EDSO for Smart Grids response to ACER's discussion paper on energy regulation: A bridge to 2025 (electricity)

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Introduction

EDSO for Smart Grids (EDSO) welcomes the public consultation organised by ACER to gather stakeholder feedback on tomorrow's electricity regulation.

The European Energy policies aiming at liberalising, integrating, and decarbonising the energy markets have forced our energy systems to undergo dramatic changes, where the more static and centrally focused system is changing into a more dynamic, less predictable distributed system, with a strong focus on the customer and the retail market. For the distribution system operators (DSO) the policies have brought fundamental changes, such as legal and functional unbundling, huge amounts of distributed and renewable energy resources to connect and integrate to the grid, deployment of smart meters. New commercial players are entering the electricity market (ESCOs, aggregators, etc.) and we can see new grid users such as electric vehicles and energy storage.

The role and the responsibilities of the DSO thus need to evolve into an active system operator and a neutral market facilitator while maintaining security of energy supply and a stable network.

Over the last decade, DSOs have invested significantly in innovation and demonstration for smarter grids. This is highlighted by the European Commission's Joint Research Centre (JRC) survey on "Smart Grid projects in Europe: Lessons learned and current developments". DSOs are involved in, or leading, 80 percent of the projects and are the source of half of the European investments. In order for the DSOs to be able to deploy these smarter, cost-efficient solutions and technologies, there is a great need to change the regulatory frameworks and incentivise investments in smart solutions beyond the traditional "investment in copper".

In the following pages, some key changes to the regulatory frameworks are highlighted, needed in order to bridge the gap to 2020 and beyond.

- **Although adequacy issues are not likely to disappear completely, do you agree that the current primary focus on levels of adequacy will likely be expanded to emphasise a later priority focus on flexibility?**

Due to the strong European renewables target, huge amounts of distributed and variable, renewable energy sources are being connected to the European electricity grids, especially the distribution grids. This paradigm shift forces the utilities to not only match electricity generation with demand at the wholesale level, but also to address the challenges of new grid users on the distribution networks appearing on the retail market: distributed generation, demand response, electric vehicles charging, storage, etc.

The role of the DSO will have to evolve into an active system manager and neutral market facilitator in order to manage this new and less predictable situation while maintaining security of energy supply and a stable network. From a relatively predictable and one way power flow situation, the new less predictable situation will include strong reverse power flows, network congestions and increased voltage challenges.

- **Should we seek to further define, measure and develop flexibility in addition to the initiatives that are underway? If so, how could this best be done and in which market time periods?**

The focus will be on the DSOs regarding the connection and integration of the huge amounts of distributed generation, the electric vehicles charging infrastructure, demand response users and storage to the grid. In order to maintain security of supply and quality of service the DSOs are evolving to become neutral market facilitators, gathering and managing data on the actions and schedule of the electricity users connected to their grid. The role of the DSO will be to make sure that security of supply and quality of service is maintained on the distribution grid and that it is not compromised by the grid users (generation and consumption). Following the same model as generation adequacy today, flexibility services could emerge on different timescales: year-ahead, day-ahead, and intraday.

How this flexibility will be managed, possible market setups, and definitions is not yet clear and there will most probably not be a one-size-fits-all solution that can be utilised in all Member States. One example of a possible setup is the German “traffic light system”. Here the situation in the grid has been separated into three categories:

- Green light means that the are no specific congestions in the grid and market players are free to act without restrictions
- When the light turns yellow it means that there is a risk for network congestions, negotiations starts between market players and network operators in order to maintain system stability and solve congestions
- Red light means network congestions, and that TSOs and DSOs have to decide on the best course of actions for the system, without regards for markets.

This is one interesting experiment, but more thinking and tests are needed before conclusions can be drawn where this may be a system to be used also elsewhere in Europe.

Regarding flexibility, ACER could support the development by proposing a European definition of flexibility and by helping to collect information on the different mechanisms existing across Europe.

- **What are the market-based routes for flexible "tools" to participate?**

DSOs have already carried out several projects addressing tools for flexibility and new projects are on-going. For instance, the "ADDRESS"[1] project studied active participation of domestic and small commercial consumers in power system markets and the provision of services to the different power system operators, by means of real time (20-30 min) interaction based on price and volume signals. Today, the follow-up called "ADVANCED[2]", is gathering information on several projects run by DSOs to propose new business models for future flexibility markets. EDSO is also involved in the "REserviceS[3]" project, which is addressing the possibility for distributed generation to provide ancillary services to DSOs, and the evolvDSO project, which is addressing flexibility services and how to share roles and responsibilities between TSOs, DSOs and markets players.

- **What measures may be required to ensure that the market receives the most appropriate signal for the value of flexibility?**

Tomorrow's flexibility market will most probably build on existing markets, but with much more data and information needed on timing and location of the services provided, as well as on the status of the local distribution grid, to which a service provider is connected.

Closer cooperation and clearer boundaries between the DSO and the TSO will also be needed. If, for example, a TSO is directly or through an aggregator regulating the overall electricity consumption down in an area, where an important amount of electricity is being produced by for example solar panels, this may create reverse energy flow and congestions in the distribution grid. To avoid or limit the occurrence of such problems, it is crucial that the DSO has the possibility to use local flexibility to secure supply and network stability.

Being the first concerned by this issue, the DSO should be able to influence the actions of aggregators and other players, like TSOs and balancing responsible parties, whose behaviour directly impacts distribution grid management. If regulation permits, DSOs could use price signals to make sure flexibility providers are not only called when needed but also where they will benefit the system the most.

This is a challenge since flexibility can be used for two different aims: flexibility driven by market mechanisms and flexibility driven by technical grid constraints. The table included in annex presents the main characteristics of these two kinds of flexibility and highlights the split of incentives between market flexibility, which may induce higher simultaneity in load and production patterns, thus possibly requiring grid reinforcements to cope with the peak loads, and technical flexibility, which aims at reducing this simultaneity in order to use the existing grid capacity in the most efficient way.

Regulators should acknowledge this situation, and transparent criteria should be agreed upon to decide when grid infrastructure must be reinforced to let the market work and when the market must be influenced to avoid new reinforcement costs borne by all energy consumers through grid tariffs.

[1] http://www.addressfp7.org
[2] http://www.advancedfp7.eu
[3] http://www.reservices-project.eu/

- **Do you think that in other, for example institutional arrangements should be considered? Is greater TSO and DSO coordination required? If so, what should NRAs do to facilitate this?**

As electricity grid management becomes more complex, with more and more variable (intermittent) generation and new users connected to the system, a greater coordination between TSOs and DSOs is of utmost importance. Here it is crucial in order to foster fruitful cooperation between TSOs and DSOs to make sure that network codes and national regulations place the TSO and the DSO on equal footing. It is important that both system operators have access to all the data they need to fulfil their respective tasks in an optimal and cost-efficient way. The regulatory framework must establish clear descriptions of TSOs and DSOs respective roles and responsibilities. In this respect, the DSO role should be to

- Maintain secure energy supply and quality of service. DSOs will thus need to manage network congestions and voltage challenges using flexibility services from grid users such as demand, distributed generation, storage, etc.
- Facilitate the market and provide data, in a non-discriminatory and neutral manner, to all parties involved in flexibility transactions.

- **How should regulators facilitate demand side participation (including demand side response and electricity storage)?**

Regulators can help facilitate demand side participation by taking actions on grid tariffs and the role of the DSO (including the boundaries DSO-TSO). A review of existing tariffs may be needed to align actual incentives with the European Energy policy targets, specifically the 2020 targets. Today's volumetric network tariffs (based on kWh) for retail customers do not generally take into account the real costs generated in the network, taking into account the high level of electricity consumption during peak hours (based on capacity). Enabling DSOs to modulate their tariffs based on real grid usage (increasing the tariff part based on capacity) is an option to promote demand side participation. Different models are being used and investigated, such as time-of-use tariffs, dynamic pricing, incentive-based demand response (reduced tariffs or lump-sum payments that provide the DSO with limited, but clearly defined access to demand-side flexibility).

It is crucial to let DSOs use demand response. Today, network codes and some national regulations only let the TSO use flexibility, even when the demand resources are connected at DSO level. Not engaging DSOs from the beginning will result in barriers for demand participation, extra costs and risks of less stable networks.

- **How can NRAs support, or incentivise TSOs and DSOs to invest in "smart networks"? What actions are needed, in particular from regulators, to promote more active distribution networks? Do we sufficiently reward avoiding "dumb" investments?**

National Regulatory Authorities (NRA) can help network operators to invest in smart grids. Firstly, it is important that NRAs are involved in and supporting research, development and large scale demonstrations to better identify good/the best solutions needed to manage grids in the future. The European Commission's European Electricity Grid Initiative and their 9-year DSO-TSO innovation and demonstration roadmap is crucial for this development, and the Council of European Energy Regulators (CEER) is involved in this programme. The low-carbon network fund in the UK and Ireland,

set up by the OFGEM, is another interesting initiative, pushing network operators to innovate and keeping good control over research costs. Similar mechanisms in other Member States are warmly welcomed to smarten networks and keep up with the development of renewable energy sources.

Secondly, it is crucial to permit DSOs to change their investment policy. Instead of investing first and foremost in more physical capacity, DSOs should be able to invest in cost-efficient and smart solutions, for example control and supervision devices in order to increase the automation of the medium and low voltage grid. One example, from the on-going REserviceS project: the cost of installing remote control equipment and using distributed energy resources to better manage a distribution grid where a significant amount of renewable energy sources are connected, could be much cheaper than physical grid reinforcement.

If DSOs are forced by the current regulatory frameworks to solve the new challenges by only traditional means (classical reinforcements), the costs for society will be higher and thus directly impact the consumer's bill. It is crucial for the energy transition that DSOs and investors have enough trust in the economic regulation system to invest in smart grids. Therefore, a sufficient, stable and predictable return on capital investments should be guaranteed, taking into account the higher risk of this type of investments. These innovative investments should be recognised in the regulated asset base and their rate of return should be aligned with the maturity of the technologies.

Thirdly, it is crucial to clearly define the respective roles and responsibilities of the TSO and the DSO.

- **What actions, identified in these papers, should regulators prioritise?**

Firstly, regulators should make sure that the right incentives are in place for "smart investments" in the distribution grids. This means both a proper recovery of costs for the new technical solutions and adapted grid tariffs that help DSOs fulfil their mission by encouraging electricity consumers and distributed generation to use the network in a way that is cost-efficient for society.

Secondly, the roles and responsibilities within future flexibility markets should be clearly defined. The DSO need to evolve into a neutral market facilitator, managing grid congestion, managing the data of connected users, sharing it with authorised third-parties to enable the provision of new services – cooperating actively with the TSO to maintain the system as a whole stable and secure.

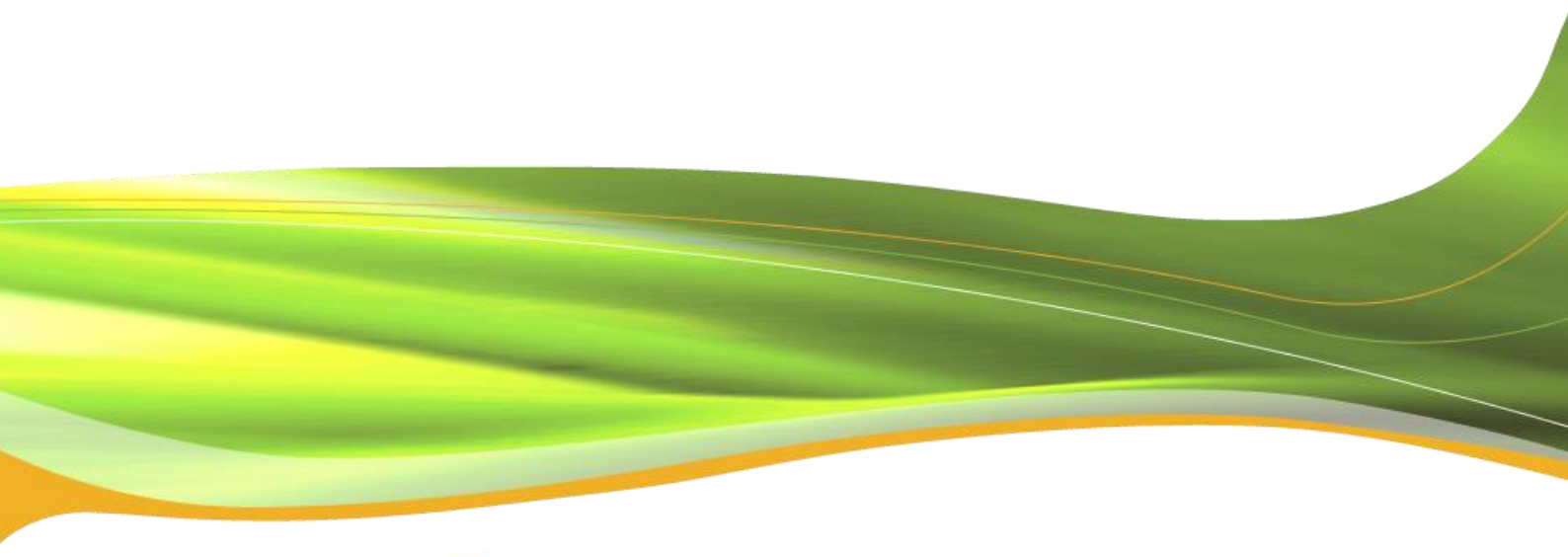
Annex

Table 1: Comparison of market and technical flexibility - draft

	Market Flexibility	**Technical Flexibility**
How does it work	**Price based:** Individual consumers and producers autonomously adapt their instantaneous consumption/production to the price signals provided by retailers, aggregators… **Volume based:** Activation by market player of a given and pre-reserved volume of flexible load/production for the purpose of re-dispatching, balancing, portfolio optimization…	DSOs seek to • reduce and shift the peak injections/consumptions of individual installations • **reduce variability and simultaneity** of consumption/ production patterns of neighbouring grid users in order to alleviate cable peak loads (and thus congestion) at a **very local scale**
Value for social welfare	• Clients can reduce energy bills due to appropriate reaction on market signals • Suppliers can optimize their electricity sourcing, TSO and BRPs can fulfil their obligations, w.r.t. balancing & nominations, … in the most cost efficient way	• Peak reduction of local loads, by activating flexibility, moderates the need of new grid capacity and thus investments in new grid infrastructure, While maintaining the same level of security of supply, and quality of service towards DSO clients • renewable energies with intermittent character and high peaks can be largely integrated in existing grid, minimizing delays and investment needs

Risk when flexibility is too intensively exploited	Market signals are mostly common for an entire control area. Market signals may thus **induce higher simultaneity** of individual production/consumption patterns than what has been statistically observed in the past[4]. This creates higher local peak loads on grid cables and thus need for infrastructure reinforcement	• DSOs may have less incentive for reinforcing the grid. • *Gaming*: market players may use market flex in a disproportionate manner in order to seek maximal simultaneity & peak loads; and thus artificially trigger curtailment (in case the NRA decided curtailment give rights to a compensation) by grid operators
How to control the risk	DSO's must be informed about all flexibility contracts with impact on their grids and may set (temporary and local) limits to the amount of activated flexibility when the stability of the grid and the quality of supply are at risk or, in some cases by means of a prequalification procedure	Set regulatory limits to: • maintain incentive to invest in necessary grid infrastructure when level of curtailment is unacceptable • avoid gaming

[4] Example: actually a simultaneity factor of approximately 0,3 is observed in the low voltage grid in Belgium. This means that when a low voltage grid cable feeds ten households, each with a peak demand of 10kVA; the theoretical peak load of the local grid is 100 kVA while the real observed total peak load is 30 kVA. DSOs take this simultaneity factor into account when dimensioning grids, in order not to overinvest in unused grid capacity. This did not take into account possible increased levels of simultaneity initiated by market flex.



EDSO
for smart grids

EDSO for Smart Grids is gathering leading Distribution System Operators, cooperating to bring Smart Grids from vision to reality.

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