“REAL PROGRESS ALONG THE ROAD TO FLEXIBILITY”

ANNUAL EVENT ON EUROPEAN ENERGY POLICIES AND PROJECTS

panel debates key takeaways

10th May 2022

CONTENTS

GENERAL INTRODUCTION AND OBJECTIVES OF THE PAPER

The current paper summarises the main ideas and messages communicated by the participants of the event “Real progress along the road to flexibility”, organised by E-REDES on the 10th of May. The event managed to bring together eighteen speakers and panellists from ten different European Projects.

These not only managed to share their ideas and best practices provided by the projects, but also some bottlenecks and recommendations, that build on their field and practical experience, that could best promote an effective and timely introduction of flexibility markets in the European Union.

The paper is organised to reflect the structure of the discussion on each of the two panels, first addressing the foundations that should be considered in the development of flexibility markets, and secondly, the practicalities of these markets. A compilation of best practices is identified in each of the sections, which are then followed by some notes on the main development gaps and on what still needs to be done to implement these markets.

WORKSHOP AGENDA


E-REDES

May 10th, 2022 |09h30 / 13h00 (WET)

"REAL PROGRESS ALONG THE ROAD TO FLEXIBILITY"

09h30 Session Opening – José Ferrari Careto (CEO of E-REDES)

09h40 Mugurel-George PAUNESCU (European Commission Policy Officer)

10h00 Panel 1 "Foundations that underpin flexibility" - *Moderated by Rita Lopes Mourão (E-REDES) with the participation of Coordinet; X-FLEX; FlexPlan; EUniversal and Interconnect*

11h10 Coffee Break

11h30 Panel 2 "Flexibility in action" - *Moderated by Madalena Lacerda (E-REDES) with the participation of OneNet; Platone; Interrface; Fever and Parity*

12h40 Key conclusions and closure – Luís Vale da Cunha (E-REDES)

13h00 Lunch

coordiNET X-FLEX FlexPlan EUniversal interconnect ONENET Platone INTERFACE FEVER PARITY

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FOUNDATIONS THAT UNDERPIN FLEXIBILITY

This panel covered three key areas that are fundamental for the implementation of flexibility markets, being: Planning & Forecasting; Network Coordination & Operation; and Interoperability & Data Exchange. The goal is not only to understand what best practices are being applied within the European projects, but also, what is still missing, to guarantee that flexibility markets respect these key pillars.

PLANNING & FORECASTING

1. Long-term planning benefits

- FlexPlan established a new grid planning methodology, introducing new storage and flexibility resources in electricity transmission and distribution grids as alternative to building new grid elements. This will: (1) reduce operational costs, as flexibility manages the forecast uncertainty; and (2) lower the environmental impact, repercussion from reduced network expansions.

- Flexibility is mostly expected to be installed at that distribution level, but it can (and should) contribute both to the planning and to the daily operation of distribution and transmission grids. So, to fully exploit the needed degree of flexibility, TSO-DSO cooperation is vital in the planning phase.

2. Flexibility services in planning and operation

- Enabling market-based flexibility services imply a change in distribution network monitoring and control towards a more predictive approach. Adopting data-driven tools, taking advantage of historical data from smart metering and other sensors, can help reducing investment requirements in monitoring equipment and related infrastructures.
- EUniversal developed long-term planning and day-ahead operation planning tools considering market-based flexibility as an active management asset.
- A coordinated quantification of flexibility needs and activation of flexibility in HV, MV and LV distribution networks is promoted by these tools. This multi-level preventive management framework for enabling DSO procurement of day-ahead market-based flexibility services for congestion management (CM) and voltage control (VC): i) Is capable to forecast the network status and identify a priori potential MV and LV network constraints, including LV state estimation tools to overcome limited monitoring and network characterisation; ii) Has a multi-level approach for the assessment of flexibility needs, considering the participation of LV flexibility to solve constraints at the MV level; iii) Enables the selection and validation of flexibility bids also considering the impact of flexibility mobilisation in both LV and MV network; iv) Is compatible with different market designs.

3. High-Impact Low Probability Events (HILP)

- Conventional planning methods usually ignore the effect of HILP events on the system, being hard to find CBA that justifies investments in resilience. However, it is now commonly accepted by a large percentage of TSOs and DSOs that HILP event impacts should be considered in the planning.
- Resilience planning CBA methods should consider the occurrence probability of these events and their impact on the system that could be estimated based on historical data. They should consider:
    - Hardening solutions (e.g., underground cables) to improve robustness and resistance to external shock. They can be effective to a specific threat (e.g., typhoons) but may have a negative effect in other occasions (e.g., earthquake), also implying longer repairing times.
    - Operational/smart measures, through preventive and corrective operational flexibility to deal with the upcoming event. Decentralised energy systems with large DER and DSR deployment can play a key role in resilience boosting efforts. Generating, storing, and controlling energy locally without relying on long transmission lines that might be prone to different threats can reduce vulnerability and improve response and restoration times.
- Hardening measures are usually both more effective and costly than operational ones, thus, a hybrid approach might offer an optimised and cost-effective solution to address resilience.
- X-FLEX developed a planning tool for DSOs to test different future scenarios and simulate power flow in LV networks to identify weak points and propose reinforcement measures. It also considers the impact of extreme weather events on network components and estimates load shedding requirements to maintain power balance while satisfying network constraints. The cost of reinforcement and operation will also be considered so that DSOs can benchmark the different solutions offered. The tool will allow DSOs to assess the DERs effect on the resilience performance of the system and will be complemented with several resilience metrics to investigate the effect of DERs during HILP events and on the restoration phase.

- Due to distribution system radiality, HILP events and consequent line failures, may isolate the downward part of the system. Thus, an appropriate schedule and dispatch of DERs may minimise load shedding in the isolated parts of the system and ensure uninterruptible system operation.
- EUniversal is also working to identify cost effective measures and tools for improving distribution network resilience, considering the flexibility of DER resources and their ability to ensure autonomous operation of limited areas of the distribution network.

4. Environmental footprint of flexibility solutions

- The FlexPlan planning tool minimises the environmental impact of the grid planning solutions, both for new storage systems and for grid reinforcements. The environmental impact arising from Flexibility Service Providers (FSP) assets' deployment and usage is also considered.

NETWORK COORDINATION & OPERATION

1. Barriers for TSO-DSO coordination

- CoordiNet identified the following barriers for TSO-DSO coordination:
    1. *Market timing and integration:* i) Challenge to align the timing of Local Flexibility Markets (LFM) with wholesale and balancing markets; ii) DSO and TSO: close to real-time market closure makes it difficult to evaluate grid status and flexibility needs; iii) FSPs: close to real-time market closure – technical constraints can limit participation; iv) Gaming risk.
    2. *Aggregation:* i) Flexibility validation: Independent data management to validate flexibility delivery; ii) Imbalance penalties: Who will be financially responsible?
    3. *Product standardisation*: i) Coordinate products between DSO and TSO - challenging to fulfil TSOs stricter requirements; ii) Few standard products with ranges for values of attributes - gives flexibility to TSOs or DSOs to better adapt to their needs and FSPs.
    4. *Consumer engagement*: i) Inversion required in management and control - difficulties with small FSPs, long term engagement, technical requirements, clear business model; ii) Long and complex prequalification process.

2. TSO-DSO coordination in flexibility markets

- To increase the TSO–DSO coordination, the following points must be considered: i) Assignment of responsibilities and interaction between TSO and DSO; ii) Focus on specific market phases (e.g. pre-qualification, procurement); iii) How the market phases are organised through a proper market design[1].
- Services with TSO-DSO coordination in CoordiNet[1]:
    1. *Congestion management:* Both TSO and DSO notify the common platform on the congestions identified and potential FSPs. The common platform, located in the TSO, via the Renewable Control Cent9re (CECRE), determines the optimal market solution to solve the congestion by limiting or re-dispatching FSPs previously identified. CoordiNet tested DSR participation in balancing services, requiring TSO-DSO cooperation to facilitate the delivery of services from FSPs located in the distribution. Accordingly, and through the platform, the DSO sets the limits to or excludes these FSPs to deliver balancing services.
    2. *Voltage control*: If a common DSO-TSO market has stricter entry requirements for small distribution-level resources, as compared to a local (disjoint distribution-level) market, some distribution level bids may not be able to participate to solve distribution-level congestions. Given the fact that these congestions can only be solved using distribution

[1] D. M. Utrilla, D. Davi-Arderius, A. G. Martínez, J. P. Chaves-Ávila and I. G. Arriola, "Large-scale demonstration of TSO–DSO coordination: the CoordiNet Spanish approach," CIRED 2020 Berlin Workshop (CIRED 2020), 2020, pp. 724-727, doi: 10.1049/oap-cired.2021.0209.

level resources, the volume of available useful flexibility to the DSOs is typically lower than that available to the TSOs. Hence, a priority of access to the DSO may be needed to make sure the DSO meets its needs. However, a higher pooling of resources, without priority access, to meet all the SOs needs would be the most efficient. If such a market is implemented, it needs to have inclusive entry requirements to enable the participation of small-scale resources.

3. MV and LV coordination for flexibility access

- Ensuring coordinated mobilisation of flexible resources between MV and LV networks is crucial to avoid further problems and maximise the use of the available flexibility. To tackle this, EUniversal adopted an iterative procedure for LV resources to solve technical constraints in the MV network. Also, dynamic flexibility areas are identified considering the available flexible resources and its effectiveness to solve the technical constraints forecasted. This will foster aggregation of LV flexible resources, limit the network information required to send to the flexibility markets and ensure that no additional technical problems are caused by the mobilisation of flexibility.
- It respects the following steps[2]: 1) If restrictions are detected at the MV level, the MV multi-period OPF is used to compute the operation plan for the DSO assets; 2) If technical constraints remain, the MV Flexibility Scheduling tool is used to compute flexibility needs for the MV network; 3) The Data-driven Voltage Control (DdVC) uses the expected voltage in the MV/LV substation to determine the additional flexibility required to solve LV voltage constraints and the security limits for the aggregated flexibility at the MV/LV substation; 4) The flexibility needs are sent to the market platform through the UMEI.

4. Grid Stability, Security of Supply and Grid resilience

- X-FLEX developed the following tools for Grid Stability, Security of Supply and Grid resilience, with attention given to potential impacts from HILP events: 1) SERVIFLEX: Integrated flexibility management tool; 2) GRIDFLEX: Advanced tools for automatic control and observability; 3) MARKETFLEX: Market platform and new market mechanisms. The tools will be mainly based on open and interoperable standards, to facilitate the replicability and scalability of the project solutions.
- Main barriers towards the scalability of X-FLEX solutions: 1) Technological – lack of common standards and DERs interoperability. 2) Regulatory – lack of an appropriate framework for LFMs. 3) Stakeholder acceptance – extent to which regulators, policy makers and end users are ready to embrace the X-FLEX solutions. Specifically, the lack of interest or information from prosumers and energy communities to force for rapid transition to flexibility services.

INTEROPERABILITY & DATA EXCHANGE

1. Interoperability Framework

- InterConnect establishes an Interoperability Framework capable of bridging the integration gaps “within” and “between” the IoT and the energy domains, that comprises of[3]:
    - *Semantic interoperability layer:* that uses InterConnect ontology over SAREF and is based on distributed enablers interconnecting all resources, platforms and services and enabling them to exchange data and instructions in a uniform and secure manner.
    - *Service Store:* a catalogue of all interoperable services, with knowledge exploring capabilities, service testing sandbox, automated interoperability compliance tests and streamline onboarding of 3rd parties’ services/ systems for the ecosystems to grow and expand.

[2] C. Gouveia, “EUniversal’s smart grid solutions for the coordinated operation & planning of MV and LV networks with high EV integration”, CIRED 2022
[3] InterConnect, "D5.1 – Concept, design and architecture of the interoperable marketplace toolbox”

  - *P2P marketplace enablers:* allowing community-based energy and data trading use cases to be implemented in an interoperable way with the project's ecosystem.
  - *Configurable access control and knowledge handling procedures:* for stakeholders to maintain the business logic behind their services.
  - *Methodology for a semantically interoperable ecosystem:* by instantiating and configuring Interoperability Framework enablers within and among digital platforms and services comprising the interoperable ecosystem. It results in enabling components interacting with each other, solely based on the knowledge of ontologies and ontology category.
- The InterConnect pilots bring the following innovations at the service level[4]:
  1. Portugal: i) Integration of SAREF-compliant demand-side flexibility (DSF) and behind-the-meter data from B2C customers in the distribution grids, through standardised DSO interface; ii) cross-sector business model with supermarkets offering EV charging as-a-service to their customers and integrating DSF from EV and refrigeration systems in grid management.
  2. Belgium: i) Cross-sector and multi-utility business rule engine to integrate interlinked assets; ii) Semantic Interoperability Evaluation Model for Devices in Automation Systems; iii) Digital systems exchanging data with unambiguous, shared, and agreed meaning; iv) Combination of EMSs engaging in a P2P market.
  3. France: i) Design and implementation of a Smart Orchestrator, in a dynamic tariff context, allowing the intelligent and remote control of different energy management microservices from various service providers and considering aggregated flexibility from other sources (space and water heaters, EV, white goods) in real-world conditions; ii) Blockchain-based platform to reward PV surplus with green coins, enabling P2P trading within the community.
  4. Germany: Chain of bidirectional end-to-end communication from the DSO to interoperable devices in residential and commercial environments via smart-meter gateway infrastructure, with a fully interoperable negotiation of energy consumption plans with intelligent devices to avoid loss of comfort, inefficiency, or conflicts with internal processes.
  5. Italy: Interoperable architecture of a monitoring and control IoT platform that covers the specific case of residential social housing and digitalisation of energy behaviours at the community level. It introduces and tests the role of a social aggregator to capitalise on inclusion and capability in accessing the emerging market of flexibility services.
  6. The Netherlands: i) Living-as-a-service interoperable platform (Ekco) for multi-domain heterogeneous services where users can connect all types of devices autonomously, including a data marketplace where data users/suppliers have wallets to hold loyalty tokens for data-value transfer; ii) REFLEX platform used by aggregators to maximise the value of flexible energy assets across multiple energy markets.
  7. Greece: i) End-to-end architecture combining the SAREF-ised services with existing open-source home automation systems, offering interoperability across a wide range of commercial energy/non-energy sensors, that will leverage information for energy efficiency purposes; ii) Innovative DSF services, based on machine learning algorithms, to exploit high-temporal resolution measurements and crowdsourcing mechanisms.

2. Universal flexibility market interface

- The UMEI[5] will materialise in the conceptual architecture design and the implementation of a standard, agnostic, adaptable, and modular combination of different publicly available APIs to

[4] InterConnect, "D1.1 – Services and use cases for smart buildings and grids"
[5] EUniversal, "D2.4 – UMEI API functional specification of DSO Interface for standardised market platforms Interaction"

link DSOs and market parties with flexibility market platforms, in coordination with other flexibility users. It will allow distributed communication without the need for a central hub.

- EUniversal is analysing the most effective approach to ensure interoperability while considering the functionalities that DSO information systems can support, considering: i) DSO preparedness to implement the solutions developed; ii) specific EUniversal characteristics and requirements; iii) existing implementation landscape, where some DSOs use customised data models and others resort to CIM.
- Existing information models do not fully cover local market flexibility exchange. For these reasons, the UMEI will, whenever possible, respect compatibility with the CIM, although this will require further developments, alongside full normalisation on data exchange by European responsible bodies.

BEST PRACTICES

The following figure summarises the main best practices from the five projects represented in the panel, comprising content both from the presentations and panel discussion, and focusing on the three different areas here analysed.

Planning & Forecasting

- New grid planning methodology considering storage and flexibility resources as alternative to network expansion [FlexPlan]
- Planning tool that takes into account the environmental impact arising from the deployment and use of FSP assets [FlexPlan]
- Long-term planning and day-ahead operation planning tools considering market-based flexibility as an active management asset [EUniversal]
- Planning tool that tests different future scenarios and simulates the power flow to identify weak points and propose solutions for it, also modelling the impact of HILP events and load shedding needs [X-FLEX]
- Established several metrics to evaluate the effect of DER during HILP events and in the restoration phase [X-FLEX]

Network Coordination & Operation

- Both TSOs and DSOs to identify congestions and flexibility needs through CoordiNet Common Platform [CoordiNet]
- Iterative procedure to enable LV flexible resources to solve technical constraints in the MV network and dynamic identification of flexibility areas considering the available flexibility resources[EUniversal]
- Common TSO-DSO Platform that determines optimal market solution to solve the congestions by limiting or re-dispatching FSPs previously identified [CoordiNet]
- Tools for Grid Stability, Security of Supply and Grid resilience, that consider potential extreme climate event impacts and are based on open and interoperable standards [X-FLEX]
- Having DSR from the distribution side participating in system services for the TSO and DSO, via alternative, coordinated market approaches [CoordiNet]

Interoperability & Data Exchange

- Interoperability Framework to integrate IoT with the energy domains, that has semantic interoperability layer, service store, P2P market-based enablers and configurable access control and knowledge handling procedures [InterConnect]
- Smart Orchestrator, that allows the intelligent and remote control of different energy management microservices in a single space/house [InterConnect]
- Bidirectional end-to-end communication from the DSO to smart devices via smart-meter gateway infrastructure [InterConnect]
- UMEI - conceptual architecture design and standard, agnostic, adaptable and modular combination of APIs to link DSOs and flexibility markets [EUniversal]

FLEXIBILITY IN ACTION

The panel discussion covered the three different phases of the flexibility markets, namely: Preparation; Activation and Use; and Measurement and Settlement. The goal of this panel discussion was not only to understand how the European projects represented in the panel respond to the existing arising trends and barriers, but also, what is still missing, to guarantee an effective implementation, from a technical, market and regulatory standpoint.

PREPARATION

1. Data exchange

1.1. Data needs

- Data required for flexibility procurement through IEGSA (INTERRFACE): data from the smart meters needed to calculate the power flows; Grid topology data; and Product description and specifications

1.2. Tools for data exchange

- Flexibility register: INTERRFACE established a model that comprises and aggregates different flexibility-related data. It can be used for the register of FSPs and for the identification of FSPs that comply with the pre-qualification criteria (product + grid pre-qualification)
- DSO-TSO coordination model/platform by ITERRFACE: where both operators can exchange information and identify their needs

1.3. Privacy rules

- DSOs and TSOs handle critical infrastructures, meaning they have to implement and adopt the NIS Directive[6], so data privacy is an important concern.
- INTERRFACE, namely the IEGSA, respects data privacy and protection, establishing functional and non-functional data privacy requirements for specific models and processes. They have a complete list on where and how data protection needs to be considered.

2. Customer Engagement

2.1. Approaches

- FEVER followed the following steps for customer engagement: (1) Identify clients more interested/willing in participating in flexibility markets, considering their total power capacity and innovation level; (2) Rank the different customers and select those in the top ranking; (3) Face to face approach.
- The following engaging points were addressed (in FEVER):
    - Free energy audit – which is useful for both parts. For the project, allows to have a map of the loads and processes, and to identify loads with most potential. For the consumers, allows them to have a picture of the processes and ways to optimise consumption.
    - Free monitoring and control of devices – allows the system operators to have eyes and hands, i.e., to control the loads. The consumer is allowed to see real data of their consumption.
    - Cost savings – allows consumption shift to times of the day where the price is lower.
    - Marketing – the participation in flexibility markets provides a green and innovative image to the factory/brand.
- PARITY developed an end users' app to monitor their consumption.

2.2. Barriers

- FEVER addressed different sources of flexibility, namely industrial DSR, EVs and batteries, and found industrial customers to be the most challenging to address as their industrial processes were involved and no economic compensation was foreseen for their participation.
- Customers should remain business as usual, be comfortable and maintain lifestyle. To guarantee this, PARITY developed a fully automated machine to machine process that doesn't disrupt the daily life habits. For the H&C sector, it is foreseen the management and

[6] "DIRECTIVE (EU) 2016/1148 concerning measures for a high common level of security of network and information systems across the Union", Official Journal of the EU, 6 July 2016

control of HVAC systems to take over necessary flexibilities to respond to the systems' requirements, while, at the same time, making sure that the comfort is not compromised.

ACTIVATION AND USE

1. Flexibility procurement

1.1. Products

- The stakeholders should know what assets/products are being sold. We normally focus on energy, but there are other assets/products involved: network, capacity, time, comfort, among, which should be considered in the design of flexibility markets.

1.2. Tariff-based solutions

- Platone (Greek Demo) focuses on network usage tariffs, they don't charge energy.
- Tariffs should be simple and practical, therefore, Platone resorts to learning and data analytics to design tariffs, so that they don't interfere in timeframe with the wholesale market and are easy to use by customers. The methodology allows for end-users and other stakeholders to know the tariff well in advance, so they can plan their actions and schedules without surprises.

1.3. Flexibility toolbox

- FEVER established the DSO toolbox for the DSOs to act, prevent and solve issues. The platform will have two different operation modes – manual mode, where the operator will need to be constantly working with the platform; automatic mode, where there is no human interaction. For the automatic mode, there are different settings that can be defined by the operator, e.g. decide which services to have running; which type of events to predict; prioritise actions, i.e., if the DSO wants to solve a specific issue, it can decide how it prefers to solve it (via bilateral contracts, market, etc); set minimum and maximum prices; among others.
- Dashboards developed by FEVER: (1) Notification: operator can see all the events predicted, by type, severity, location, time; (2) Reporting dashboard: operator can have a full report on the past actions and transactions, which is good to identify patterns and trends, and to make intelligent business operation and actions.

2. Coordination between entities

- The scalability of OneNet architecture is needed to decrease entry barriers and allow the full participation of stakeholders, regardless on their location and size, and is achieved through product harmonisation, i.e., standardised products, which reduces market fragmentation. It also facilitates participation of aggregators and helps in the investment decision making.
- In INTERRFACE, the coordination is especially envisaged in the pilots. Different types of entities, including ENTSOE and IEA, came together to identify the different services to be tested in the pilots. DSO-TSO coordination and data and information exchange is done through the IEGSA platform.

3. Coordination between markets

- OneNet aims to create a fully replicable and scalable architecture for Europe, willing to integrate different markets in one, for the multiple needs of the SO (both TSOs and DSOs). Through product standardisation, one product can be used at the same time for different purposes, e.g. for both congestion management and balancing.
- The establishment of a common market framework for the procurement of flexibility envisaged in OneNet helps in the definition of parameters for the different markets and a better integration and coordination between those markets and between the stakeholders involved.

MEASUREMENT AND SETTLEMENT

1. Flexibility verification

- A baseline needs to exist to calculate the amount of flexibility offered, which is difficult to establish especially for simple consumers, as they usually don't declare a specific schedule and there are uncertainties in demand patterns. This situation hampers this type of

consumers to offer all the range of products needed and requires careful consideration in the design of flexibility markets.

- PARITY is developing an IoT data-driven approach to define the baseline, which requires a strong data management framework.
- Traditionally it would be the DSO who takes this task (verification), but it is one of the things that is currently being disputed.
- Within the verification process, it is crucial to guarantee the security and privacy of end customers. For that, PARITY is using a blockchain process to provide data to authorised stakeholders that are part of the process.
- The settlement is a problem that needs to be holistically addressed from regulatory to technologically basis.

BEST PRACTICES

The following figure summarises the main best practices from the five projects represented in the panel, comprising content both from the presentations and panel discussion, and focusing on the three different phases here analysed.

Preparation

- Flexibility register [INTERRFACE & OneNet & Platone]
- Functional & non-functional privacy requirements for models and processes [INTERRFACE]
- Blockchain access platform: intermediate layer between the customer and the project's ecosystem based on a device installed in customer's property [Platone]
- Ranking process for customer identification [FEVER]
- Different engagement approaches: free audits; free monitoring & control; cost savings; marketing "green label" [FEVER]
- Standardised flexibility products [OneNet]
- Traffic light concept to define grid network state and grid constraints [PARITY]
- Price signals embeded in network usage tariffs, that are defined well in advance through learning and data analytics tools [Platone]

Activation & Use

- Market Platform that matches System Operators requests and Flexibility offers [Platone]
- Data management middleware that links all stakeholders with embedded TSO-DSO coordination platdorm [INTERRFACE]
- EU replicable and scalable arquitecture, integrating different markets in one for all SOs needs [OneNet]
- Merit order list is established for flexibility offers, in ascending price order [Platone]
- DSO toolbox for flexibility procurement [FEVER]
- Optimisation tools to determine best value stack solution [OneNet]
- Asset control schedules at prosumer level, generated and applied automatically for the controllable assets available on-site, respecting end user's comfort [PARITY]
- Tools for P2P flexibility trading and local community management [FEVER]

Measurement & Settlement

- Connection to datahubs for settlement data validation [INTERRFACE]
- IoT data-driven approach to dynamically forecast and define the baseline [PARITY]
- Blockchain agent to perform the settlement phase, to: provide data to authorised stakeholders; add tokens to consumers' wallets; and, apply penalties based on the rules (KPIs) [PARITY]

WHAT IS NEEDED?

As a final remark to this event, it is important to highlight the main ideas on what is still needed and missing to effectively implement flexibility markets in Europe. The figure below provides a summary on these main ideas, according to the messages and positions defined within the workshop by the ten different EU projects represented.

Planning

- For normal operation:
  - Incentivise private investors to deploy flexibility resources and their participation in real time markets to compensate RES variability.
  - Facilitate the participation of flexibility resources in real time markets by creating a set of specific products.
  - Push TSOs and DSOs to modify planning procedures to favour the deployment of flexibility resources, also keeping in mind TSO-DSO cooperation for acquiring resources from distribution.
  - Implement adequate planning tools, capable of testing different future scenarios and simulate the power flow to identify weak points in the network and propose reinforcement actions to tackle them.
- For HILP events:
  - Hybrid planning approach (hardening + operational solutions) that considers HILP event impacts and their probability.
  - Appropriate DER schedule and dispatch to minimise load shedding and ensure uninterruptible system operation during HILP events.

Coordination

- Coordinated mobilisation of flexible resources between different voltage levels to maximise the use of the available flexibility without causing further grid problems.
- Either implement a priority access to DSOs for distribution level flexibilities or establish inclusive entry requirements in multilevel markets.

Data & Interoperability

- Interoperability is needed to make sure every player is able to participate throughout the entire value chain without barriers and to help monetise assets.
- Conditions need to be created in the short-term for DSO-Market interaction, through open and simple interfaces that can guarantee this objective without having to wait for standardisation, which usually takes too long.
- Interoperability solutions should consider DSO preparedness for adoption of the different soltuions.
- Interoperability needs to be ensured either by finding high-level interoperable solutions or ensuring compatibility between the different information models applied.
- Required ability and technology to collect, monitor, handle and distribute data (both real-time and historical) through robust and trustworthy infrastrucure.

Consumer Engagement

- Considering that flexibility markets are still not mature enough, market liquidity needs to be urgently tackled, e.g. through effective consumer engagement approaches.
- Adequate tools are needed to engage with the consumers in a non-intrusive way.
- An evaluation needs to be carried out to perceive and quantify the economic value of flexibility to the different FSPs.
- Adequatly communicate how FSPs could gain value from the flexibility markets.

Market & Regulation

- Since the successful implementation of the discussed solutions and measures depends on the regulatory reality and level of transposition by the different EU Member States, strong effort needs to be done on the adaptation of national regulation.
- Implement single incentives per timeframe and voltage level and leave energy products for the wholesale market, thus focusing on different approaches for flexibility at local level.
- Revise the entire market chain architecture to favour participation from distribution while discouraging exercise of market power.
- Attention needs to be given to the new aggregator figure, providing a credible and financially sustainable role for it.