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Technical Information Systems and Generation Management System Interdependencies

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Today electricity sector is characterized with: increased share of DG/RES, together with the growing amount of storage and EV's in the overall generation mix, which are mostly power electronic (PE) interfaced,; advent of market actors, like generation aggregators (commercial VPP) and DR/DSM aggregators; market providers of new services, not only ''standard'' ancillary services but also black start, restoration services and soon to come provision of the system inertia; ever changing market rules and push to reduce CO2 emissions by closing down fossil fuel power plants (PP). Also, interfaces between GenCo's-TSO/ISO-DSO might sometimes become inadequate. As a result of these changes power system operation, control and decision making in different regimes with existing tools are getting much more complex and less efficient than before.

On the bright side, above mentioned trends are accompanied with the progress both in energy technology (like storage, PE and HVDC that enable DG/RES integration with the system and high capacity transmission) and in Information communication technology (ICT), like virtualization platforms, cloud services, data mining/machine learning tools, that might enable more efficient and faster monitoring and control of all processes involved in the electricity sector.

In the domain of generation companies (GenCo's) to cope with increased competition on the market, today it is of paramount importance to maximize the existing asset market value. To do so, generally two IT support systems are needed. One for asset condition monitoring at the PP fleet level (sometimes of EAMS type), that might (or might not) include maintenance management component/subsystem, and the second one for real time generation monitoring and control (often of GMS type), Apart from supporting their own tasks, these two together enable crucial data (unit production cost and its availability and capacity) necessary for supporting market trading functions (i.e. within ETRM type system).

Depending on Genco's generation mix, PP size, type, age and level of automation, scope and level of ICT support and its functionality, very different architectures might be needed to solve the current challenges at the state-of-the-art level, and consequently increase overall process efficiency.

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As always, first dilemma is what is better, to develop specific (custom design) solution that will satisfy all important requirements or to use commercially available existing solution and to customize it for the specific company. Actually one must choose from several solutions, not one, as there is no single commercially available solution that has all the functionality needed. Of cause many of the existing information and control systems, at the PP level, at the company HQ (or at the location of Fleet-wide performance centre) and at the company generation control centre if any, should be integrated within overall (corporate) system architecture.

In light of pace of the changes going on within the electricity sector resulting in the new functionalities needed and regulations volatility that impacts the requirements, from authors point of view it is preferable to put system flexibility at the first place, i.e. to develop the basic Asset condition and performance monitoring and maintenance system, that is the core of the IT support of the GenCo. In this way company will obtain solution open for extension and easier/less expensive modification. This system is aimed to company's daily technical (O&M) activities with the goal to use existing assets efficiently, and to feed data needed to the GMS and ETRM systems too.

In this presentation, after reviewing current situation with existing challenges and solutions in the domain, requirements based system architecture for the GenCo type entities will be presented. It is intended to support IT based asset performance monitoring, asset maintenance and generation management functions. Then basic applications of these systems will be shortly described. Based on identified interfaces, integration issues will be addressed too.

At this point relevant questions regarding the type and level of integration between the main systems will be posed, as well as questions about their interdependencies, having in mind that decision making process is going on at different control levels.

The technology issues will be briefly addressed too.

At the end, as an illustrative case-study, issues and solutions from the two on-going projects performed for one SEE Genco will be presented and discussed.

Finally, still open questions will be addressed.