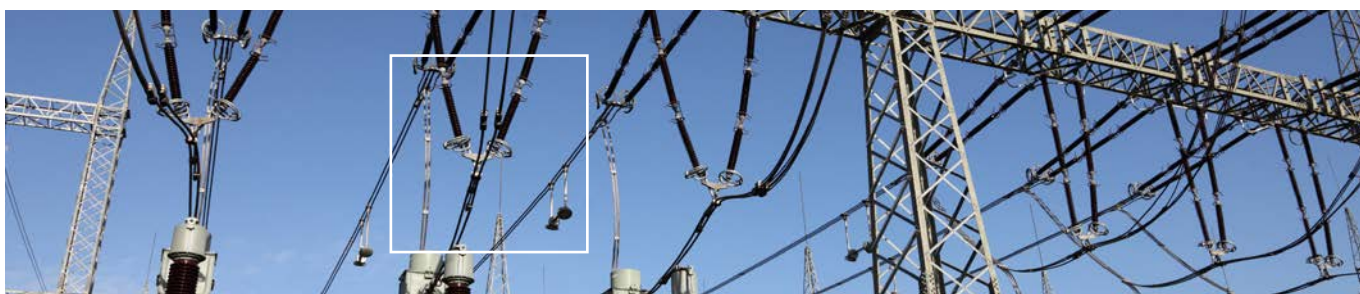


II. Grid Executive & Expert Roundtable

Today's questions and challenges on the road ahead of European grid companies



Power grids have become a dynamic part of the utility industry, as well as an important revenue driver and stable source of income for integrated utilities. Arthur D. Little brings executives and experts of European grid operators together annually to discuss the main challenges power grid operators currently face and will be facing in the near future. The II. Grid Executive & Expert Roundtable in Vienna, held 14–15 October 2015, brought interesting insight to asset management and digital transformation of a distribution system operator (DSO), which is a comprehensive challenge not limited to smart metering and smart grids.

The future role of energy distribution in the new energy market

The European Union (EU) recently experienced GDP growth accompanied by declining electricity consumption, which is a key driver for the power industry. Is such a trend sustainable in the long run, considering that the implemented efficiency measures have to reach their limits sooner or later? Dean Brabec of Arthur D. Little demonstrated different energy policies between various EU countries; the critical situation of transmission systems in Poland, Czech, Slovakia and Switzerland caused by delayed construction of transmission lines in Germany; and other challenges. At the end of the presentation, the important role of distribution companies was stressed, since they represent a significant source of revenue and will represent approx. 2/3 of total investment in European power grids in the coming 10-20 years.

Introductory note, Dean Brabec and Georg Glaser from Arthur D. Little



Asset management – core function in evolution

Asset management is the heart of a DSO's core business. It bridges the interest of the asset owner and translates its goals into operational activities. With an uncertain regulatory environment and technological developments at a high pace, asset managers require a much more strategic approach than ever before.

Implementing a comprehensive management system for asset management, such as PAS 55, helped Stromnetz Berlin improve quality along the entire asset management cycle. A structured and transparent process enables the company to make asset management decisions in line with the strategic goals of the firm. This process allows the firm to make its decisions based on information with high quality which maximizes the benefit for asset owners.

Key-note regarding Asset Management, Jürgen Schunk from Stomnetz Berlin



An integrated view on grid quality, asset information and long-term economics allows Netz Oberösterreich to optimize its asset lifecycle. Specifically, the long-term view ensures that current asset management decisions, such as maintenance vs. investment, are taken to provide the greatest benefit to the firm. Taking into account the view on grid quality, such as the SAIDI impact of assets, will become more and more critical once quality becomes a stringent factor in regulation. Based on this information, Netz Oberösterreich has been able to deliberately include smart components in its grid to avoid high-capacity investments and lower SAIDI significantly.

Mr. Gernot Dobetsberger from Netz Oberösterreich presents current developments



Similarly, CEZ distribuce employs a comprehensive view for asset management:

- Comprehensive asset management strategy with the aim of continuous improvement of grid quality
- Application of TOTEX-based principles within the organization
- Utilization of existing asset data and improvement of its quality
- Improved control of internal and external suppliers
- Clear organizational structure and improved motivation system

Specifically, the use of an asset health index has a major impact on the company's CAPEX optimization.

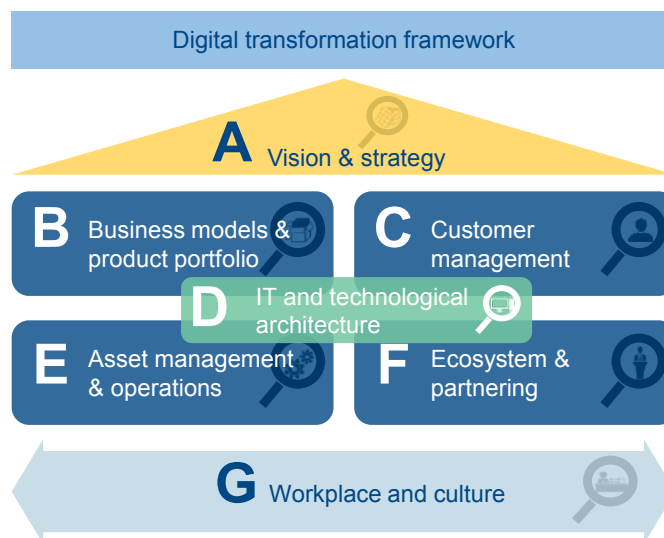
(We would like to thank CEZ distribuce, Netz Oberösterreich and Vattenfall Europe Netzservice (Stromnetz Berlin), on which this section is based.)

The digital grid operator – more than smart

The automation of the grid infrastructure on medium and low voltage levels and its integrated connection to a centralized IT system are often summarized with the term "smart grids". A regulatory push by the EU to implement smart meters will increase the availability and quality of data, "allowing DSOs to enter the world of digitalization fully." Digitalization for DSOs will

lead to an abundance of available data on the grid, generation or consumption, and allow interference with consumption and power quality and availability from a central system. Furthermore, digitalization changes the entire ecosystem in which a DSO is embedded. This provides many opportunities, as well as challenges. Arthur D. Little provides a framework for the "digital transformation" for grid companies, to enable them to become "Digitally Proactive Distribution System Operators", which allows proactive pushing of digitalization efforts.

Digital Transformation Framework for DSOs



Digital transformation will touch every aspect of the DSO – hence, it needs to be an important part of the company's strategy as an enabler of new business models such as data provision, innovative grid tariffs and management of renewable energy sources. The major impact of digitalization will be seen in the interaction with customers and their expectations of customer experience. All other elements of the DSO internal organization beginning from Asset Management over IT to single workplaces will also be probably affected by the impacts of digitalization.

Mr. Radek Svoboda and Mr. Georg Glaser from Arthur D. Little present the digital transformation framework



¹ The System Average Interruption Duration Index (SAIDI) is a reliability indicator commonly used by utilities, and shows the average outage duration for each served customer

CEZ distribuce is working on a number of leading smart grid developments in its Vrchlabi pilot project. The company is testing automated failure management on low and medium voltage grids, island operation of distributed power generation (through a CHP unit), and electric car-charging infrastructure.

Salzburg Netz promotes the “Smart Grid Model region Salzburg” (SGMS), in which a small town is involved in pervasive smart grid technology tests, such as centralized Volt/Var control, virtual power plants and smart heat networks. Tests prove that 50% of distributed photovoltaic generation in the grid and 50% of consumption coming from electric vehicles can be managed without affecting power quality.

Laborelec went a step further into the future and demonstrated a concept for the “uberization of the power industry.” Using electric vehicles as more than just consumers or batteries when connected to the grid, the concept shows where cars can be used to physically transport electrical power from sources to consumers, e.g. private homes. Further important elements of the future energy world that Laborelec is researching are island microgrids and demand-side management.

Key-note regarding changes in the power industry, Daniel Marenne from Laborelec (GDF Suez)



In a digital DSO, the available data can be used to improve decision-making and facilitate innovation. Siemens demonstrated an approach to data insight based on iterative and multi-structured data analysis. Within asset management, gathered data can be, e.g., used to determine asset health and optimize asset management decisions. An exemplary case study demonstrated through big data analytics which chemical gas structure of transformer station oil indicates upcoming quality problems with the transformer.

AIT researchers demonstrate the SmartEST laboratory



(We would like to thank CEZ distribuce, Laborelec, Salzburg Netz and Siemens, on which this section is based. Furthermore, we would like to thank the Austrian Institute of Technology (AIT) for demonstrating future grid equipment functionalities in the “SmartEST” laboratory.)

Concluding questions

Power grids have become a dynamic industry, with rapid technological changes, policy and regulatory revolutions and increasing customer expectations. We intend to discuss the following questions at the III. Grid Executive & Expert Roundtable:

- How can DSOs continue optimizing their businesses with uncertain future regulations, stakeholders and ecosystem?
- What impact will future customers and their expectations have?
- What is the pace of change?
- How should DSOs adapt – and how fast?
- What does this transformation need from regulators, owners and governments?

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Arthur D. Little

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