

FLEXGRID

A novel smart grid architecture that facilitates high-RES penetration through innovative markets towards efficient interaction between advanced electricity grid management and intelligent stakeholders

Final e-Demo Event

Pitch: Flexibility Suppliers' Toolkit(FST)

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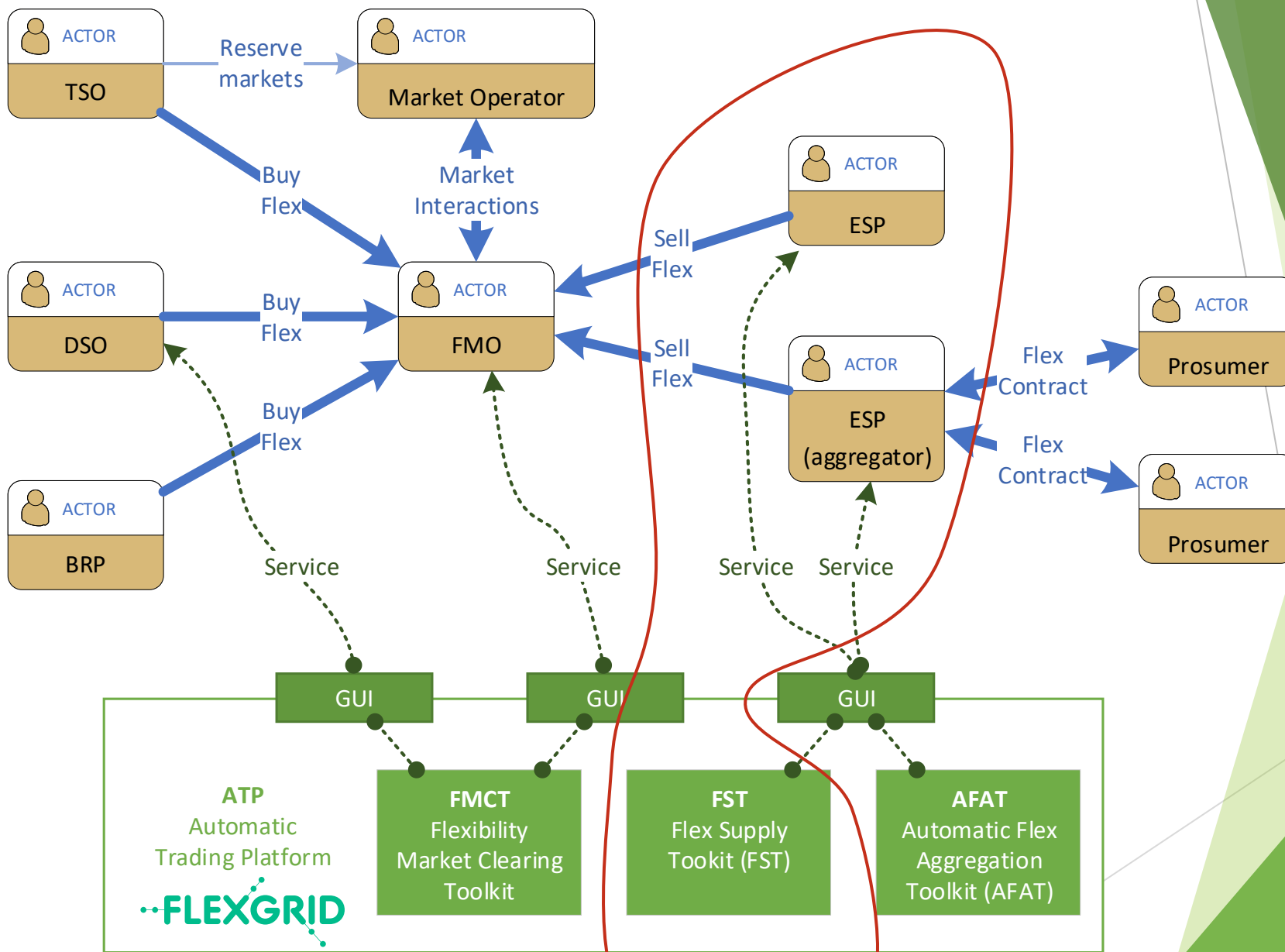
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Problem

- ▶ **Business challenges of an Energy Service Provider (ESP) in the modern power system paradigm**
 1. High penetration of renewable energy sources increases uncertainty of the system, whereas distributed energy sources may cause bidirectional power flows.
 1. RES production forecasting
 2. Market prices forecasting
 2. ESP needs to figure out how to set its business strategy to maximize profits
 1. Optimal scheduling problem
 2. Investment problem
 3. How potential distribution-level flexibility markets affect ESP market participation strategy?

FlexSupplier's Toolkit (FST) solution

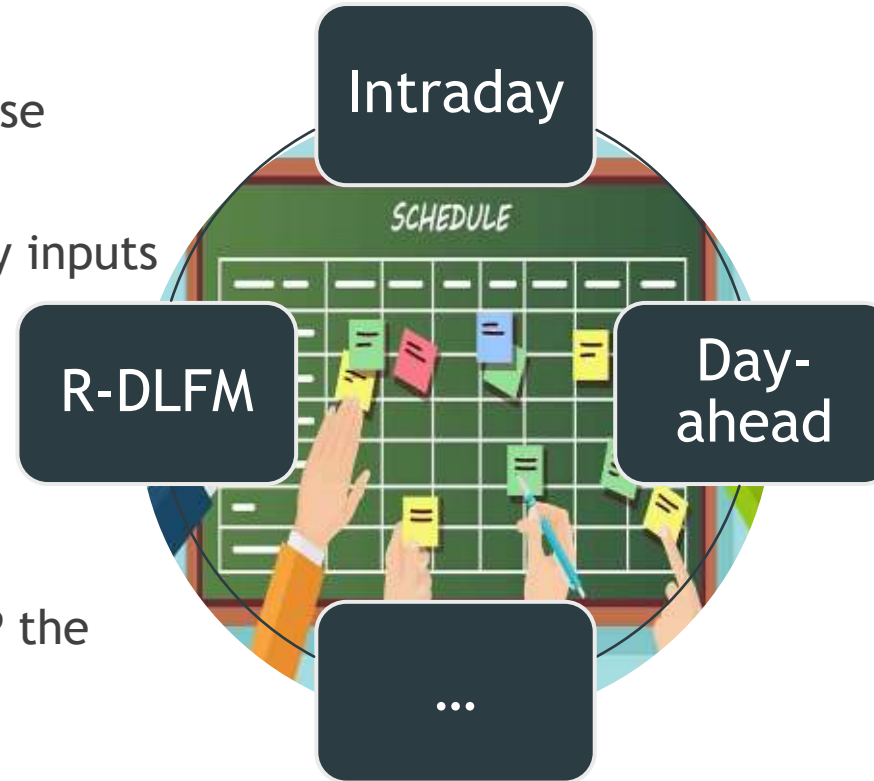
FLEXGRID Flexibility Suppliers' Toolkit (FST) services

- ▶ **FST service #1 (Minimize ESP's Operational Expenditure)**
 - ▶ Optimal scheduling problem that observes multiple markets in which an ESP may participate
- ▶ **FST service #2 (Minimize ESP's Capital Expenditure)**
 - ▶ Optimal siting and sizing -> investment problem
- ▶ **FST service #3 (Maximize ESP's stacked revenues)**
 - ▶ Co-optimization of stacked revenues from all markets



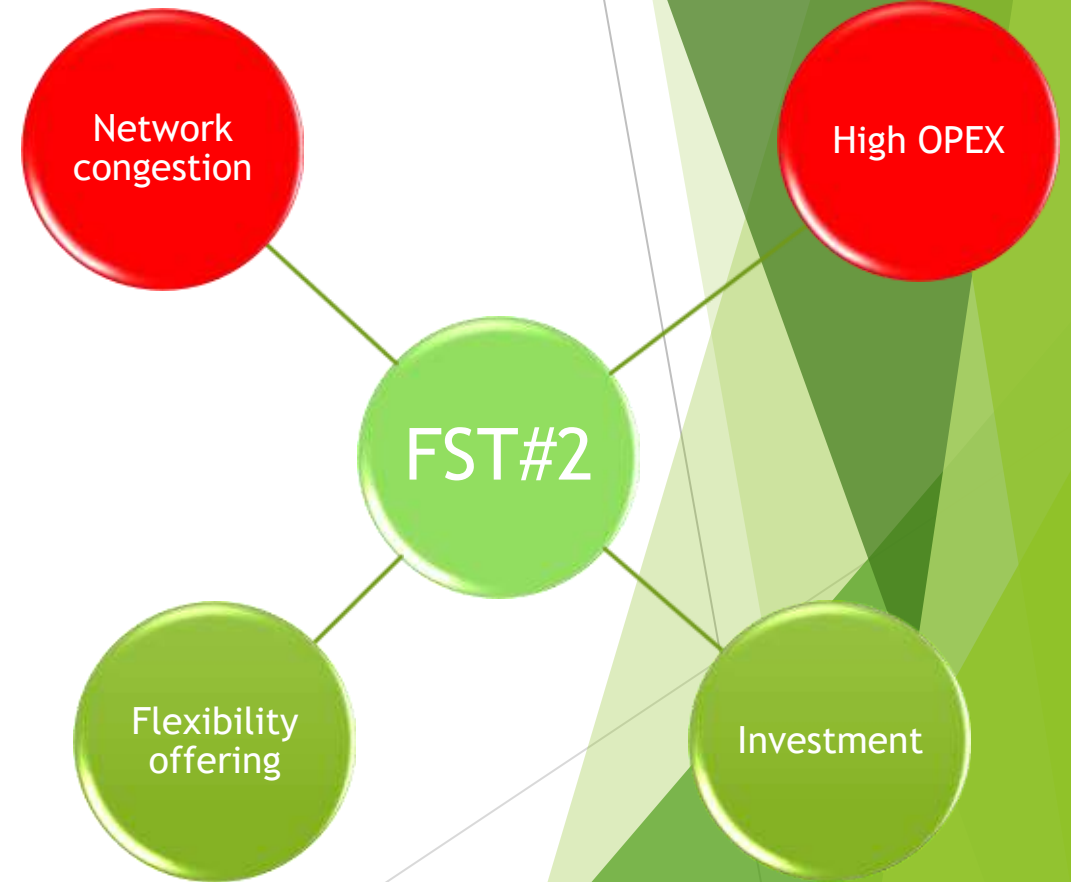
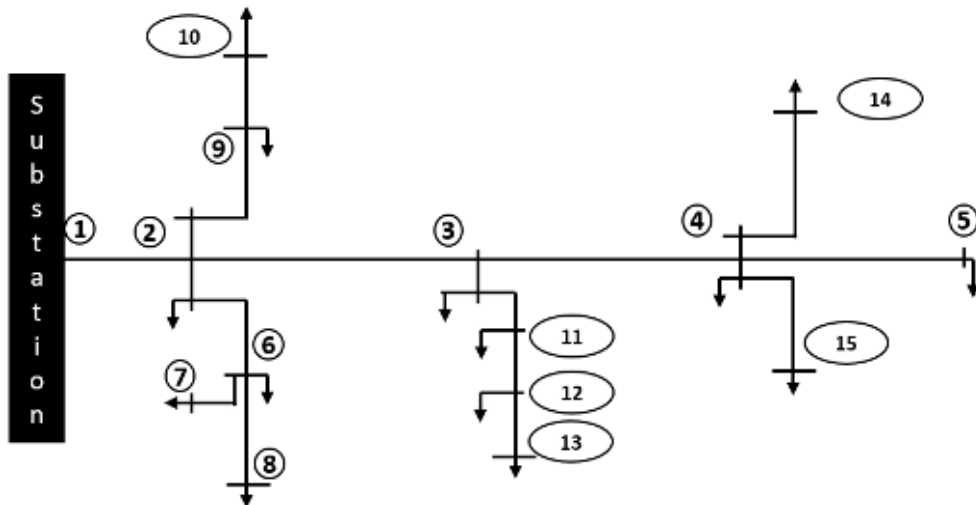
FST service #1 (Minimize ESP' OPEX)

- ▶ Participating in multiple markets may cause many problems for the ESP
- ▶ This service takes into consideration many inputs such as:
 - ▶ Market prices
 - ▶ RES production forecasts
 - ▶ ...
- ▶ And creates the schedule that fits the ESP the most



FST service #2 (Minimize ESP's CAPEX)

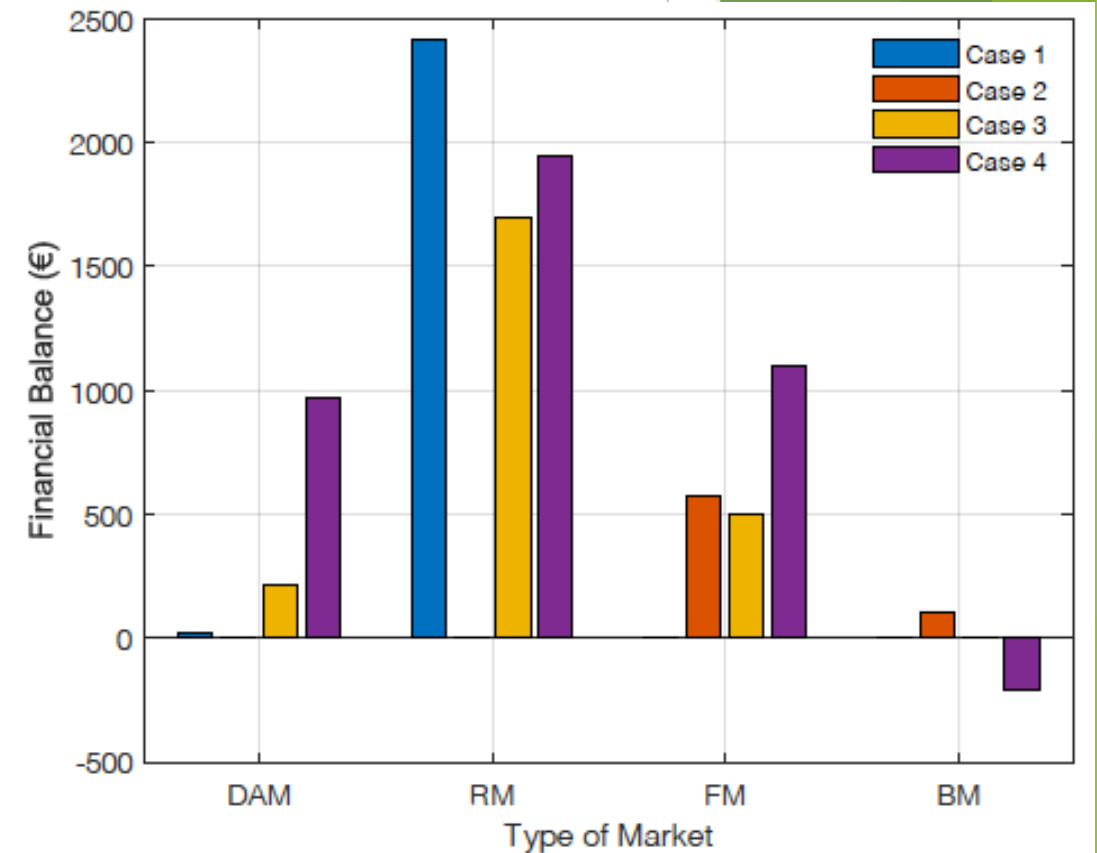
- ▶ This service helps the respective ESP to decide on optimal investment strategy to achieve goals such as 5% OPEX reduction target
- ▶ It takes into consideration:
 - ▶ Network constraints
 - ▶ Different markets
 - ▶ Customer needs



FST service #3 (Maximize ESP's Stacked Revenues)

The main idea is to formulate the ESP's decision process.

- ▶ **Case 1 → DAM + RM → Services to TSO only:**
 - ▶ ESP trades energy in the DAM mainly to generate more profit opportunities in the RM.
- ▶ **Case 2 → FM + BM → Services to DSO only:**
 - ▶ ESP provides flexibility to the DSO, while taking into account the expected BM prices.
- ▶ **Case 3 → All markets (myopic strategy):**
 - ▶ ESP initially decides on its energy trading in the DAM ignoring the profit opportunities that follow (participation in RM, DLFM and BM).
- ▶ **Case 4 → All markets (FLEXGRID strategy):**
 - ▶ ESP co-optimizes its stacked revenues from all markets



	Case 1	Case 2	Case 3	Case 4
ESP's Profits (€)	2444.2	674.02	2415.7	3815.5

DEMO

Insert DEMO video here, make sure it is in good HD quality (4 mins)

Competitive Advantages

- FST service #1
 - **Higher overall profit** for the ESP
 - Precise battery modelling
- FST service #2:
 - A method to determine the price of flexibility (2312.29 € and 2390.12€ profits) with and without network constraints)
 - Achieved **OPEX reduction** strategy
- FST service #3:
 - ESP obtains significantly higher revenues through the joint optimization of both the TSO and the DSO services than the sum of the individual profits from devoting the BSUs to one of the two applications
 - More than **50%** higher profits

Exploitation pathway

- Perform real-life pilots at a higher TRL
- Each one of the 3 FST service offerings can be exploited as a standalone service or any other combination -> modular-by-design S/W architecture
- Support for all other interested scientific and commercial inquiries
 - Interact with interested commercial and academic institutions to further develop and exploit FST solutions
- Give policy recommendations for potential distribution-level flexibility market
- For more information about possible collaboration, please contact us



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THANK YOU !!

Questions?

Visit our website!

<https://flexgrid-project.eu/>

YouTube channel:

<https://www.youtube.com/channel/UCepdrFhiltkGTi7dmNL--yg>

GitHub area:

<https://github.com/FlexGrid>



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