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Innovation Action

flexitranstore

An Integrated Platform for Increased FLEXIbility in smart TRANSmission grids with STORage Entities and large penetration of Renewable Energy Sources

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D9.1 Order converter rules

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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.

The order converter is a module that generates orders suitable as an input for the enhanced market algorithm developed in the project. It enables the demonstration, the test of the developed market algorithm and the comparison of the results with the real market outcome. It converts real market data to a form more favourable for the enhanced algorithm such as enhanced products. Another role of the order converter is to fit the demonstration to the two sites by handling their differences.

Deliverable D9.1 provides methodology for order creation for all the planned scenarios as an input of the fictive marketplace in both demonstration countries (Bulgaria and Cyprus). Scenarios and their schedule are detailed, and all necessary input for order conversion are specified. descriptions are formalized in equations to assist IT implementation.

1.2 Concept and methodology

The demonstration aims to test the matching algorithm developed in WP9 and compare its results with the real market outcome. The demonstration is going to be virtual, not leading to binding outcomes therefore running parallel to the existing electricity market.

The order converter has a dual function: data conversion and generation. It transforms the real market data to a format suitable for the enhanced market demonstration software and converts certain market orders to enhanced, newly developed order types. In general, the order converter also ensures a minimum liquidity level of the demonstrated market by providing enough orders for each tested scenario. Because not only order conversion but also generation is necessary, the authors introduce a new term for this dual function: Automated Order Source (AOS). The AOS is supposed to incorporate the order conversion and the order generation, too. Order generation is necessary if real market data is missing or when imaginary future scenarios are to be tested.

The real bids from the existing intra-day market 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 area. The automated order source (AOS) 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 give 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. In summary, the enhanced market demonstration application contains five main modules: the automated order source, the order book manager, the matching algorithm, a web interface and a developer and analyser module.

The AOS needs to run the following functions at a certain day according to the schedule of the demonstration:

- Collect data from FEG and external databases for later order generation that will be demonstrated 1-week later
- Generate orders to be run at the fictive marketplace
- Run a test for the generated orders at D-2
- Feed the bids for the simulated day D (7 days after the real market day).

On the one hand, the AOS needs to handle standard IDM products (available in the Nordpool platform). On the other hand, the AOS needs to generate new order types that have been developed in WP4. First, two types of products will exist as the output of the AOS. These products are the hourly (H) and the quarter hourly (Q) products so the 'product' denotation refers to the duration of the delivery. Both products are available in the Nord Pool platform, but the Q orders are currently not used by IBEX in Bulgaria. Cross-product matching is interpretable between the H and Q orders. Normally only hourly sell and buy orders can be matched in the IDM algorithm. But there is an example for the so-called cross-product matching for instance at the Hungarian Power Exchange (HUPX) where the matching of a H sell (buy) product is permitted with corresponding Q buy (sell) products for the same delivery hour if the whole H offer can be matched.

1.3 Key activities and results

The aim of the base case orders is to increase the liquidity of the demonstration market. The base case orders are required in two time resolutions: in hourly in the BC-H and in quarter-hourly format in the BC-Q and BC-X turns. The creation of base case orders differs in the two demonstration markets for the reason that intra-day market exists in Bulgaria but not in Cyprus. So, in Bulgaria, the bids submitted to the existing IDM can be used for order conversion. Conversely in Cyprus, we can only rely on power system and operation data in default of any market in fact. These base case orders have to be sent to the Order Book Manager during the whole demonstration, not only in case of base case scenarios but only in case of fictive scenarios (RES, ES, DSR).

The non-base case scenarios are objected to study the effect of different changes in the future power system: either the increase of RES built-in capacity (and penetration), demand response capability and energy storage capacity on the market or the effect of unusual weather conditions. At both demonstration markets new orders need to be generated but the methodologies are distinct also in consequence of no operating electricity market in Cyprus. For all the scenarios the base case orders of AOS for H, Q and X turns also have to be added to the order book to assure the base liquidity of the fictive market.

1.4 Conclusions

Deliverable D9.1 provides methodology for order creation for all the planned scenarios as an input of the fictive marketplace in demonstration 5 in both demonstration countries (Bulgaria and

Cyprus). Besides, the scenarios and their schedule is also clarified in detail. All the necessary input data for the Automated Order Source have been specified. This work has been essential for the IT implementation of the AOS. The descriptions have been also formalized in equations that particularly facilitates the IT implementation. This report makes a great contribution towards the realization of demonstration 5 in the FLEXITRANSTORE project.

However, some threats have been identified during the work. First of all, the available data in Cyprus is quite limited. In case the requested data is not available it can risk the success of the Cypriot demonstration. Such data is the day-ahead or balancing (market) price. If TSOC is not able to provide it by default it must be generated realistically. Secondly, generation forecasts also seem to be essential as an input of the AOS and it is not sure that the project partners possess them in the required time and technology resolution. If missing, external procurement is required.