on the Dutch pilot |
| 14:15 | 16:00 | 1:45 | Enexis | Field Visit: SSU, EVSE's and solar car experience |
| *16:00* | *16:15* | *0:15* | *All* | *Discussion, wrap up* |

*Figure 5 Agenda of the InterFlex consortium meeting on BRIDGE, 27th November 2018*

In the morning, each InterFlex representative in BRIDGE presented the work achieved in 2018 in its own WG.

This meeting was an opportunity to discuss the issues addressed by the InterFlex partners in terms of Regulation, Data Management, Business Model and Customer Engagement. Some partners identified topics in which they can bring their experiences and recommendations, which will create a strong added value for the BRIDGE initiative.

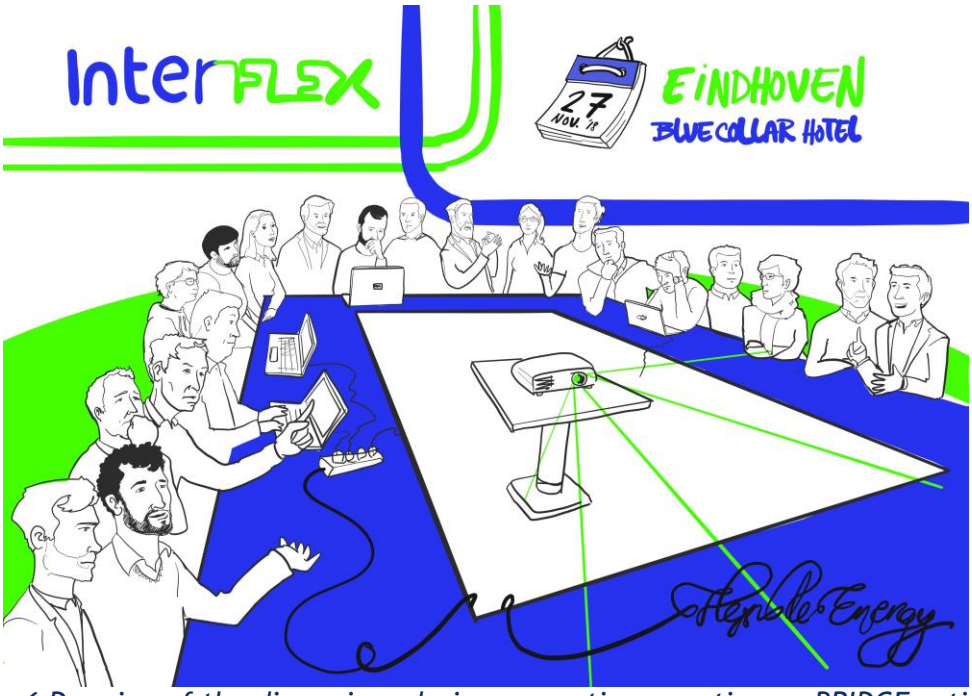



*Figure 6 Drawing of the discussions during consortium meeting on BRIDGE activities*

In the afternoon, some experts from Enexis presented the architecture of the platform used in the Dutch demo. The consortium then visited the area of the Dutch demonstrator and experienced a drive in the solar car. This solar car, developed by students of the Eindhoven University of Technology, will be used in the Dutch demo for vehicle-to-grid application.

*Figure 7 InterFlex members experiencing a solar car after the consortium meeting on BRIDGE activities*

## 3.2. BRIDGE consultation process

A BRIDGE consultation process were implemented in order to increase the InterFlex exchanges prior to the submission of a BRIDGE report.

This process is a consultation and validation procedure whose aim is to give each InterFlex partner the opportunity (not the obligation) to comment on the reports created by the different working groups. Since 2018 reports were already written when the process was implemented, this latter will be applicable in 2019.

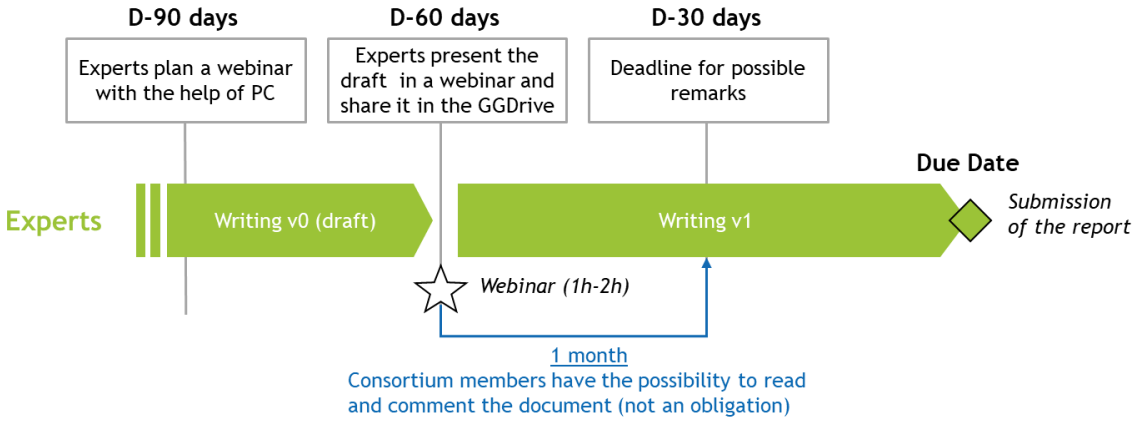



*Figure 8 BRIDGE consultation Process implemented in InterFlex*

Members of the consortium can identify experts within their company for each WG, who can attend the BRIDGE webinars and give their feedback to the WG reports.

For specific report requested by the European Commission with short deadlines (1-2 months), this process should be adapted as much as possible.

# 4. REFERENCES

1. Grant Agreement number – 731289 - INTERFLEX – H2020-LCE-2016-2017/H2020-LCE-2016-SGS
2. D4.4 Proceedings of yearly workshops towards DSO, regulatory bodies and other stakeholders -2nd year

# 5. APPENDIXES

Within the Business Model working Group (see section 2.1 of the present deliverable), ENGIE and ENEDIS designed two questionnaires:

Annex 5.1: **Data and financial flow organization for the different players**
This questionnaire was designed and sent to DSO and aggregators to define what flow needs to be set up in order to let the market work and propose an organisation;

Annex 5.2: **Market design for the use of flexibility by the DSO:**
This questionnaire was designed and sent to DSO to understand what their flexibility needs are, what commercial organisation could be set up and how a DSO could use the flexibility provided by the aggregators.

## 5.1. Data required for flexibility market existence and organization

*Local flexibilities may create value for the Distribution System Operator (DSO) either by postponing grid investment or by solving grid's constraints. In the first scenario, flexibilities may allow grid reinforcement measures to be done at a later time. In the second scenario, using flexibilities to solve grid constraints, flexibilities may be used to keep the quality of the distributed energy even when incidents or works on the grid are necessary.*

*The following questionnaire aims at understanding what data are required to be exchanged between market players (DSO, aggregators, B2B/B2C clients) to create and organize a useful and operational local flexibilities market.*

## TOPIC 1: Development of local flexibility market

- **What are the data required to identify a place where local flexibility is required?** Information about constrains localization, constraint occurrence, price of the flexibility (cost of shifting grid reinforcement, of solving grid constraint..)..
  ⇨ Type of data, way of collecting the data, way of exchanging the data

Note: FutureFlow is focused on TSOs' cross border aFRR market and not on DSOs' markets.

- **What are the data required to develop the local flexibility market ?**
  Market data (prices, liquidity, maturity of offers), public data giving visibility on products/prices on the short term and mid-term in order to incentivize players to develop flexibility portfolio where it is required and economically interesting for the system.
  ⇨ Type of data, way of collecting the data, way of exchanging the data

Note: FutureFlow is focused on TSOs' cross border aFRR market and not on DSOs' markets.

- **How many actors are required to develop a healthy competition with price transparency without price confidentiality breach?**
  **What is the data required for making the competition healthy?**

Note: FutureFlow is focused on TSOs' cross border aFRR market and not on DSOs' markets.

## TOPIC 2: Operation of flexibility market

- **In your project/views, can you briefly describe the process for flexibility exchange between the player ?**
  Day-ahead offers, intraday offers, yearly tender..

FutureFlow proposed procurement procedure envisages separate procurement of aFRR balancing capacity and balancing energy. One of the main argument for this is that combined procurement of balancing capacity and energy cause lower liquidity of balancing market. With combined procurement, gate closure time for balancing energy bids must be aligned with the gate closure time of balancing capacity bids, which is at best one day ahead (currently in FF related countries it is: Hungary Quarter yearly/W-1/D-1, Romania Quarter yearly/W-1/D-1; Austria W-1; Slovenia Y-1). This longer distance between bidding and energy delivery causes more uncertainties for potential suppliers and leads to reduced market competition. Reduced market competition produces in most cases exercise of market power and higher costs for balancing services. On the other hand, unbundled procurement of these two services and closer to real time balancing energy bids submission, will favour participation of smaller portfolios also, especially the ones combined of DR/DG (mainly RES).
Therefore, working assumption for FF target model is that balancing capacity is procured on a week-ahead timeframe. Bids for aFRR balancing capacity (in general standard and specific) include:

1. offered quantity for balancing capacity,
2. direction of activation (upward/downward),
3. product resolution
4. balancing capacity price
5. connecting TSO

All selected bids for provision of balancing capacity are obliged to submit the energy bids in bidding for balancing energy. These selected balancing capacity bids, which guarantee balancing capacity, will submit the energy price in bidding for balancing energy.
Bidding for balancing energy provision is organized on intraday timeframe, with gate closure time 30 min before the real time. Balancing energy bidding list is comprised from energy bids of pre-procured balancing capacity providers and additional "free" energy-only bids from other prequalified market participants.
Bids for aFRR balancing energy include:

- offered quantity,
- direction of activation (upward/downward),
- price and
- product type (standard /specific)
- in case there was balancing capacity exchange among the TSOs: connecting TSO, contracting TSO[1]

FutureFlow will investigate both options: one with only standard products with harmonized FAT in all participating TSOs allowed on the CAF platform, as well as the hybrid solution with both standard and specific products allowed to be exchanged over the CAF platform (with standard product being eligible for activation in all four control areas, and specific products with slower FAT being e.g. eligible for activation in Slovenia, Hungary and Romania, but not in Austria)
On the basis of submitted and verified balancing energy bids, each TSO will create local merit order lists for both upward and downward direction (based on bid prices) which will be forwarded to the regional FutureFlow common activation platform. Local merit order lists will be aggregated on the platform to form a Common Merit Order List (one for upward, and one for downward direction) which will include all previous information on bids with additional information of originating control area for each bid.

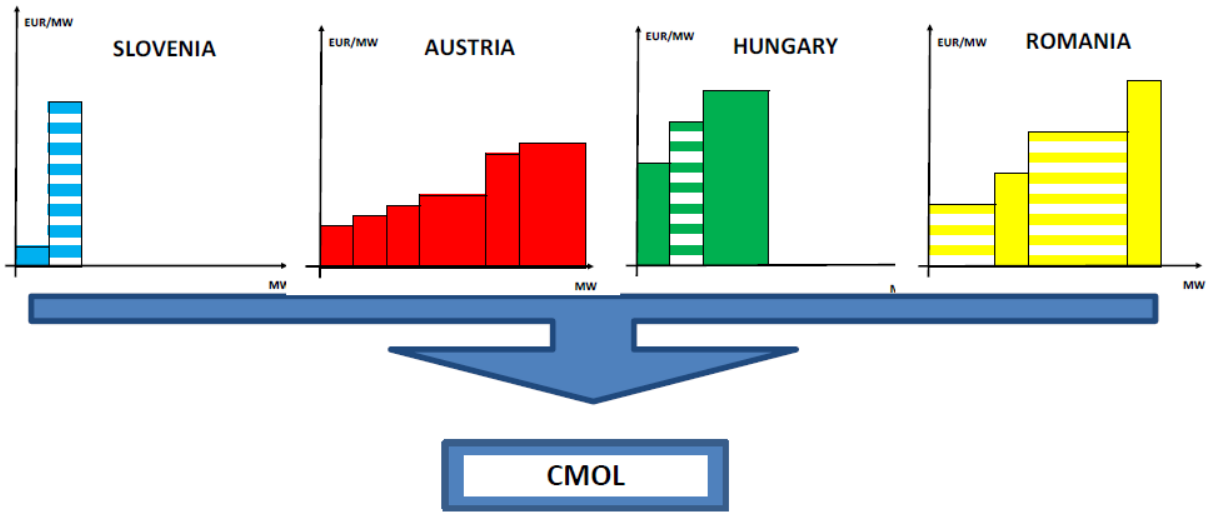



Figure 9 – Example of Common Merit Order List creation

- **What are data flows associated to this process to monetize local flexibility?**
- **From a DSO point of view ? From an aggregator point of view?**
  Flex offers (quantity, prices, maturity), activation orders, localization of the offer on the grid, duration..
  ⇨ Type of data, way of collecting the data, way of exchanging the data

Note: FutureFlow is focused on TSOs' cross border aFRR market and not on DSOs' markets.

## TOPIC 3: Settlement process

*Following flexibility activation process, a settlement process has to be implemented for financial exchanges (players remuneration or penalties in case or default).*

- **What are the data required to check flexibility activation?**
  Baseline consumption, realized consumption..
  ⇨ Type of data, way of collecting the data, way of exchanging the data

There is no perfect verification method which could cover all types of units with the underlying characteristics and all the different requirements of the individual TSOs approaches and requirements of market clearing rules. In particular, the FAT requirement of the individual TSOs varies between 5 min to 15 min, and the tolerance bandwidth for aFRR activation is defined differently by each TSO. Each TSO defines some specific terms depending on the characteristics and requirements of the control zone but anyhow tries to avoid unnecessarily strict rules, which could result in a barrier for new market participants and as a consequence the TSO or balancing market operator would have to deal with the disadvantage of low market liquidity or even too less market participants to provide the required amount of aFRR.

Given to these facts it seems to be a reasonable approach to be flexible in the definition of baselines as long as a transparent and reliable method is applied. It proved to be a good practice that the provider can propose a baseline calculation method during the pre-qualification procedure which will be evaluated by the TSO. There is no known baseline methodology which could cover the specific characteristics of many industrial consumers or portfolios of industrial consumers. Usually these consumers can provide flexible capacity only for a limited time period. The integration of industrial consumers with limited availability into portfolios and the reduction of aFRR product duration should facilitate the reliable provision of flexible capacity. Some TSO and portfolio operators mention that product durations longer than 4 h are not favorable for these kind of consumers and recommend further investigations to develop a new baseline methodology for industrial consumers.

Since baselines based on power market trading schedules are a commonly used baseline method, the procedure for verification of an aFFR activation based on the analyzed requirements is summed up in Figure 18 (FutureFlow, Deliverable 1.1 Selection of DR and DG units for participation in aFRR markets).

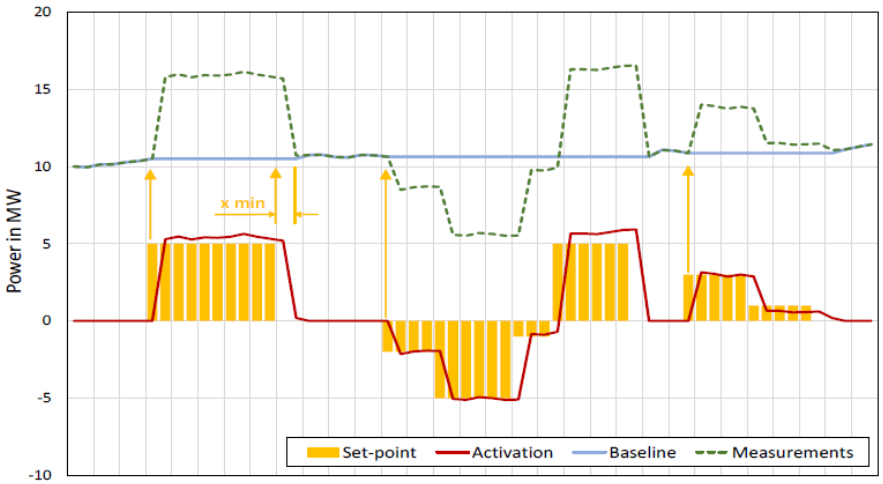



*Figure 18: Example of the baseline method "continuation of the current measurements value at reception of activation command"*

The basis is a data series of real measurements and the trading schedule (1). The measurements are sent to the TSO in real time (or close to real time) but the schedule can be sent in advance in some cases. In case of too much noise on the measurements a real time filtering method might be applied before sending the data to the TSO. Additionally, discrete steps in the baseline must be converted into ramps (2). As soon as an aFRR activation command is received the baseline must be corrected to the level of the last

measurements (3) and will then be fixed for the duration of the activation. If the baseline has to be send in real time in parallel to the measurements, the correction also must be performed in real time. Finally, the aFRR activation is calculated as the difference between the filtered measurements and the corrected baseline (4). Then all the required data is processed and can be send to the TSO close to real time.
This procedure provides a quite general approach. Depending on the resource characteristic, the behavior of a pool of resources and the requirements of the TSO some of the steps might be negligible in certain cases.

- **What are the data required to calculate rewards/penalties for each player?**
  ⇨ Type of data, way of collecting the data, way of exchanging the data

To monitor in FutureFlow curtailment performance of DR/DG units and later calculate rewards/penalties for each player the following data is needed:

- Selection of pool (group of DR&DG units)
- Measurement data
- Baseline data (optional)
- Forecast data -relative
- Forecast data – absolute
- Returning set-point

## TOPIC 4: Other questions

- **In your views, which barriers do you identify for flex market development?**

Note: This was not investigated in FutureFlow.

- **What would be the obstacle to data sharing between the local players ?**

Note: This was not investigated in FutureFlow.

## 5.2. Market design for the use of flexibility by the DSO

**TOPIC 1: Technical use cases for the DSO**

*Local flexibilities may create value for the Distribution System Operator (DSO) either by postponing grid investment or by solving grid's constraints. In the first scenario, flexibilities may allow grid reinforcement measures to be done at a later time. In the second scenario, using flexibilities to solve grid constraints, flexibilities may be used to keep the quality of the distributed energy even when incidents or last-minute works on the grid are necessary.*

1.1 Flexibility use on the MV level

- *Do you already use or planning to use flexibility for use cases of the MV level? Which use cases associated?*
- *Are these use cases are pilot tested or deployed at large scale?*
- *Which barriers do you identify for use case implementation? (e.g. power flow computation for need estimation, investment computation, contractual principles, lack of flexibility offer, no actual need for flexibility due the current level of renewable generation/EV)*

1.2 Flexibility use on the LV level

*The LV level is now characterized by a lower observability for the DSO, due to less sensors, as well as the low reliability of forecasting tools at this reduced scale.*

- *Do you already use or planning to use flexibility for use cases of the LV level? Which use cases associated?*
- *Are these use cases are pilot tested or deployed at large scale?*
- *Which approach are you using or planning to use on the LV grid: flexibilities managed remotely or local enslavement? Or a hybrid approach?*
- *Which barriers do you identify for use case implementation? (e.g. power flow computation for need estimation, investment computation, contractual principles, lack of flexibility offer, no actual need for flexibility due the current level of renewable generation/EV)*

1.3 Type of flexibility used

*Flexibility can be retrieved from several means, such as demand side management.*

- *What type of flexibility are you already operating or planning to operate for local purposes?*
- *Are you leveraging or planning to leverage other energy networks (gas, heat networks…) to provide local flexibility, and if yes, for which use cases?*

**TOPIC 2: Procurement strategies**

*The procurement of flexibilities by the DSO may be made either through over the counter (OTC) agreements or through an organized market. OTC agreements can be adapted to flexibilities that cannot or would not be part of the national flexibility market. When the potential flexibility volume allows, OTC agreements should be part of a market-based process.*

- *In your views, who should manage flexibilities for solving distribution grid constraints? The DSO directly by contracting with customers or the DSO through an aggregator contracting with clients?*
- *If any, which approach are you testing? OTC agreements or market approaches?*

**TOPIC 3: Local market**

*On the local scale, flexibility can be used by the TSO or the DSO to relieve grid constraints, but also by other stakeholders to foster self-consumption.*

- *In your views, does a local market make sense?*
- *In your views, are you thinking of a local energy market, in the sense of commodity, or local flexibility market, in term of services, or an hybrid approach?*
- *If yes, who in your view should operate such a market platform? Should such a local market platform be opened to other*

**TOPIC 4: Market design and compensation**

*These flexibilities could be remunerated on both the capacity and energy or on energy only. The first option is more adapted to cases in which the activation of the flexibility is unsure. Penalties can be introduced in order to incentivize flexibility reliability*

- *Are you already compensating some flexibilities?*
- *If yes, how do you assess or measure the value of local flexibility services? How do you price such services?*
- *If no, how would you price such services?*
- *Which contractual approach would you propose?*

**TOPIC 5: Product Standardization**

*The TSO products for balancing for example are already standardized. The DSO products are more specific to the location and the type of the grid.*

- *Did you already standardize some flexibility products for the DSO use?*
- *If no, which barriers are you identifying?*

**TOPIC6: TSO-DSO Interaction**

*In many countries, the flexibility is already used by the TSO to serve balancing purposes.*

6.1 Impact on the distribution grid of flexibilities activated for the TSO

- *Did you perform studies to assess the potential negative impacts on the distribution grid of flexibilities activated for the TSO or national markets?*
- *In your views, the activation of flexibility connected on the distribution grid for national markets/mechanism could have negative impact for the DSO operation?*

6.2 Flexibility exchanges at DSO/TSO interfaces

- *Do you have an interface to exchange flexibilities with the TSO at DSO-TSO interfaces?*
- *Which use cases are you testing in association with the TSO? (e.g. reactive power at TSO/DSO interfaces, active power to relieve the upstream HV line…)*