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Innovation Action



flexitranstore

An Integrated Platform for Increased FLEXibility in smart TRANSmision grids with STORAge Entities and large penetration of Renewable Energy Sources



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D9.3 Demonstrating market is operational in Bulgaria and Cyprus

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Executive summary

1.1 Scope of deliverable

Work package 9 of FLEXITRANSTORE will demonstrate how to enable flexibility in the wholesale market as well as the operation of the elaborated market design and clearing algorithm that is harmonized with the requirements of the Internal Electricity Market. In the frame of the work package, the intra-day market structure is tailored for flexibility providers (DSM sources and storage owners) through the introduction of new flexibility products.

Deliverable 9.3 presents the electricity market platform, developed specifically for the FLEXITRANSTORE project. Besides presenting the IT environments in operation, detailed tests were carried out to prove functionality of the solution before the actual demonstration.

1.2 Concept and methodology

Demonstration 5 of the FLEXITRANSTORE project, named Wholesale Market Demonstration and Clearing, is planned to run a fictive marketplace developed in WP9. This fictive marketplace is an upgraded intra-day market (IDM) that will be tested in two demonstration sites virtually: in Cyprus and in Bulgaria. The upgraded market refers to the addition of new products and orders to the matching algorithm that have been recommended based on previous market analysis in these countries and developed to enhance market flexibility. The fictive marketplace will run in real-time parallel to the real continuous intra-day market where the former will exist with a one-week time shift. The demonstration is going to be virtual, not leading to binding outcomes. The results of the demonstration market will be compared to the real IDM.

The concept of Demonstration 5 can be followed in Figure 1 and Figure 2 for the Bulgarian and Cypriot demonstration areas respectively. The enhanced market demonstration application (MDA) contains five main modules: the automated order source (AOS), the order book manager, the matching algorithm, a web interface and a developer and analyser module. The real bids from the existing IDM in Bulgaria will be sent to the order converter from the order book of the real intra-day market (IDM) where the bids of real market participants are collected and converted into suitable form. In the absence of IDM in Cyprus, these (base case) orders are going to be generated based on power system data and forecasts. Apart from the base case orders, additional fictive orders are also required during the different scenarios detailed later. These so-called scenario bids are planned to be generated in both demonstration areas. The AOS module sends all bids to the order book manager module (using FEG data exchange) that also handles bids of volunteer participants. Voluntary participants (FLEXITRANSTORE project partners or external actors) can also submit bids to the fictive marketplace which will be gathered by the order book manager. Voluntary participants are expected to make their bids in appropriate form for the algorithm therefore no conversion is needed on them. The order book manager passes the bids to the enhanced matching algorithm developed in the project. The results of the fictive market outcome can be analysed by the developer and analyser module.

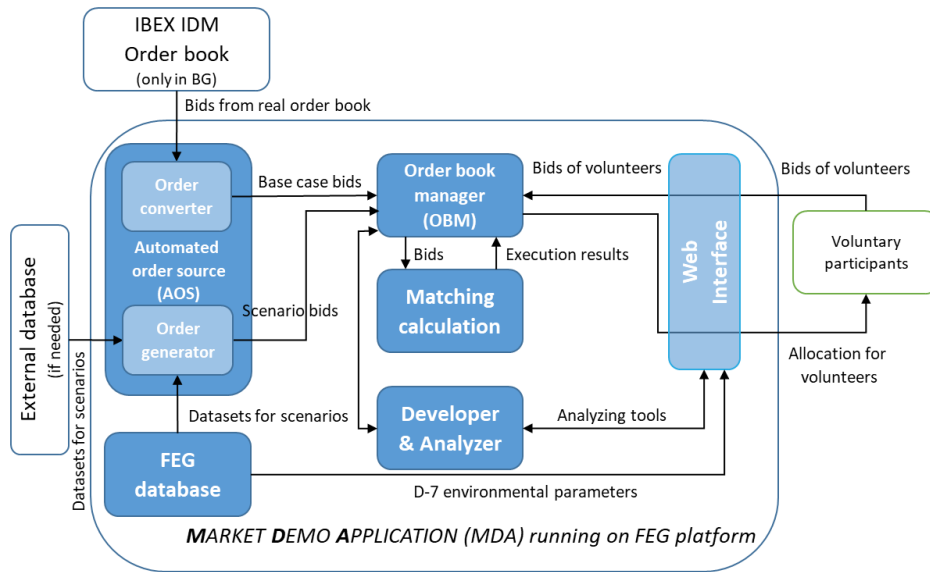


Figure 1: The concept of the market demo application in Bulgaria

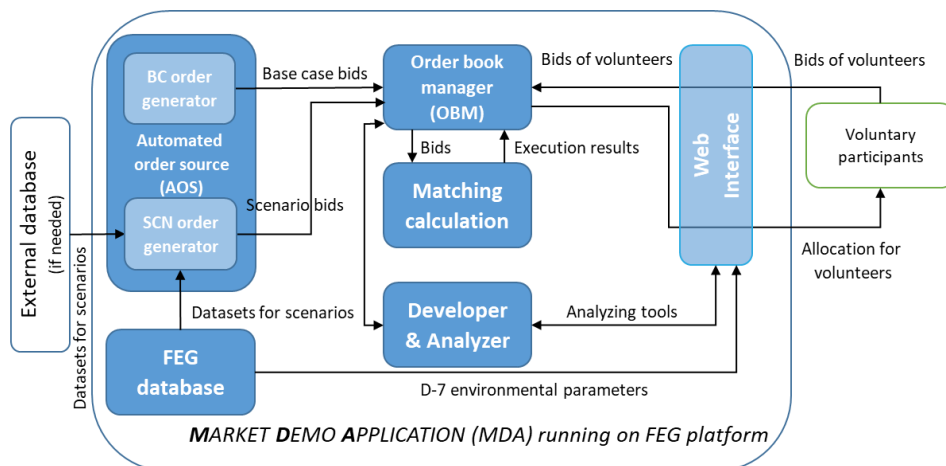


Figure 2: The concept of the market demo application in Cyprus

1.3 Key activities and results

Testing of the AOS was carried out for the two markets successfully.

The matching algorithm was tested for the following functions:

- Open product
- Limit orders
- Iceberg orders

- Immediate-or-cancel order
- Fill-or-kill order
- Basket order – core commands
- Exclusive basket order
- Volume constraint order
- Cumulative volume constraint order

All tests were successful.

The API was tested for the following functions:

- Open products
- My orders
- Create new order
- Update order
- Remove order
- My trades
- Get All Orders
- Get Active Orders

All tests were successful.

In order to test the full functionality of the platform, two internal tests were carried out, on 15-16 April and on 22-23 April. During this test all demonstration participants were assigned the same periodic tasks as they are during live demonstration (uploading data, performing analysis, etc.). The main difference compared to live operation was that no volunteer bids entered the market, only the ones submitted through the AOS and the API.

The tests were fully successful from a technical perspective, the market platform was confirmed ready to be used. Minor changes were made, considering the display screens and the units in some cases.

1.4 Conclusions

During the demonstration, the enhanced IDM platform can receive sale and purchase bids from two sources:

- Automated order source: In order to ensure a certain liquidity on the demonstrated virtual market independent from the activity of real demonstration participants, as well as to be able to compare the result to the existing market, bidders are represented through the AOS.
 - In Bulgaria, where an intra-day market also exists currently, the market bids are loaded into the demonstration marketplace in suitable form.
 - In Cyprus, where neither IDM nor any other electricity market is in operation, IDM bids are generated based on technical capabilities, constraints and marginal costs of power plants and demand need.

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- Inputs of volunteer participants: The virtual demonstration market will be open also for volunteer participants who thus will be able to test their own bidding strategies, test the enhanced IDM algorithm and use the newly introduced product and order types. They can make their offers through a web interface in real-time. Participants can be either FLEXITRANSTORE project partners or external interested parties.

The market demonstration is going to be divided into scenarios. The base case (BC) scenarios are going to serve as benchmarks. During the demand-side response (DSR), energy storage (ES) and renewable energy sources (RES) scenarios more corresponding offers will be generated and bid automatically to the demo market to test higher penetration of each technology. The weather scenario will test the effect of unexpected and extreme weather events on the IDM. The IDM market demonstration will start from May 2020 for three quarter until the end of February 2021 with a one-week lag.

Results of the demonstration will be analysed and published in Deliverable D9.4 of the FLEXITRANSTORE project by month 42.