EU-SysFlex

INNOGRID 2020+ PROJECTS SESSION: FLEXIBILITY & NEW MARKETS

RESULTS FROM TASK 3.2: MARKET DESIGN

Jan Budke, innogy SE

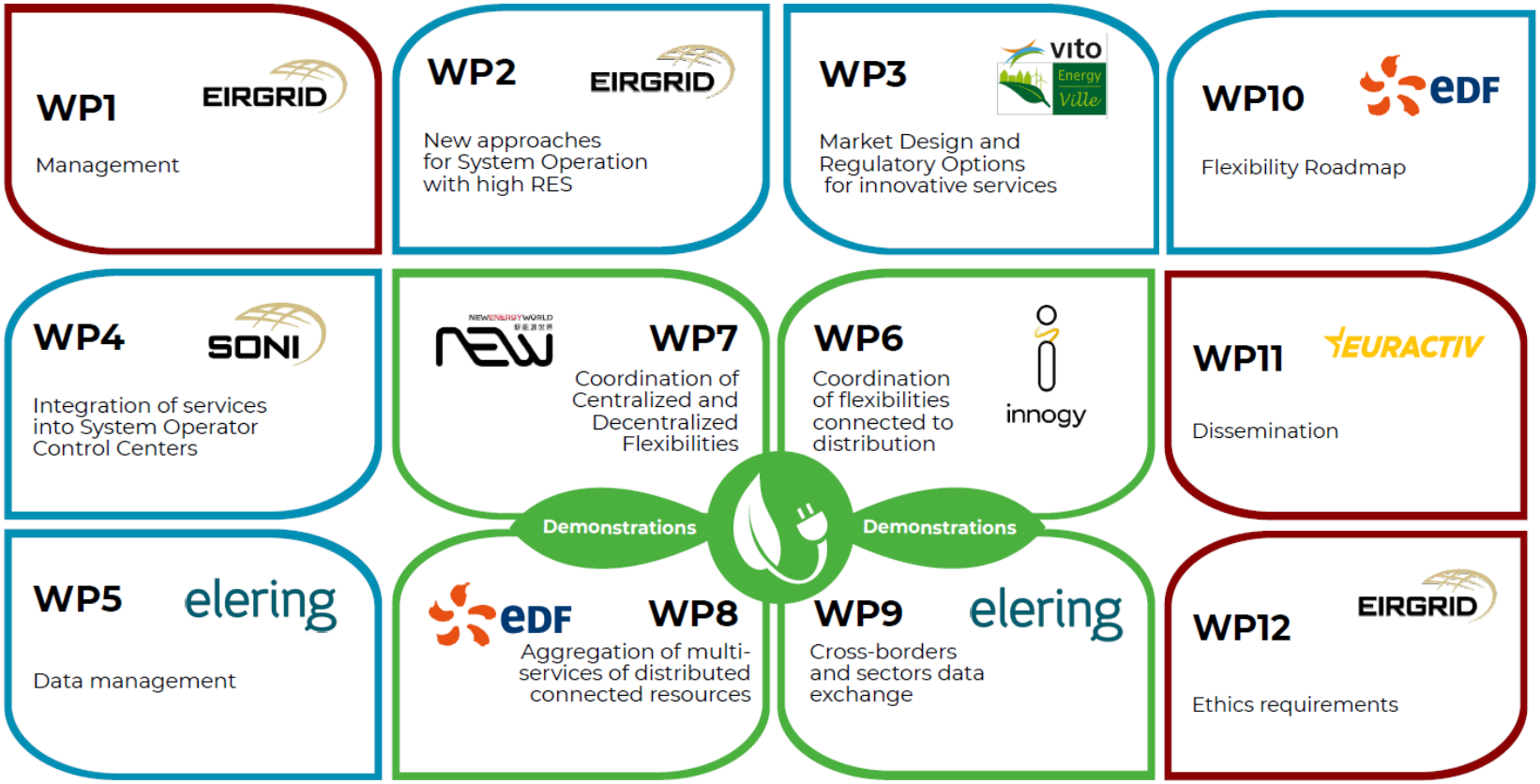
June 30th, 2020

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 773505.

EU-SysFlex Project Structure

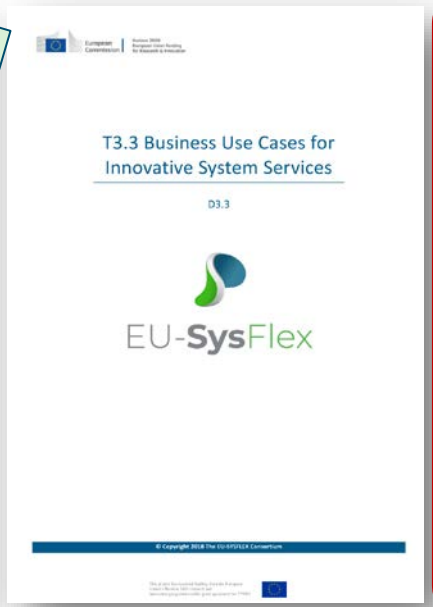
Key facts:

H2020; from 11/2017 to 10/2021; € 26.5 mn budget; 34 partners; 7 demos



WP3: Analysis of market design and regulatory options for innovative system services

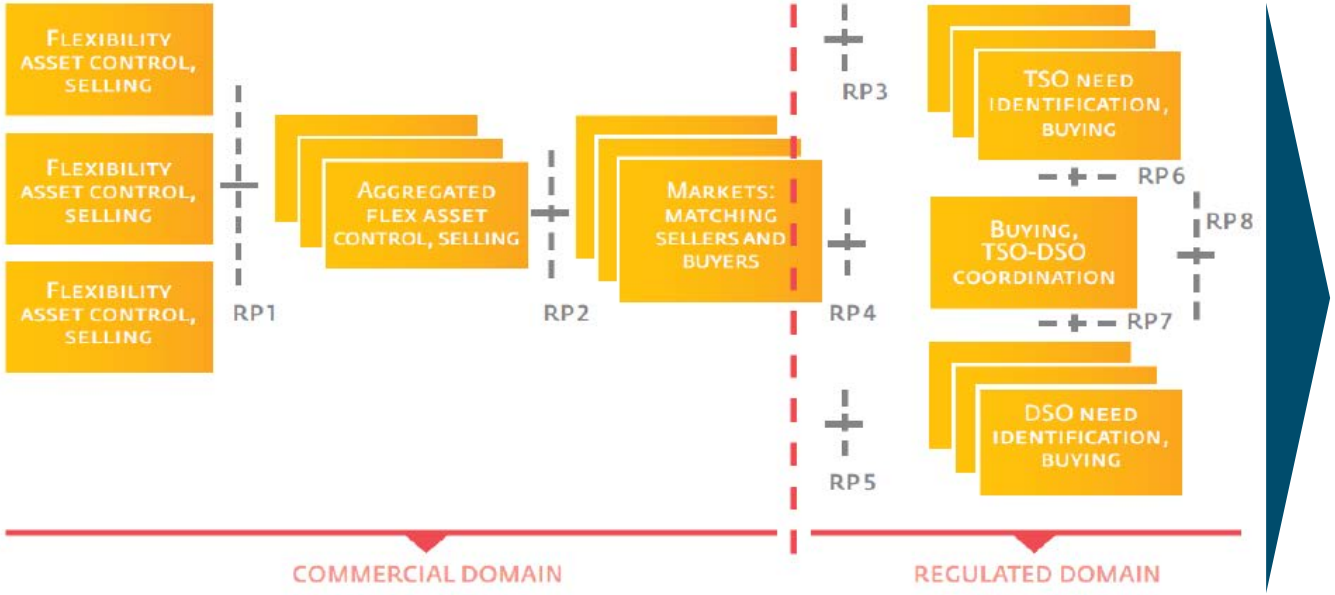
Qualitative assessment



Quantitative assessment

All deliverables online at: https://eu-sysflex.com/documents/

The *ASM report* serves as basis for discussing TSO-DSO coordination and interfaces with the flexibility markets



RP_x = REFERENCE POINT X

Reference points (RPs) identifying data exchanges in both the commercial and regulated domain.

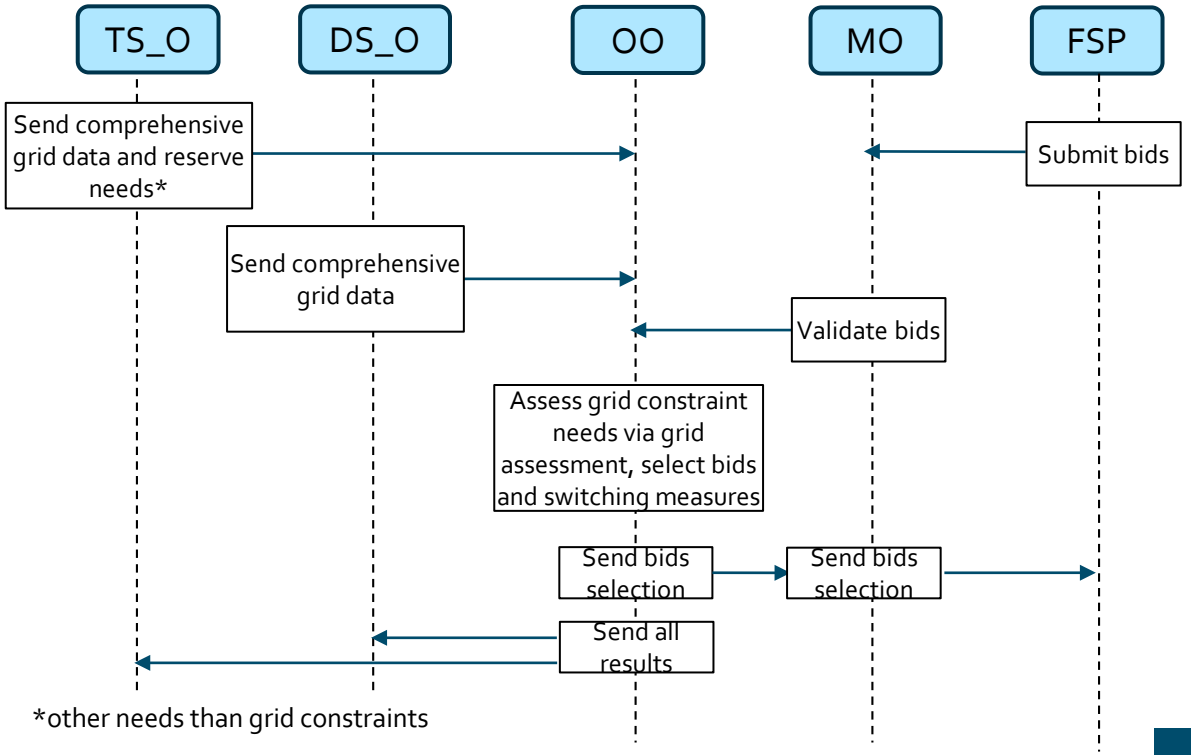
Source: TSO-DSO Report „An integrated approach towards Actice System Management".

Major questions:

- Who selects bids?
- Based on which data?
- Centralized or decentralized?
- One or many marketplaces?
- Balancing with or w/o congestion management?

➡ To analyse the implications of the allocation of the task "bid selection" to different actors, the new role "optimization operator" was introduced.

Centralised optimisation with comprehensive grid data



TS_O: Transmission System Operator

DS_O: Distribution System Operator

OO: Optimisation Operator

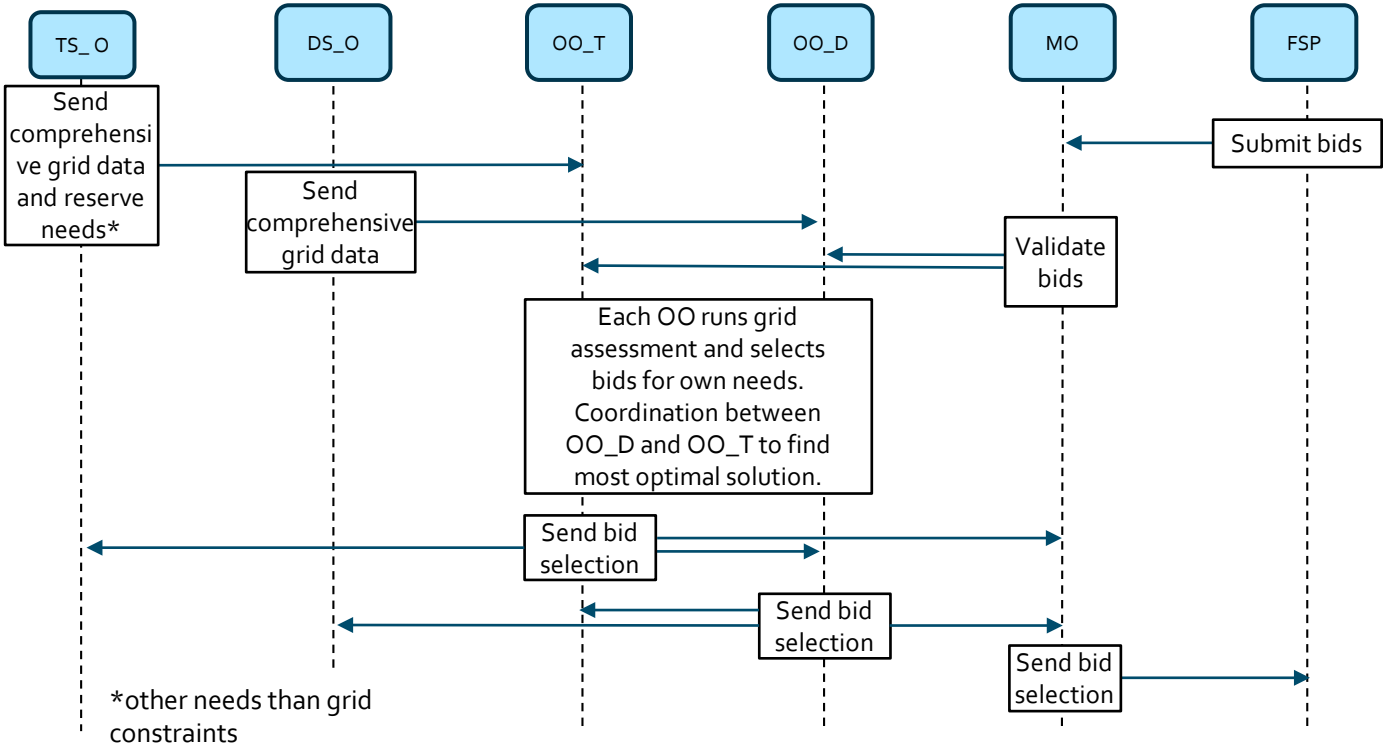
MO: Market Operator

FSP: Flexibility provider

- Other grid data variants:
  - Partial grid data (sensitivities, e.g. for only one topology)
  - Bid limitations
- Centralized/decentralized optimization is independent of number of marketplaces.

More congestions and switching options: comprehensive grid data more useful

Decentralised optimisation with comprehensive grid data



TS_O: Transmission System Operator

DS_O: Distribution System Operator

OO_T: Optimisation Operator in Transmission

OO_D: Optimisation Operator in Distribution

MO: Market Operator

FSP: Flexibility provider

- Coordination approaches:
  - bottom-up (efficient for radial grids and focus on one type of scarcities)
  - top-down (only works for static DSO grids, i.e. with prequalification)
  - hybrid (in single situations: might be more efficient* for meshed grids and/or focus on ≥ scarcities)
- Decentralised optimisation does not reduce liquidity by design.

*not including higher efforts

Discussion of advantages of centralised and decentralised optimisation

Advantages of centralised optimisation	Advantages of decentralised optimisation
• **Less coordination effort** between roles needed • **theoretical possibility of (fully) optimal solution** • Economy of scale (one vs multiple places for the optimisation algorithm) • **Interoperability concentrates on interface to one OO**	• **Stepwise optimisation** implementation along the voltage levels is **possible,** considering specific voltage level and regional requirements • **Easier to match localised solutions to scarcities,** since no new optimisation of the whole system is necessary • **Simpler individual algorithm,** less data processed • **Fit to current SOs responsibility and regulation framework** • **Higher resilience**

To which actor to allocate the OO role?

- **Responsibility of the Optimization Operator**: Select flexibility bids and, if necessary, switching measures (to keep operational security (U,I,f) within defined limits), taking into account grid data/bid limitations
- Studied for the actors:
  - Each DSO and TSO (for decentralized) and TSO (for centralized)
  - TSOs/DSOs joint venture (for centralized)
  - Commercial third party (e.g. market operator, for decentralized and centralized)
- Regardless of the national situation, an **allocation of the optimisation to an actor other than each individual system operator**, being responsible for the safety of their systems under the Electricity Directive, leads to **significant governance and regulation challenges**.
- See the comprehensive table in the Deliverable 3.2
- Disclaimer: All solutions are theoretically feasible and, to properly allocate the roles of OO, it's necessary to conduct a cost-benefit analysis, considering all chances and risks, but specifically also addressing national specificities (regulation, number of DSOs and TSOs within a bidding zone, existing processes of optimisation, historical organisation, etc.) and choice for centralised or decentralised optimisation.

How could congestion management and balancing be combined?

- **Three versions of a combined process design for mFRR/CM**
  1. coordination of B and CM via connected bidding phase (shifting residual bids to B bidding phase)
  2. joint bidding for CM and B, but separate bid selection
  3. joint bidding for CM and B, and joint bid selection (to solve both CM and B at once)
- **Joint product is a prerequisite for combined processes** and **must comply with mFRR and CM requirements**
  - FAT ≤ 12.5 min

    → certain FSPs with longer FAT/preparation time will be excluded (e.g. some demand response)
  - locational bids
  - describe rebound behaviour (if existing)
- All versions: **different cost increasing/decreasing effects and challenges**

  → details: see comprehensive tables in Deliverable 3.2
- **Currently, only V1 seems feasible** due to time constraints
- Application of "joint procurement" at all and which version specifically depends a lot on national situation

  → **advantage of combining mFRR and CM is not a given thing**

B: Balancing
CM: Congestion Management

Follow us

eusysflex.com

@eusysflex

@eusysflex

@eusysflex

EU-SysFlex

Thank You!

Questions?

This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 773505.