



Publishing date: 06/11/2013

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## **Discussion Paper on Energy regulation: A Bridge to 2025**

### **Electricity**

**6 November 2013**

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#### **1 Context**

The overarching paper, which sets out the energy regulation 'bridge' to 2025, identifies key challenges and possible responses that regulators must consider in the coming years to 2025. Three more detailed papers cover specific consumer, electricity, and gas issues respectively.

This paper takes forward the thinking in the overarching paper to further develop the electricity-related technical ideas and considerations. In it we seek to elaborate some of the content and ideas within the overarching paper and poses questions where we would appreciate early views from stakeholders.

#### **2 A Bridge to 2025**

##### ***The present foundations for electricity***

The framework guidelines and network codes of the Third Package, together with other existing priorities such as the Infrastructure package and REMIT, provide the fundamental basis for the efficient functioning of the integrated European electricity market. Whilst these short-term priorities are clear, a longer-term view must build on the present strong foundations in order to meet the new challenges that lie ahead.

Although full implementation of *all* network codes and initiatives on wholesale market integration may not be feasible by the 2014 target date, a core assumption that successful implementation of the single electricity market is the immediate priority and efficient, market-based congestion management and cross-border trade will be the backbone of the European wholesale market, contributing to producer and consumer surplus.

The foundations for electricity therefore include:

- A fully implemented 3<sup>rd</sup> Package with European-wide implementation of the network codes and the target model for cross border trade in electricity;

- Adequate infrastructure developments to support cross border trade and competition;
- More efficient and well-functioning national markets as a consequence of network code implementation.

Inherent in the development of the Bridge is the clear assumption that Member States will implement all the measures in the third package in a complete, coordinated and timely fashion.

### ***The bridge to 2025***

The abundant interactions between the challenges identified in the overarching paper require holistic thinking in terms of regulatory policy and actions. In the electricity sector national and European Renewable Energy Sources (RES) targets are already driving changes in wholesale energy markets. As the share of RES grows, so too does the essential requirement for additional flexibility to accommodate the non-programmable, less-predictable, nature of RES technologies.

At the same time governments and regulators in several European countries appear concerned that in the future the total level of electricity generation capacity delivered by the market may not meet demand at all times. Concerns related to generation adequacy<sup>1</sup> are likely to increase as the share of RES generation increases. This is because the utilisation of conventional thermal generation will be under pressure by the low marginal costs of RES technologies.

The current focus on levels of adequacy may therefore need to be expanded to also include consideration of the tools needed to flexibly manage fluctuations in the generation and demand balance. In this respect, more emphasis will be required on the appropriate tools – for example related to generation response, DSR and storage – available for market participants and TSOs to accommodate close to real time changes in generation and demand.

**E1. *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?***

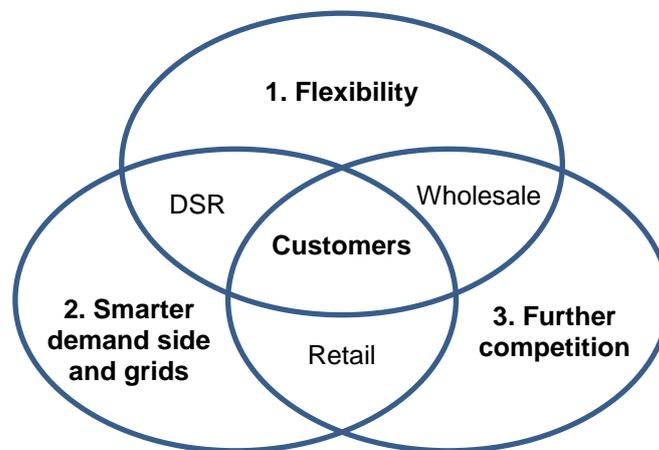
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<sup>1</sup> Adequacy can be defined as the ability of the system (generation and network) to meet the aggregate power and energy requirement of all consumers at virtually all times.

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The impacts of the requirement for greater **flexibility** will fall on both the electricity and gas markets. For the electricity sector, potential responses (detailed below) are likely to require fresh thinking about the role of consumers, retailers, aggregators and the distribution network operators as these support a **smarter demand side and smarter grids**. Additional European harmonisation and integration to **encourage competition** in wholesale energy markets, and changes in retail markets, will also be needed.

The illustration below summarises the core aspects of our electricity-specific Bridge and their clear interrelationships. The three challenges of flexibility, smarter demand and grids and further competition are not isolated issues – they can only be properly understood in the light of overlaps between them. They have implications for wholesale and retail markets and for demand side response, among other factors, to differing extents – a simplified representation of this is shown in the diagram below. At the heart, these issues address how the electricity system best meets the needs of customers in the future.



## **2.1 The flexibility challenge**

National and European electricity policies have fostered the rapid growth of non-programmable renewable energy generation capacity (NP RES), especially wind and photovoltaic (PV), connected to both transmission and distribution networks. A number of important characteristics are associated with NP RES technologies: their output is, at times, less predictable and less-controllable than conventional thermal generation and they are prone to rapid changes in output. These characteristics can directly affect the operational security of electricity networks, for example:

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- The lower predictability of NP RES sources may lead to more errors in forecasting generation;
- The more NP RES, the smaller the proportion of load covered by generation units able to provide sufficient inertia for frequency and voltage stability. As a consequence, setting appropriate reserve margins is technically more complex and potentially more expensive. This situation may be heightened by the lack of adequate network infrastructures where NP sources are located;
- To accommodate the rapid changes in output associated with NP RES, TSOs require fast reaction in terms of balancing energy. This has traditionally been covered by high-cost conventional generation facilities with quick response times.

A strong NP RES rate of generation connected to all voltage levels may require a far-reaching change of criteria to gear the electricity system towards smarter markets and networks. It may also have consequences for gas markets as gas plants are likely to increasingly play a key role in providing quick-response flexible capacity for the electricity system.

Extra measures or adaptations to market design that could serve to mitigate problems in the future include:

- Incentivise better forecasts, e.g. by requiring balance responsibility for all market participants (including RES);
- Ensure that the need for, and value of, flexibility is appropriately indicated through strong price signals and appropriate products and associated supply markets for gas and coal;
- Provide market based routes for flexible plants, demand-side response and electricity storage to effectively participate in national and cross-border intraday and balancing markets;
- Encouraging greater cooperation between TSOs to improve real time operational security;
- Continue to improve the planning and implementation of adequate network infrastructures, including further interconnection between member states.

As a basic prerequisite to develop sources of flexibility, a new role for distribution networks (and possibly of Distribution System Operators) should be considered in which some balancing services may be provided on medium and low voltage levels – e.g. via pooling mechanisms or aggregators – alongside traditional providers. The relationship between Distribution System Operators and other respective players such as the Transmission System Operator on one hand and suppliers on the other hand, may need to be redefined.

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Common issues related to providing and rewarding new sources of flexibility may require further consideration of technical aspects such as metering and settlement rules, controllability and close-to-real-time data availability (e.g. prices, generation output), implementation monitoring and compliancy. These specificities are examples of what shall be taken into account in setting market rules where new sources of flexibility are encouraged to participate in market mechanisms and are appropriately remunerated for their services.

***E2. 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?***

***E3. What are the market-based routes for flexible ‘tools’ to participate?***

***E4. What measures may be required to ensure that the market receives the most appropriate signal for the value of flexibility?***

***E5. Do you think that other, for example institutional arrangements should be considered? Is greater TSO and DSO coordination required? If so, what should NRAs do to facilitate this?***

In parallel, CEER is launching a [public consultation](#) on regulatory and market aspects of demand-side flexibility in an effort to gather views and evidence on the barriers and opportunities affecting the emergence of demand-side flexibility measures. This research, and the resulting advice, will also inform the development of our thinking in “The Bridge to 2025”.

## **2.2 Smarter Grids and smarter demand**

A more active, smarter demand side and smarter grids have great potential to provide solutions to the challenges posed by the growth of NP RES. In the near future, the energy system should be working towards pan-European electricity highways that ensure the functioning of the market, security of supply across Europe and generation increasingly located in areas where resources are most abundant. In addition, efforts to develop smart grids should help network users to contribute effectively to system operation, to use and produce power locally and to make more efficient use of energy.

Greater engagement and price responsiveness on the demand side should allow for more flexible system operation and may require additional support from enhanced grids at distribution as well as at transmission levels. This focus on the demand side includes a broad range of potential options, including domestic and commercial demand side response and electricity storage. It will be important that all of the potential demand side options are able to compete on a level playing field and no barriers exist that prevent them from providing their services to the market or from being appropriately remunerated for them.

There will be increased technical challenges for networks to support the enhanced energy system. For example, multi-terminal High Voltage Direct Current (HVDC) networks, power electronics and smart grid solutions that are currently at the cutting edge of technical innovation may well be a feature. The role of regulation in removing barriers to innovation will be critical, as well as protecting network users from undue risks that may come from early adoption of untested technologies.

Complementary measures or adaptations to market design that could serve to ensure that smart grids and a smarter demand side can play a role in meeting the flexibility challenge include:

- Removing barriers for distributed generation (including micro-generation), load and distributed storage to provide system services such as reserve and balancing energy, and active and reactive power
- Enabling consumers to become active consumers and *prosumers* and play a new active role in managing the electricity system (further details can be found in the consumer paper)
- Encouraging the development of storage on the transmission and distribution networks and on the consumer side. Including "power-driven" services (e.g. for frequency regulation or quality of service) or "energy-driven" services (to shift energy in time)
- Effective regulation of smart networks through developing network regulation and, where appropriate, use of performance indicators
- Designing regulation that empowers and protects consumers such that they can engage effectively with the market for demand response products and services (further details can be found in the consumer paper).

In this developing energy environment, the traditional regulatory approach should be reconsidered in order to identify which regulatory tools need updating to meet the technological challenges faced by new actors and services in the energy industry. These new players are beginning to emerge to meet the energy needs of European consumers and it is crucial that both industry and regulators act to encourage consumers to play an active role in the energy chain.

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- E6. How should regulators facilitate demand side participation (including demand side response and electricity storage)?**
- E7. 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?**

### **2.3 Encouraging Competition**

Competitive and functioning wholesale electricity markets are a prerequisite for functioning retail competition. While recognising the on-going efforts of the Framework Guidelines and Network Codes process, it can still be argued that the European wholesale and retail markets are not functioning at an optimally efficient level. In part, this may be explained by the existing focus on cross-border issues rather than the design of national-level support schemes (for example, on RES support or capacity remuneration mechanisms). In the mid-term, we expect to have an adequate, integrated and reliable energy network which can deal with intermittency and increasing cross-border flows. Physical barriers should be removed through investments in infrastructure that ensure secure supplies of electricity. This should result in increased physical cross zonal capacity and better optimisation of available capacity. Similarly, the harmonisation of cross zonal energy products will facilitate the development of internal and cross zonal market liquidity.

Wholesale electricity markets are increasingly complemented with national non-market based support mechanisms. Depending on the design of each mechanism, they can create distortions and significantly hinder market functioning. One of the most relevant distortions relates to the financing of RES subsidies. In some markets the financial burden of RES subsidies is the main driver of retail costs at the expense of market driven commodity pricing. RES subsidies, which are paid for by consumers via surcharges, may distort investment decisions and can weaken market signals. Regulators should seek to influence the design of support mechanisms to limit market distortions and to promote the development of the European Emissions Trading System to meet carbon-related policy objectives.

To further encourage competition in electricity markets, all generation and demand should compete in a non-discriminative way over the different time horizons of the wholesale market. The resultant competitive pricing signals should influence end-consumer prices and facilitate investment signals and demand response. Subsidies should be limited to the extent where absolutely necessary to facilitate market entry of new technologies. A competition framework for all generation would also

ensure that different RES technology investments are made in those areas with the most favourable conditions (e.g. solar in the south).

Having a more equal playing field for competition also influences the impact of price signals towards generation investments and the need for capacity remuneration mechanisms (CRMs). In a well-functioning and efficient market, capacity remuneration may or may not be needed to ensure generation adequacy. Given the on-going debate surrounding CRMs in Europe, every step in this direction needs to be clearly justified and carefully evaluated. Moreover, a proper competition environment for such mechanisms needs to be ensured wherever they are implemented. Regulators should seek to promote cross-border solutions to adequacy problems.

As consumers are increasingly expected to become more active in energy markets (for example, through demand response and/or smart metering), regulators need to recognise consumers' right to choose by whom and how their energy is to be provided and charged. Although this freedom could be framed by regulation, offering meaningful choice for customers (including residential consumers) is a key way to ensure their full protection.

***E8. How should NRAs influence the competition debate, for example on support schemes, regulated tariffs, capacity remuneration mechanisms, etc?***

***E9. To what extent should the relationship between competition in electricity and gas markets influence regulators' activities? Could regulatory action on the gas market, help solving the flexibility problem of the electricity market?***

***E10. How should regulators remove barriers to entry for new supply sources?***

***E11. What actions, identified in these papers, should regulators prioritise?***



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