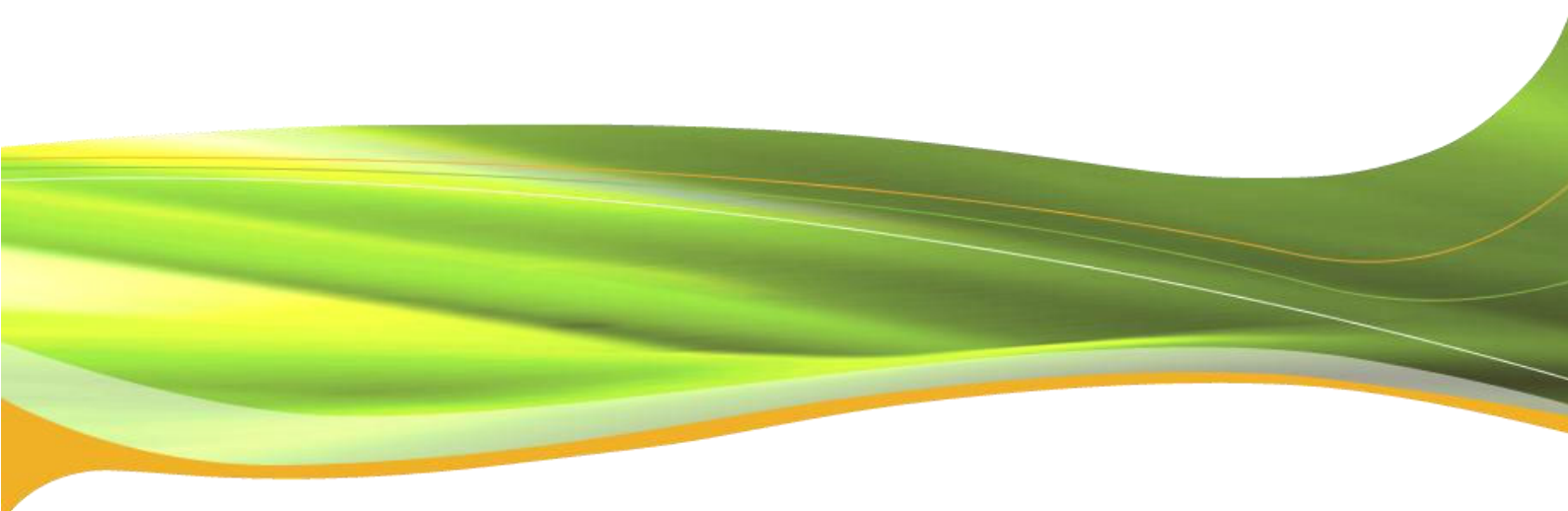




# **The role of the DSO in the Electricity market – from a Smart Grid perspective**



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## 1. Background

The European Commission (EC), DG Energy, are planning to present a proposed European market model for Smart Grids, defining roles and responsibilities for different market players, in November this year. Work on this is carried out within the EC's Smart Grid Task, bringing forward a reference market model, options for viable business models and suitable instruments for accelerating the roll-out and foster the deployment of Smart Grids.

In February 2012, the European Commission re-opened the Smart Grids Task Force, with four focus areas; Smart Grid standards, Data protection and security, Regulatory issues and Smart Grid infrastructure. Many experts from EDSO for Smart Grids and the members companies are taking part in the work of the Smart Grid Task Force that is based on the results from the previous Task Force presented in June 2011.

Since the Smart Grids development is focused on the distribution system operator (DSO), who will also be a neutral facilitator for the retail electricity market, EDSO for Smart Grids would like to bring forward its view on the role of the DSO in the electricity market.

## 2. The electricity system – generation, transmission, supply, consumption

The general basis for the future European electricity market is a deregulated electricity market; with competition in generation and supply of electricity, unbundled from the regulated network operations (transmission and distribution), market integration at European level and market based electricity prices (no regulated electricity prices).

At the same time the basic principles have not changed; despite ever increasing variations in generation and consumption patterns electricity must be generated at the same time as it is consumed, only very small amounts can be stored and voltage and frequency levels must be kept within prescribed limits to ensure the security and stability of electricity supply.

## 3. The challenge – a paradigm shift

The basis is the EU targets for 2020 and 2050, taking into account the climate and environment, security of energy supply and competitiveness as well as the third market package are strong drivers for the development of Smart Grids. Due to this, the role of the DSO will change dramatically. In yesterday's market the distribution network had no constraints or bottlenecks and was often designed

radially to distribute electricity from the bulk generation connected to the transmission level to the end consumers. In tomorrow's electricity market the distribution network operation and management will change. The connection of an ever-increasing share of distributed renewable energy resources, the charging of electric vehicles and the customers actively taking part in the market will change the role, responsibilities, functions and activities of the DSOs. The distribution networks will no longer be only radial distribution from transmission to customers, but complex interlinked networks mixing generation and demand with much higher variations and reverse flows from distribution networks to transmission networks. Generally, we can foresee that the challenges faced by TSOs today, like congestion management, will soon be a reality in the daily operations also at DSO level. Also new market players will be developed, such as aggregators, load curtailers, virtual power plant operators and other energy service companies.

To be able to handle the distribution of electric energy to and from the customers, managing distributed energy resources connected at the medium and low-voltage levels and remaining responsible for securing the stability of supply in the distribution network, the DSOs will have to introduce new functions and services in their operations, such as storage and ancillary services to actively manage/balance the supply and demand in the local network.

#### **4. The role and responsibilities of the DSO – functions of today and tomorrow as Smart Grids are progressing**

Based on the present core responsibilities of the DSO – the distribution of electric energy and securing the stability and security of supply in the distribution network – the changes in preconditions will bring the need for further tasks and responsibilities for the DSO.

- To be able to guarantee a stable distribution network and security of electricity supply there will be a need to include also local balancing of supply and demand/dispatching/active network management (in coordination with the TSO) –this may also include local storage of electricity if feasible and available
- Facilitating a robust, efficient, non-discriminating and transparent retail electricity market
- Owning and operating advanced metering infrastructure (can differ in some countries)
- Storing and providing consumer and producer metering data (owned by the customer, stored by the DSO)
- Providing an open data interface (standardised interface and protocol) at the local and system level to provide basic information to the customer (free basis service and options where there will be a fee) – providing data in an open and transparent way will ensure that any player in the market can develop and offer services to customers
- Enabling active demand by offering services on peak shaving and load control

The DSO will be in charge of reliable operation of the distribution grid and act as a neutral facilitator. Being a regulated monopoly, the DSO can ensure uniform and harmonised deployment of the smart grid. It must have the means to plan and manage the new opportunities and risks related to the grid, and to ensure the quality of supply.

## 4.1 Active network management/balancing local supply and demand

The DSO has a natural role to perform active network management but the need for the DSO to actively manage his distribution network will differ a lot between different DSOs. Some networks will stay fairly radial with a low amount of distributed generations and variable load, whilst we will see a different development in other networks with a lot of new intermittent generation, big variations in the demand and complex network structures. There will also be a development over time.

Regardless of other market players there will always be a requirement for the network operator to ensure quality of service, handling voltage-power-frequency regulation in real-time and hours ahead. Network operators will have to balance supply and demand exploiting market mechanisms in the reserve market (e.g., existing mechanisms in some countries like secondary and tertiary regulation as well as to-be-designed mechanisms like ancillary services markets). Depending on different network conditions, such active management and dispatching functionality will be implemented directly by the TSO, in cooperation between TSO and DSO, or by the DSO itself.

## 4.2 Options

Depending on the DSO, the external conditions and the national regulator, there will also be optional functionalities for the DSO, for example;

- Where regulation allows this, the DSO could be directly involved in the management of the electric vehicles charging infrastructure as an extension of the regulated role, enabling cost-efficient local load management, help the deployment of charging spots, guarantee open access and support standardisation.
- The DSO could engage in energy efficiency work, offering services to consumers and other market players. There are many different possibilities; one example is the energy efficiency solution in Denmark, where the DSO is playing a leading role in improving energy efficiency at the end-user level.

## 4.3 DSO and the relation to other market players

*The customer* – is the main player in the market. There is a need to empower the customer with smart metering systems to give him the opportunity to view and understand his energy consumption and to actively take part in the electricity market. There will be many different possibilities to add further services and functionalities at the customer's premises (on the other side of the meter).

The DSO will have a natural contact with the customer through the meter, the open data interface, possible services and the physical delivery of electricity. The consumer will have a contact with the suppliers/retailers of his choice as well as possible contacts with aggregators, energy service companies and other service providers.

*Energy service companies/Supplier/Aggregator* – have the role of offering to sell electricity to the customer, developing products and services tailored to many different customer preferences. The supplier is a natural point of contact with the customer.

The TSO – will still be an important part the future smart grid environment but the changes in

generation (from bulk generation to decentralised generation) will need to be accompanied by new tools and methods to deal with balancing and dispatching the grid also at the local level, here TSO/DSO cooperation will need to be further developed.

## **5. Data collection, transmission and processing**

There is a basic distinction between data needed for the DSO network operations and historical consumption data for billing/switching purposes.

Some data are crucial for core DSO operations such as guaranteeing the distribution of electric energy and securing the stability and security of supply in the distribution network. In this case it is crucial that the responsibility for the services and the data of the DSO network operations lay with the DSOs. Also from a cost-efficiency point of view this is important.

For the exchange of data between the customer and different market players, for example regarding supplier switching, a data hub or “data-exchange” can be developed. The customer will be the owner of his/her consumption data that will be collected and managed by the DSO, being a regulated player the DSO can ensure the confidentiality and neutrality needed in the market. It is of utmost importance that the system ensures a non-discriminatory information exchange between market players.

There is a need to define open, standardised interfaces and protocols for the upcoming large amounts of data flow between the customer, the DSO and other market players evolving in a competitive environment – suppliers, aggregators, load curtailers, ESCOs, etc. – to ensure the legibility and usability of the data.

There will be an increasing need for efficient telecommunication solutions, to collect and manage data and information. This will bring forward increased cooperation possibilities between Telecommunication companies, proposing solutions, and DSOs, specifying the needs and integrating new solutions.

Data and information security is crucial to build a trustful relation between all market players, including the customer. Without an absolute guarantee that the data collected is handled in a secure way, it will not be possible to involve the customer or create a stable basis for new business opportunities. The DSO, a regulated player, is very well positioned to ensure this.

### **5.1 The smart meter**

The smart meters must provide bi-directional communication between the consumer and the supplier/operator and promote services that facilitate energy efficiency within the home (Directive 2009/72/EC).

On the one hand, it provides the customers with precise and timely information on its energy consumption and production, enabling him to take measures to become more energy efficient. On the other hand it provides the DSOs with accurate data on consumption patterns and enables them to

better manage and plan their investment on the grid.

In most cases the smart meter systems will be installed, owned and operated by the DSO. The DSO can in line with the outcome of EC mandate M/490 ensure consistent ICT development and in the most cost-efficient way of set up the meter-management, ensuring harmonised and coordinated deployment, eliminating transaction costs.

## **6. DSOs are committed – a great need to develop the regulatory frameworks**

DSOs are the main players in the development of Smart Grids and can as trustable and stable regulated companies, in direct contact with all other players in the electricity market, be the needed neutral market facilitator.

The challenges are tremendous and the DSOs are committed and there is a window of opportunity right now with regard to replacement for ageing infrastructure, but smartening of the grids will require significant capital expenditure, thus there is a genuine need to change the regulatory frameworks to make this transition possible:

- Roles and responsibilities in the market must be clearly defined
- A fair rate of return is essential – the national regulatory frameworks must be changed accordingly and also take on a long-term perspective, incentivising the development of Smart Grids including RD&D and allowing DSOs an adequate return on these important investments
- On European level network codes and standards should be developed to support a cost-efficient development.

In this way the distribution system operators can contribute in full to promote the transition towards Smart Grids and a sustainable and competitive future society.



**EDSO**  
for smart grids



**EDSO for Smart Grids** is gathering leading Distribution System Operators, covering more than 70 percent of the EU points of electricity supply, and cooperating to bring Smart Grids from vision to reality.

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