This vision is ENTSO-E's response to the Energy Union Communication

ENTSO-E's **'Vision package'** includes four executive papers on an augmented market design, on regional co-operation to complete the Internal Energy Market, on better regulation for energy in the EU and on the interaction of security of supply and European markets. These papers, launched at the Annual Conference of ENTSO-E on 20 November 2015, formulate high-level recommendations accompanying the Energy Union implementation, 'from promise to practice'.

MARKETS AND INNOVATION DELIVER THE ENERGY UNION

European markets for electricity and a better deal for customers: This was the promise of three liberalisation packages. The 20/20/20 targets added the green and climate agenda to market. While the 2020 objectives are starting to deliver, distortions due to subsidies have been upsetting the market agenda. The current imperative is to reconcile markets with the 2020 and 2030 sustainability agendas and to make the best use of innovation.

ENTSO-E outlines in this policy paper which changes are needed[1)]: prices reflecting scarcity, linking retail and wholesale markets, a coordinated regional and European approach for renewable energy sources (RES), an overall change in the offers to and interaction with the active customer, and better research and development (R&D) management. These elements should form part of the forthcoming review of electricity legislation.

[1)] See also ENTSO-E: Market Design Policy Paper, 15/09/2014; ENTSO-E: Demand Side Response Paper, 15/09/2014

1 RENEWABLES AND INNOVATION: COMPLEMENTARY GAME CHANGERS FOR SYSTEM AND MARKET

Renewables drive innovation, and renewables necessitate innovation:

The more RES we have in the system, the more the system has to be sophisticated, flexible, and responsive[1].

High renewables penetration also requires generation and demand flexibility as well as system services (see box), since variability goes along with balancing. In addition, there is an issue with investment in the current setting: The increasing share of capital intensive and zero or low variable cost technologies (especially wind and solar energy) leads to many hours in the year with no revenues for any generation technology. Elements of answers are, according to ENTSO-E, to accept price spikes, but also revenues from system services or capacity mechanisms when present. That is why the European Commission envisages new legislation on market design and on how to best value flexibility, capacity and services in the market design.

Taking a view on the 2030 time horizon, we expect the share of renewable energy sources to grow beyond 45 % of the total annual demand[2]. In addition, we will see an increasing impact of decentralised generation and self-consumption, large-scale roll-out of smart meters, and growing energy efficiency, also thanks to the electrification of heating and transport.

By **'system services'**, we mean all those services that TSOs need to keep the power system stable and reliable at all times. These include not only ancillary services such as black start capability (the ability to restart a grid following a blackout); frequency response (to maintain system frequency with automatic and very fast responses); and fast reserve (which can provide additional energy when needed), but also the provision of reactive power for voltage stability, transient and dynamic stability, inertia, fault levels, power flow limits, (n-1) security, etc.

To keep the system in balance, demand must become more flexible. However, if this flexibility was imposed on the customer, quality of life and industrial and commercial productivity could suffer greatly. Fortunately, information and communication technology (ICT) is providing tools to empower customers to make their own choices about how flexible their demand is. Large industrial and commercial customers can continuously manage their consumption and also their system services offerings as functions of relative price and value. Alternatively, they can set parameters once in a while and leave the continuous management to a service provider or their electricity supplier. Through these choices and parameters, customers are managing their demand much more actively than in the past, telling their service provider or supplier which use of electricity and – in the future, perhaps – even which appliance is worth what price to them. Since this worth changes with the time of day and many other parameters, the smart homes, businesses and industries of the future will send signals about the value of electricity to suppliers and third party service providers such as aggregators by the billions each day.

[1] For more details on flexibility requirements, please refer to ENTSO-E's SOAF 2015, Chapter 5: https://www.entsoe.eu/Documents/SDC%20documents/SOAF/150630_SOAF_2015_publication_wcover.pdf#search=soaf%202015

[2] EC impact assessment on 2030 policy framework: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014SC0015&from=EN

2 MARKETS, AND CUSTOMER EMPOWERMENT CONTRIBUTE TO SECURITY OF SUPPLY

ENTSO-E believes that the full implementation of market design changes exposing all demand and RES to price fluctuations, cost-reflective balancing prices and market-based hedging products minimises the need for capacity mechanisms and might in the long run make them redundant.

Capacity mechanisms might, however, remain a possible element of the market design, depending on how successfully market signals and innovation will deliver the needed flexibility and system adequacy, in line with political targets on security of supply. In the future world of smart grids, smart commerce and smart homes, billions of signals from customers on the value to them of electricity at particular times and for particular uses will in aggregate send investment signals for generation, storage and demand response capabilities. Over the coming years, the no-regret recommendations from our September 2014 policy paper on market design should become reality, i. e., demand should become responsive to price signals, scarcity pricing will be introduced, the effect of taxes and levies that can blunt price signals will be reduced, and hedging products will be developed. The more that is the case, the more aggregate customer signals can drive investment decisions.

3 A FUTURE-PROOF MARKET DESIGN MUST BE BASED ON EFFICIENT PRICE SIGNALS

Moving the customer to centre stage requires market design adjustments in addition to ICT innovation. Demand must become responsive, the effects of taxes and levies, which can blunt price signals, need to be reduced, RES have to be integrated into the market, hedging products have to develop and prices reflecting actual scarcity need to be introduced.

We believe that such scarcity prices – wholesale price spikes reflecting temporary scarcity situations (e. g., periods of low wind or solar and high demand) – are central to enabling the future market design to ensure power system adequacy and efficiency resilience and to mobilise effective end-consumers' participation in markets. Prices reflecting actual scarcities, rising to 'sufficiently high levels' frequently enough, will incentivise market parties to invest in flexible generation, storage or demand-response.

STRENGTHENING PRICE SIGNALS TO VALUE ENERGY, FLEXIBILITY AND SYSTEM SERVICES

Market price signals should be strengthened to drive electricity usage, dispatch and investment. This requires unconstrained price formation in all markets (day-ahead, intraday and balancing) to reflect the real cost of electricity. ENTSO-E welcomes in this regard the reference to such a need in the joint declaration for regional cooperation on security of electricity supply within the European internal market of 12 European countries on 8 June 2015[1)].

The updated market design must reveal system costs and the value of services delivering adequacy, flexibility and resilience. For this purpose, a market-based procurement of such services should be organised whenever possible[2)], introducing new products and ensuring a level playing field among those delivering them: generation, demand-side measures or storage.

Since the lion's share of the power mix of the future will be coming from variable renewables, RES need to move to a level playing field and bear the same responsibilities (i. e., balancing) as other market participants. Renewables have to get better trading opportunities, which they currently lack in some markets. They also have to be exposed to price signals, in particular when we see negative prices at wholesale levels. Reserves, for instance, are products through which system adequacy problems should appear first via price signals.

The need for cross-border procurement of these services will be defined by TSOs through assessments[3)] of the location and the extent of both the existing scarcities and the available resources. Cross-border trade of system services, whenever possible, should take place when it creates value, taking into account its effect on energy trading. The trading of energy and of system services across borders could for instance be achieved via 'co-optimisation' of both energy and system services (such as reserves). In fact, such co-optimised trading is already foreseen by ENTSO-E's Electricity Balancing Network Code for reserve capacity. By 2019 at the latest, ENTSO-E will propose a methodology for 'co-optimised capacity allocation'.

RECOMMENDATIONS

1. ENTSO-E and ACER should work together to propose system services markets. These markets should be integrated across borders whenever possible.

2. The EC should review the Electricity and Renewables Directives to strengthen price signals and ensure that all market participants, including RES, have the same responsibilities (e.g., balancing responsibility).

1) Joint Decleration for Regional Cooperation on Security of Electricity Supply in the Framework of the IEM

2) Depending on the potential to develop competition for each specific service.

3) TSOs and ENTSO-E assessments will allow the identification of the gap between scarcities and available resources, in respect to location, magnitude and time horizon. For more details on how such assessment will support market design choices see our policy paper Where Markets meet Security of Supply

DEVELOP RISK-HEDGING PRODUCTS

The balancing responsibility exposes market participants to new financial risks. Therefore, the market will need to provide corresponding risk-hedging products like the intraday cap futures recently introduced by power exchanges.

Hedging products should develop naturally as an outcome of a market in which all generators and suppliers are subject to balance responsibility; in which imbalance prices are reflective of full system costs; and in which finally market parties, including consumers, are incentivised to balance their position as early as possible.

Such hedging products value flexibility and translate it into a more predictable and 'bankable' revenue stream, compared to the underlying commodity. At the same time, these products will allow market participants to mitigate their financial risks and provide more stable investment incentives. As long as the risk-hedging products are not developed by the market, they may need to be centrally developed (e.g., regulators could place obligations on balancing responsible parties or suppliers to purchase a certain amount of such products; TSOs would need to be closely involved in the design and certification of such products).

RECOMMENDATIONS

3. ACER and NRAs should put full financial balance responsibility on all market participants to expose market parties to system adequacy price signals.

4. To improve the investment signal while mitigating the risks for market participants, new risk hedging products should be developed by the market, or if that doesn't occur, be introduced through an appropriate regulatory framework.

REDUCE THE IMPACT OF TAXES AND LEVIES ON POWER BILLS

The significant and increasing proportion of fixed charges, taxes and levies of the average final household electricity bill reduces the relative savings that households would benefit from decreasing wholesale prices. Retail prices are usually composed of firstly the actual price of energy (some 40–45 %); secondly the costs of the networks (distribution and transmission[1]); some 25 %); and finally taxes and levies (some 30–35 %). The only dynamic part in the retail price is the energy part, while up to 60 % of the retail prices are static and unrelated to the actual power price. Therefore, the impact of fixed non-market components that are not cost-reflective (i.e., taxes, levies, and RES charges) on final retail bills must be reduced. Whenever possible, these costs must be transformed into more dynamic market components.

RECOMMENDATIONS

5. Member States should **review their relevant legislation** to reduce the price-blunting effect of general taxes, RES charges and levies on the retail energy price

[1] The actual TSO component represents on average 4 % of an end-consumer's electricity bill (based on preliminary ENTSO-E data from selected countries)

TARIFF STRUCTURES TO EVOLVE AWAY FROM CONSUMPTION-BASED PATTERN ALONE

Network development is increasingly driven by the renewables paradigm: The need for flexibility, the co-existence of centralised and decentralised generation all require important network investments. Since partial or full self-consumption patterns develop and the current network tariffs are largely based on 'yesterday's' unidirectional flows from generation to consumption, there is a need for an update of transmission and distribution tariffs. Tariffs have to be reflective of the actual grid costs and hence have to encompass an adequate component of fixed and capacity cost. The emerging self-consumption model has economic benefits for consumers because it opens new cost-containment opportunities, allowing them to increasingly control their energy bills. Self-consumption can also lower wholesale energy prices, for instance, by reducing eventually peak demand.

However, although it maximises the economic benefit of the individual, self-consumption might have unintended negative consequences for society at large if self-consumers benefit from the security of the grid without paying for it (for instance, when using it to sell surplus electricity to the grid).

To ensure that consumers can continue to benefit from self-consumption without upsetting network development, national regulatory authorities (NRAs) should allow TSOs and DSOs to shift more grid costs to the capacity component of the bill so that consumers are further incentivised to manage their consumption while still contributing their share to their actual use of the networks.

RECOMMENDATIONS

6. TSOs and DSOs should be closely involved by ACER and NRAs in assessing alternative models for network tariffs.

A REGIONAL AND EUROPEAN FRAMEWORK FOR RES AND TECHNOLOGY DEVELOPMENT

The year 2014 saw important amendments to RES support mechanisms in Europe, most notably through the State Aid Guidelines revision. Support mechanisms have to be related to market prices so that, for example, no RES subsidies are granted when wholesale prices are negative or when market uptake is a given. Should subsidies for RES technologies in the future still be necessary – for instance due to prolonged low CO_2 prices – they should be designed in a way that minimises the market and operational impacts and be sufficiently co-ordinated across Europe to support trading or participation across borders. ENTSO-E welcomes the EU-wide RES target for 2030 and stresses the need for a regionally coordinated approach to RES development. Moreover, to ensure that RES investments are efficiently driven by price signals, European Policy should ensure a comprehensive approach to RES targets, reformed ETS, interconnection targets and energy efficiency.

RECOMMENDATIONS

7. The EC should review the RES directive with a view to minimising market distortions, promoting cost-efficiency and facilitating regional RES co-operation.

4 LINKING OF WHOLESALE AND RETAIL MARKETS

While the past decade has transformed the energy sector and wholesale markets in particular, retail energy markets have remained largely unaffected. Among the most important obstacles to consumer participation in many countries in the power markets, is the lack of enabling 'hardware': smart meters, which are needed to deliver accurate information on cost and consumption as the starting point for active customer participation.

REPLACE STATIC CONSUMPTION PROFILES WITH TIME-OF-USE SETTLEMENT AND ENLARGE CUSTOMERS' CHOICE ON CONTRACTS AND SERVICES

Most household consumption in Europe is still settled based on static consumption profiles, even if the customers have smart meters. This means that consumers can only save on their electricity bills if they consume less, but not by shifting their consumption to off-peak hours or by responding, in real-time, to high or low electricity prices. It also means that suppliers are not responding to the actual consumption of their own client portfolio, but only to the static consumption profiles attached to their clients.

Allocation based on estimated consumption profiles instead of actual, time-stamped consumption thus prevents suppliers from offering pricing schemes that value flexibility, thereby restricting effective market participation. Suppliers have less room to diversify their retail products, resulting in less consumer choice and less competition.

RECOMMENDATIONS

8. Member States should introduce time-of-use settlement based on smart meter readings for consumers.

9. National regulators should enable customers to choose among different electricity supply contracts, from those based on actual price volatility to others with protection from price spikes, as well as among different services

REMOVE BARRIERS TO DEMAND-SIDE RESPONSE

To ease the uptake of flexibility, consumers should be enabled to access all markets (from long-term to day-ahead, to intraday and balancing, including system services) directly or through service providers such as independent aggregators. Regulatory barriers, which prevent direct market access for demand-side response in several countries, need to be removed to unlock the full demand-side response potential, including barriers related to the relationship between independent aggregators and suppliers. In all cases, the efficiency of markets has to be preserved, such as the pivotal role of balancing responsible parties, their information needs and balancing incentives. Sufficient competition between energy suppliers themselves on one side and with independent aggregators on the other side is key for consumers to have the negotiating power they need to optimise the economic value of their flexibility.

RECOMMENDATIONS

10. ACER should assess Member States' regulatory frameworks for demand-side response and recommend best practices. Based on this assessment, EC and Member States could consider further legislative initiatives where necessary and without neglecting the important contribution of voluntary approaches

DEVELOP TSO-DSO CO-OPERATION AND PROVIDE EUROPE-WIDE RULES ON DISTRIBUTED FLEXIBILITY

To link retail and wholesale markets effectively and enable system users at distribution level to participate in the market, the TSO-DSO interface needs to be more clearly defined and agreed upon. TSOs and DSOs have already launched initiatives for closer cooperation in the areas of coordinated access to resources, regulatory certainty, grid visibility and grid data. There is a need to design an integrated solution for balancing and congestion management at both TSO and DSO level to make more efficient use of distributed resources in the interest of the customers. Therefore, DSOs and TSOs should investigate possible options for coordinating the use of flexible resources. One option could, for instance, take the form of a single marketplace for both flexibility and balancing services. TSOs could thus access distributed resources (all low-voltage connected customers and small-scale generation) for the overriding concern of system operation purposes (balancing, stability, etc.), while DSOs could at the same time use these resources to operate distribution networks.

We believe that Europe-wide or regional rules are needed to facilitate access of flexibility sources at distribution level to all markets and thus better integrate retail and wholesale markets. Such rules (no matter whether in the form of a regulation, guideline or network code) will allow maximising benefits of Demand Side Response, storage, distributed generation and smart grids to the benefit of the customer. The customer is also at the heart of data ownership, and an appropriate data model framework has to be developed swiftly across Europe. ENTSO-E believes that there would be efficiency and advantages for a single representation of DSOs in Brussels.

RECOMMENDATIONS

11. ENTSO-E will launch on a voluntary basis a work stream on distributed flexibility with DSOs and involve closely all interested stakeholders in this work and share conclusions.

12. The EC should propose European rules (i. e., a guideline, network code, regulation) on distributed flexibility, encompassing the TSO-DSO interface, data management, network fees and retail market integration of storage, empowerment and privacy rules for the customer, self-consumption and managing interactions between suppliers and independent aggregators.

13. TSOs and DSOs should investigate further integrated solutions for balancing and congestion management, at both TSO and DSO levels.

14. ACER should assess data governance models on a non-binding basis and develop guiding principles for NRAs on these, promoting the technical standardisation of data exchange formats and communication protocols.

5 INNOVATION TO UNDERPIN THE MARKET-BASED ENERGY TRANSITION

Sound research, development and innovation policies have to bring new technologies to the point at which markets will decide about their uptake. Innovation indeed goes beyond technological innovation; it also encompasses process and business model innovation.

Processes have to be tested, and best practice needs to be shared. Sound innovation policies and an innovation culture shared by all stakeholders are needed for success.

Currently, the member TSOs of ENTSO-E already engage in a large number of research and development projects and are committed to innovation. ENTSO-E and EDSO for Smart Grids set up annual conferences on sharing results and addressing common network issues. As a result of missing research and development incentives for TSOs in several countries, innovation efforts across Europe are very heterogeneous. The regulatory model for TSOs is based on national oversight to ensure cost-effective delivery for local consumers. This poses three challenges for fostering the required participation of TSOs in innovation underpinning the large-scale transformation of the power sector. Indeed, this innovation is based on innovation clusters, including several parties from different geographic locations, sectors, or parts of the power sector value chain. Pilots, trials and errors are needed to test new technologies and processes.

The first challenge is that the legal mandate of national regulators is to primarily ensure the correct application of national legislation and to protect national consumers. It is important that NRAs engage in a cultural change where they take the regional and European dimension much more into account.

Secondly, regulators often allow TSOs to innovate provided they do this within their overall regulatory allowance. However, if there is a major transformation of the power system, as is the case to meet the EU climate policies, significant capital investment is necessary also for TSO R&D, which needs to be recognised.

Finally, the scale of the current EU policy has implications for the pan-European power system and not just the individual Member States' systems. While learning and knowledge can be achieved and shared from local to pan-European level, it is necessary that a specific pan-European power system innovation is enabled. The funding mechanism to allow for this evolution challenges the existing regulatory model. There is, therefore, a need for regulators to address the lack of innovation support in the TSO and DSO sector to share best practice on models like RIIO[1)] or ARPA-E[2)].

[1)] RIIO stands for Revenue = Incentives + Innovation + Outputs and refers to Ofgem's regulatory model for network companies.

[2)] ARPA E is the Advanced Research Project Agency Energy, depending on the US Department of Energy, and using competition and market elements in research support.

RECOMMENDATIONS

15. ACER should address the missing innovation incentive issue in regulated networks through non-binding benchmarking across Europe.

16. TSOs will support policy-makers in identifying regulatory barriers to innovation and support their removal.

A significant innovation potential lies with new actors from the ICT sector, independent aggregators, prosumers and storage solutions. The TSO community thus needs to be prepared for game-changing modifications such as low-cost local storage and must be prepared to define the cooperation with these actors in activities to smarten the grids.

6 CONCLUSION

All our recommendations point in the same direction: The forthcoming legislative review has to ensure, through undistorted market price signals, that all supply and demand actors contribute to efficient and secure electricity dispatch, usage and investment decisions. These price signals complement the current target model for the electricity market and the network codes and guidelines that implement it. That way, a main step will be taken towards reconciling market, sustainability, and security of supply in the interest of all European customers.

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