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**Guidance note on Directive 2012/27/EU on energy efficiency, amending Directives 2009/125/EC and 2010/30/EC, and repealing Directives 2004/8/EC and 2006/32/EC**

**Article 15: Energy transformation, transmission and distribution**

*Accompanying the document*

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**Implementing the Energy Efficiency Directive – Commission Guidance**

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## ARTICLE 15: ENERGY TRANSFORMATION, TRANSMISSION AND DISTRIBUTION

### A. INTRODUCTION

1. The Energy Efficiency Directive<sup>1</sup> (hereinafter also 'the Directive' or 'the EED') and the Internal Energy Market package (hereinafter also the 'IEM' or the 'Third Package')<sup>2</sup> are complementary and mutually supportive, notably as regards the objective of promoting an efficient electricity and gas network and contributing to improved security of supply.
2. Mechanisms to promote energy efficiency in network tariffs and regulation and grid operation and to remove barriers to demand response are sketched in the IEM and in complementary legislation<sup>3</sup> and in the Energy Services Directive (hereinafter also the 'ESD')<sup>4</sup>, which will be repealed by the EED as of 5 June 2014.
3. Article 15 on Energy Transformation, Transmission and Distribution of the EED and the related Annex XI and Annex XII aim at maximising grid and infrastructure efficiency and promoting demand response. The **main obligations** for Member States in Article 15 are to ensure that:

- As regards network tariffs and regulation,

- National regulatory authorities pay due regard to energy efficiency in carrying out the regulatory tasks specified in Directives 2009/72/EC and 2009/73/EC;
- Incentives in transmission and distribution tariffs that are detrimental to the overall efficiency (including energy efficiency) of the electricity system or those that might hamper participation of demand response in balancing markets and ancillary services procurement are removed;
- Tariffs allow suppliers to improve consumer participation in system efficiency, including demand response, depending on national circumstances; and
- Network regulation and tariffs fulfil the energy efficiency criteria in Annex XI, taking into account guidelines and codes developed pursuant to Regulation (EC) No 714/2009<sup>5</sup>.

- Concerning demand response,

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<sup>1</sup> Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC, OJ L 315, 14.11.2012, p. 1.

<sup>2</sup> Directives 2009/72/EC and 2009/73/EC, Regulations (EC) No 713/2009, 714/2009 and 715/2009.

<sup>3</sup> Regulation on wholesale market transparency and integrity in energy, REMIT, and the proposed Regulation on guidelines for trans-European energy infrastructure.

<sup>4</sup> Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services, OJ L114, 27.4.2006, p.64.

<sup>5</sup> Regulation (EC) No 714/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation (EC) No 1228/2003, OJ L 211, 14.8.2009, p. 15–35.

- National regulatory authorities encourage demand side resources, such as demand response, to participate alongside supply in wholesale and retail markets;
- Access and participation of demand response in balancing, reserve and other system services markets is promoted, requiring that the technical or contractual modalities to promote participation of demand response in such markets –including the participation of aggregators- be defined;
- High-efficiency cogeneration operators can offer balancing services and other operational services, where technically and economically feasible and subject to the safety and reliability requirements of the grid; and
- Transmission system operators and distribution systems operators, in meeting requirements for balancing and ancillary services, treat demand response providers, including aggregators, in a non-discriminatory manner (this is subject to technical constraints inherent in managing networks).

- In the operation and design of the gas and electricity infrastructure,

- National regulatory authorities, within the framework of Directive 2009/72/EC and taking into account the costs and benefits of each measure, provide incentives for grid operators to improve energy efficiency;
- Rules relating to the ranking of the different access and dispatch priorities, where such priorities are granted in their electricity systems, are clearly explained and published; and
- An assessment and improvement of energy efficiency in the design and operation of the gas and electricity infrastructure is undertaken.

4. Article 15 includes provisions that apply exclusively to electricity (last paragraph of Article 15(1) and the related Annex XI); rules relating to the ranking of high-efficiency cogeneration priority access and dispatch (Article 15(5)) and its contribution to balancing and other operational services (15(6)); and demand response (15(8)). The other provisions of Article 15(1) and Article 15(2), (3) and (4) apply equally to gas and to electricity.
5. This note provides further information to guide the implementation of measures in the EED relating to new requirements on energy efficiency criteria for energy network regulation and tariffs, demand response and energy efficiency in network design and operation of the gas and electricity infrastructure. Each section specifies first the relevant provisions of the IEM and subsequently explains how Article 15 complements those with new obligations. The note outlines the new requirements that are included in the legislation and the new roles and duties of Member States, national regulatory authorities (NRAs) and operators.
6. This note aims to provide guidance to Member States on how to apply Article 15 of the EED. The note states the views of the Commission services, does not alter the legal effects of the Directive and is without prejudice to the binding interpretation of Article 15 as provided by the Court of Justice

## **B. NEW ROLES FOR THE DIFFERENT ACTORS IN THE INTERNAL ENERGY MARKET AND NEW ACTORS**

### **B1. National energy regulatory authorities**

7. The IEM (Article 3(11) of the Electricity Directive<sup>6</sup> and Article 3(8) of the Gas Directive<sup>7</sup>) establishes that in order to promote energy efficiency, Member States or, where a Member State has so provided, the regulatory authority *‘must strongly recommend that electricity and natural gas undertakings optimise the use of electricity and gas, for example by providing energy management services, developing innovative pricing formulas, or introducing intelligent metering systems or smart grids, where appropriate’*.
8. Such encouragement is reinforced by the general objectives and duties of national regulatory authorities, which are responsible for promoting a competitive, secure and environmentally sustainable internal market in electricity/gas networks, taking into account long-term objectives (Article 36(a) of the Electricity Directive, Article 40(a) of the Gas Directive). Relevant long-term objectives are European targets for the share of energy from renewable sources in final energy consumption, energy efficiency and greenhouse gas emission reductions. Article 36 of the Electricity Directive and Article 40 of the Gas Directive list the general objectives of the NRA. The specific duties and powers that Member States must grant to the NRAs are listed mainly in Articles 37 of the Electricity Directive and 41 of the Gas Directive. The two sets of provisions are complementary and should be understood in conjunction with each other: whilst carrying out its duties and exercising its powers, the NRA must follow the general objectives assigned to NRAs<sup>8</sup>.

The core duties of NRAs include:

- Duties in relation to tariffs for access to transmission and distribution networks; fixing or approving, in accordance with transparent criteria, transmission or distribution tariffs or their methodologies;
- Duties in relation to unbundling: ensuring that there are no cross-subsidies between transmission, distribution, liquefied natural gas, storage, and supply activities;
- Duties in relation to the general oversight of energy companies: ensuring compliance of transmission and distribution system operators, system owners (where relevant) and electricity or gas undertakings with their obligations under the Directive and other relevant European Union legislation, including as regards cross-border issues;
- Duties in relation to consumer protection: helping to ensure, together with other relevant authorities, that consumer protection measures, including those set out in Annex I (to the Electricity and Gas Directives) are effective and enforced; publishing recommendations, at least annually, in relation to compliance of supply prices with

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<sup>6</sup> Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC, OJ L211, 14.8.2009, p.55.

<sup>7</sup> Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC, OJ L211, 14.8.2009, p.94.

<sup>8</sup> For additional clarification on the general objectives, duties and powers of the regulatory authorities, please look at the interpretative note on Directive 2009/72/EC and Directive 2009/73/EC “The regulatory authorities”, ([http://ec.europa.eu/energy/gas\\_electricity/interpretative\\_notes/doc/implementation\\_notes/2010\\_01\\_21\\_the\\_regulatory\\_authorities.pdf](http://ec.europa.eu/energy/gas_electricity/interpretative_notes/doc/implementation_notes/2010_01_21_the_regulatory_authorities.pdf)).

Article 3 (of the Electricity and Gas Directives); ensuring access to customer consumption data.

9. Article 15 of the EED adds a specific objective and duty to **pursue energy efficiency**, whereby Member States must ensure that national energy regulatory authorities pay due regard to energy efficiency in carrying out the regulatory tasks specified in the Electricity and in the Gas Directive regarding their decisions on the operation of the gas and electricity infrastructure.
10. Furthermore, Article 15(8) of the EED establishes that Member States must ensure that national regulatory authorities encourage demand side resources, such as demand response, to **participate alongside supply** in wholesale and retail markets.
11. In addition, it follows from the wording of recital 45 of the EED that Member States should ensure that national energy regulatory authorities take an integrated approach encompassing potential savings in the energy supply and the end-use sectors.

## **B2. Transmission system operators (TSOs) and Distribution system operators (DSOs)**

12. The IEM defines the main tasks of the TSOs and DSOs. Article 12 of the Electricity Directive (and Article 13 of the Gas Directive) on the tasks of TSOs provide that they must be responsible for ensuring a secure, reliable and efficient transmission system. In the context of such an electricity system, Article 12(d) of the Electricity Directive specifies that TSOs must be responsible for ensuring the availability of all necessary ancillary services<sup>9</sup>, including those provided for by demand response.
13. Ancillary services are commercial services procured by system operators (the TSOs and the DSOs) from network users. Ancillary services procurement is one of the tools that enable system operators to ensure the security of supply and quality of service of the electric system. The availability of appropriate contractual and technical structures within ancillary services is necessary for the participation of demand response. Demand response usually provides the same service as generation. To allow for and encourage its participation, operational and participation rules are needed.
14. Article 25 of the Electricity and Article 25 of the Gas Directive lay down the tasks of the DSOs and states that they must carry out their responsibilities with due regard to energy efficiency. According to Article 25(7) of the Electricity Directive, DSOs must consider energy efficiency/demand-side management measures or distributed generation that might

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<sup>9</sup> According to Article 2(17) of the Electricity Directive, 'ancillary service' means a service necessary for the operation of a transmission or distribution system. Similarly, Article 2(14) of the Gas Directive defines 'ancillary services' as all services necessary for access to and the operation of transmission networks, distribution networks, liquefied natural gas (LNG) facilities, and/or storage facilities, including load balancing, blending and injection of inert gases, but not including facilities reserved exclusively for transmission system operators carrying out their functions.

supplant the need to upgrade or replace electricity capacity when planning the development of the distribution network. In this context, Article 2(29) of the Electricity Directive defines *‘energy efficiency/demand-side management as a global or integrated approach aimed at influencing the amount and timing of electricity consumption in order to reduce primary energy consumption and peak loads by giving precedence to investments in energy efficiency measures, or other measures, such as interruptible supply contracts, over investments to increase generation capacity, if the former are the most effective and economical option, taking into account the positive environmental impact of reduced energy consumption and the security of supply and distribution costs aspects related to it’*.

### **Priority access and dispatch rules for high-efficiency cogeneration**

15. Article 15(5) of the EED complements the IEM by adding an obligation (with several exceptions) for TSOs and DSOs to guarantee the transmission and distribution of electricity from high-efficiency cogeneration, give it priority or guaranteed access to the grid and give it priority dispatch, when they are in charge of dispatching (*i.e.* in those Member States with such a dispatch system is used). These provisions build on and expand on Article 8 of the Cogeneration Directive, which already required priority dispatch by TSOs, but not by DSOs. The priority access and dispatch rights of high-efficiency CHP are without prejudice to the priority access and dispatch rights of electricity from renewable sources provided in Article 16(2) of Directive 2009/28/EC<sup>10</sup> on the promotion of renewable energies and Article 15 of the Electricity Directive concerning common rules for the internal market in electricity and the need to ensure continuity in heat supply. In addition to these obligations, TSOs and DSOs must comply with the requirements set out in Annex XII of the EED (*on energy efficiency requirements for transmission system operators and distribution system operators*). Cogeneration is promoted as one of the major forms of distributed generation capable of enhancing energy efficiency also in grids due to its close location to consumers. Furthermore, the requirement of priority access to the grid is new. This priority should only apply to high-efficiency cogeneration, *i.e.* cogeneration that ensures at least 10% primary energy savings compared to the references of separate heat and electricity production according to Annex II of the Directive<sup>11</sup>. The upgrading and strengthening of the grid rules in the Cogeneration Directive for high-efficiency CHP aims to maintain the equality of treatment of electricity from high-efficiency cogeneration with electricity from renewable energy sources following the strengthening of the grid rules relating to the latter in the Renewable Energy Directive<sup>12</sup>.
16. The priority rules for high efficiency CHP originate therefore from the need to ensure the continuity of heat supply as indicated in Article 15(5). Priority dispatch for high-efficiency CHP is needed in view of the operational constraints CHP operators face since when they produce heat for their heat consumers, they must simultaneously produce electricity to

<sup>10</sup> Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC OJ L 140, 5.6.2009, p. 16–62

<sup>11</sup> The calculation of electricity from high-efficiency cogeneration must follow the calculation methodologies in Annex I using the detailed guidelines laid-down in Commission Decision 2008/952/EC and the reference efficiency values for separate heat and electricity production established in Commission Implementing Decision 2011/877/EU (see Article 14(10) and Annex I, last paragraph).

<sup>12</sup> See Interpretative Note on grid rules for high-efficiency CHP in Article 8 of the Directive 2004/8/EC on the promotion of cogeneration (SWD/2012/13) available at: <http://ec.europa.eu/energy/efficiency/cogeneration/doc/2012swd0013.pdf>.

achieve primary energy savings. Therefore, when they have to ensure continuous heat supply, they have limited flexibility to adjust the production of electricity. Cogenerators also often do not select when they produce the electricity, since they are subject to the need of the heat consumers to provide steam for chemical and industrial plants or to district heating systems during cold weather. In such circumstances, their electricity should be accepted by the grid, so as to enable their operation in cogeneration mode. Any curtailment of their ability to produce electricity may lead to a significant loss of efficiency and thus would defeat the purpose of cogeneration. For these reasons, when cogeneration operators have to serve a heat consumer, they should also be able to feed electricity into the grid and have priority over other electricity sources that are less efficient or more flexible.

17. Under EU law, therefore, both electricity from renewable sources and electricity from high-efficiency CHP enjoy the right of priority dispatch under certain conditions. Limitations on priority access and dispatch can be applied when this is needed for the maintenance of the reliability and the safety of the grid and to ensure its secure operation.
18. In this context of equal priority access and dispatch rights for both electricity from renewable sources and electricity from high-efficiency CHP, the need to define the operational conditions for the implementation of these different priority accesses and dispatch rights arises. The EED therefore requires Member States to ensure that the rules on how the different rights will be ranked in their electricity systems are clearly explained in detail and published in view of the need to maintain the grids' operational security and stability, *i.e.* in cases where two or more equal priority access or dispatch rights conflict with each other.
19. Due to the characteristics of some renewable energy sources which are not always available with the same intensity (such as wind or solar energy) and the limited state of development of storage technologies for the electricity produced from these variable resources, Member States must in any case ensure that priority access of dispatch for energy from variable energy sources is not hampered. The differentiation made between electricity from variable and non-variable renewable sources is based on their physical characteristics and is objective. For other forms of electricity from renewable energy and high-efficiency cogeneration, all of which have priority, Member States may establish other rankings.

### **Demand response**

20. In the context of the requirement for Member States to promote access to and participation of demand response, the EED (Article 15(8)) provides that Member States must require national regulatory authorities, or TSOs and DSOs where the national regulatory systems so require, to promote access to and participation of demand response in balancing, reserve and other system services markets. This requires clarifying, and if necessary changing, what the technical or contractual requirements for participation in those markets are, e.g. minimum required capacity, timing and duration of demand response activation, notice time for activation, etc., in a way that is appropriate for demand side participation. The promotion of access to and participation of demand response should also include dedicated provisions organising the relationships between relevant stakeholders, in particular between demand response service providers (e.g. aggregators or energy saving companies –ESCOs–) and

balance responsible parties<sup>13</sup>. These may be part of technical or contractual arrangements or any other participation procedures and be further defined and harmonised taking into account future network codes developed pursuant to Regulation (EC) No 714/2009.

### **B3. New actors, including aggregators**

Further to the definitions originating from the IEM (e.g. TSO or DSO), the Directive refers to other actors in the energy market such as demand service providers and defines in Article 2(45) 'aggregator' as a *demand service provider that combines multiple short-duration consumer loads for sale or auction in organised energy markets*. The role of aggregators and their participation in demand response is further clarified in Article 15(8), which states that TSOs and DSOs must treat aggregators and other demand response providers in a non-discriminatory manner and on the basis of their technical capabilities in meeting requirements for balancing and ancillary services, subject to technical constraints inherent in managing networks. With regards to the access of demand response to balancing, reserve and other system services markets, Article 15(8) establishes that the technical specifications for participation in these markets must include the participation of aggregators<sup>14</sup>.

21. Some types of cogeneration may be capable of a mode of operation that technically and economically enables them to provide flexible generation and storage. These cogeneration operators, including micro-cogenerators, should be able to participate in balancing markets, including demand response. Technical specifications for the participation in balancing, reserve and ancillary services market should be expanded for the participation of some types cogeneration installations in accordance with Article 15(6) and (8).
22. In summary, Member States must do the following things;
  1. Ensure that **national regulatory authorities** pay due regard to energy efficiency in carrying out their regulatory tasks and that they encourage demand side resources, such as demand response, to participate alongside supply in wholesale and retail markets.
  2. Provide clear and transparent rules on how the different priority rights will be ranked in their electricity systems, which allow **TSO and DSOs** to (a) guarantee the transmission and distribution of electricity from high-efficiency cogeneration; (b) give it priority or guaranteed access to the grid and (c) when they are in charge of dispatching, give it priority dispatch.
  3. Require **national regulatory authorities**, or if the national regulatory system so require **TSOs and DSOs**, the definition of technical modalities for demand response participation in balancing, reserve and other system services markets. These technical

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<sup>13</sup> Balance or balancing responsible parties are responsible for compilation of the balance between supply of energy and anticipated consumption of energy with any numbers of generators or loads in its balance area.

<sup>14</sup> The International Energy Agency states that 'aggregation' of flexible energy resources means that a third party collects and implements a portfolio of flexible energy resources and operates them combined as a flexible resource on the energy market such as the whole sale electricity market. The aggregator may also offer the aggregated flexible resources to the market for system reserves or as ancillary services for the operators of energy distribution networks. The term Virtual Power Plant has roughly the same meaning as distributed energy resources aggregation ('*Integration of Demand Side Management, distributed generation, renewable energy sources and energy storages. State of the art report*').

specifications must include the participation of aggregators and potential actors from cogeneration installations.

### **C. ENERGY EFFICIENCY CRITERIA IN NETWORK TARIFFS AND REGULATION**

23. The Electricity Directive (Article 37(1)(a) and (6)) provides that national regulatory authorities must be given the duty of fixing or approving – in accordance with transparent criteria – transmission and distribution tariffs or their methodologies. In carrying out those tasks, national regulatory authorities should take account of the long-term, marginal avoided network costs from distributed generation and demand-side management measures while respecting that the Electricity Directive (Article 37(6a) provides that those tariffs or methodologies must allow the necessary investments in the networks to be carried out in a manner allowing those investments to ensure the viability of the networks. Article 37(8) of the same Directive establishes that in fixing or approving the tariffs or methodologies and the rules for balancing services, the regulatory authorities must ensure that TSOs and DSOs are granted appropriate incentives, over both the short and long term, to increase efficiencies, foster market integration and security of supply and support the related research activities. It follows from the text of the Electricity and Gas Directives that NRAs have the duty of fixing or approving not only network tariffs or their methodologies, but also methodologies used to calculate or establish the terms and conditions for connection and access to national networks, the provision of balancing services and access to cross-border infrastructures.
24. Article 10(1) of the Energy Services Directive imposed obligations on Member States on energy efficient tariffs and regulation, requiring the removal of incentives in transmission and distribution tariffs that unnecessarily increase the volume of distributed or transmitted energy. In addition, it gave Member States the possibility of imposing public service obligations relating to energy efficiency on undertakings operating in the electricity market. With this provision, the Energy Services Directive supported regulatory incentives that encourage energy efficiency gains and lower peak investment needs and the removal of volume-based incentives, moving from a volume-based model into a quality and efficiency based model.
25. The EED builds energy efficiency criteria into the design of network tariffs and regulation. It also follows from the wording of recital 45 and Article 15(1) that in the context of the continuing deployment of smart grids, Member States should ensure that national energy regulatory authorities are able to ensure that network tariffs and regulations incentivise improvements in energy efficiency, e.g. via providing incentives to make available system services to network users. Improvements in energy efficiency include facilitating demand side participation for instance in reserve markets. A possible incentive may be the inclusion of an incentive in the grid tariff to reward flexibility, for instance reducing the fee significantly for customers that reduce their load during peak times and shift it to off-peak. Similarly, adapting the technical standards for participating in reserves markets in a way that does not increase the network fee. Stimulating the participation of such flexible loads may require amendments to the existing regulatory framework, for instance the network tariff methodology, to avoid excluding flexible loads from the balancing market and incentivise users to reshape their load profile in line with network needs.

## **C1. Providing incentives for the deployment of smart grids**

26. A common policy view is that regulatory and market structures need to adjust to the development of renewable energy, electrification of demand (notably transport), the deployment of smart grids and more generally to a need to increase flexible capacities. Sources of flexibility can include demand side resources, distributed generation and energy from cogeneration and storage.
27. The Electricity Directive encourages Member States to deploy Smart Grids, which should be built in a way that encourages decentralised generation and energy efficiency. The Smart Grids Task Force (SGTF)<sup>15</sup> suggested that common criteria to assist Member States in the assessment of costs and benefits of measures needed to deploy smart grids should be put forward. The SGTF suggested that these should be based on quantifiable indicators such as improved energy efficiency and energy savings or lower bills due to better customer feedback. In this context, guidance and advice for conducting cost-benefit analysis of smart grids projects was provided in 2012<sup>16</sup>.
28. The EED establishes that Member States must ensure that national energy regulatory authorities, through the development of network tariffs and regulations and taking into account the costs and benefits of each measure, provide incentives to TSOs and DSOs to make available to network users (e.g. generators, retailers, consumers, storage owners, aggregators) system services permitting them to take advantage of the energy efficiency potential of smart grids (Article 15(1)).
29. As the term is undefined in the EED it is necessary to decide how to interpret '*system services*'. Article 2(18) of the Electricity Directive defines '*system user*' as '*a natural or legal person supplying to, or being supplied by, a transmission or distribution system*'. In the light of this, it would seem sensible to conclude that for the purposes of the EED, the term '*system services*' should be understood as everything that relates to supplying to, or being supplied by, a transmission or distribution system or network and maintaining the balancing of the system, *i.e.* supply matches demand. This could include facilities supplying ancillary services as well as all services to the system which help to increase its efficiency and/or lower consumption within organised electricity markets. These services can include demand response, demand management, management of distributed generation and decentralized storage and other such services. System services could be procured by TSOs and DSOs from network users, according to their technical capabilities.

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<sup>15</sup> The Smart Grids Task Force (SGTF) was set up by the European Commission (EC) at the end of 2009. The SGTF reached a consensus over the last years on policy and regulatory directions for the deployment of Smart Grids. The SGTF has also issued key recommendations for standardisation, consumer data privacy and security.

<sup>16</sup> JRC reference report "Guidelines for conducting a cost-benefit analysis of smart grid projects", 2012 ([http://ec.europa.eu/energy/gas\\_electricity/smartgrids/smartgrids\\_en.htm](http://ec.europa.eu/energy/gas_electricity/smartgrids/smartgrids_en.htm)).

30. The EED establishes that network tariffs and regulation must not prevent TSOs, DSOs or energy retailers from offering or making available, as system services, in ‘*organised electricity markets*’<sup>17</sup>, measures listed in Annex XI(2) to:
- i. Shift customers’ demand from peak to off-peak (taking into account the availability of renewable energy, energy from cogeneration and distributed generation);
  - ii. Induce customers to reduce demand;
  - iii. Store energy; or
  - iv. Connect or dispatch electricity from distributed generation.
31. The Commission's Communication on Smart Grids<sup>18</sup> and its accompanying staff working document on definitions, expected services, functionalities and benefits of smart grids<sup>19</sup> provides similar examples of services to be provided in smart grids, such as the integration of distributed energy resources (both large and small-scale renewable generation, heat pumps, electric vehicles and storage), allowing consumers to modify their behaviour according to price and load signals or promoting the active participation of all actors in the electricity market through the promotion of demand response programmes.

## **C2. Energy efficiency criteria for electricity network tariffs**

32. With regard to electricity, Article 15(1) requires Member States to ensure that network regulation and tariffs fulfil the criteria in Annex XI (on ‘*Energy efficiency criteria for energy network regulation and for electricity network tariffs*’).
33. In this regard, network tariffs must reflect reductions in network costs resulting from demand management, demand response and distributed generation. This means that national regulatory authorities must take account of these reduced costs (and efficiency gains) when fixing or approving tariffs, or the methodologies underlying the calculation of tariffs.
34. Cogeneration, like distributed generation, can provide significant grid efficiency improvement through avoided grid losses. Member States may therefore want to encourage high-efficiency cogeneration to be sited close to areas of demand by reducing connection and use-of-system charges, to encourage high-efficiency cogeneration to be located close to areas of demand.
35. Article 15(4) complements Article 15(1) and Annex XI(1) and (2) by requiring the removal of network tariff rates for transmission and distribution that are detrimental to the overall efficiency (including energy efficiency) of the generation, transmission, distribution and supply of electricity. This requires assessing tariffs with respect to their efficiency, including energy efficiency, and the removal of tariffs or part of tariffs that are detrimental from an efficiency point of view. This could for example mean looking at whether the tariff design

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<sup>17</sup> For the purpose of this provision the term ‘organised electricity markets’ includes over-the-counter markets and electricity exchanges for trading energy, capacity, balancing and ancillary services in all timeframes, including forward, day-ahead and intra-day markets.

<sup>18</sup> ‘Smart grids: from innovation to deployment’, COM(2011) 202 final.

<sup>19</sup> SEC(2011) 463 final.

sends price signals that encourage more rather than less energy consumption or focuses on fixed rather than volumetric charges that do not encourage customer energy efficiency. Furthermore, demand response is a way to tap the potential of energy efficient use of infrastructure and therefore incentives in tariffs and regulations should reflect signals to power saving or optimal utilisation of energy infrastructure assets resulting from increased demand side participation, including demand response.

36. Repeating Article 10(2) of the ESD, Article 15(3) of the EED provides that Member States may permit components of schemes and tariff structures with a social aim for net-bound energy transmission and distribution, provided that any disruptive effects on the transmission and distribution system are kept to the minimum and are not disproportionate to the social aim.
37. In summary, Member States must do the following things:
1. Ensure that national energy regulatory authorities provide incentives to TSOs and DSOs to make available to network users (e.g. generators, retailers, consumers, storage owners, aggregators) system services permitting them to take advantage of the energy efficiency potential of smart grids.
  2. Ensure that network tariffs and regulations fulfil the energy efficiency criteria in Annex XI and are cost-reflective of cost-savings resulting from demand management, demand response and distributed generation.
  3. Ensure the removal of network tariff rates for transmission and distribution that are detrimental to the overall efficiency, including energy efficiency, of generation, transmission, distribution and supply of electricity.

#### **D. MEASURES TO ENABLE AND DEVELOP DEMAND RESPONSE**

38. Demand response can be defined<sup>20</sup> as changes in electricity usage by end-use customers from their normal or current consumption patterns in response to market signals, such as time-variable electricity prices or incentive payments, or in response to acceptance of the consumer's bid, alone or through aggregation, to sell demand reduction at a price in organised electricity markets. The objective of such market signals is to induce modulation (increase or reduction) of electricity usage and to optimise usage and balancing of networks and electricity production and consumption, for example by consuming less during peak times or by facilitating the integration of electricity from variable renewable energy sources and micro-generation. Although sometimes a differentiation is drawn between different types of demand response (e.g. consumer vs. industrial, price/load led vs. incentive contracts, etc), demand response includes all intentional modifications to consumption patterns of electricity of end-

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<sup>20</sup> See for instance the definition by the International Energy Agency, which says that 'demand response or demand side response are programs and activities designed to encourage consumers to change their electricity usage patterns, including timing and level of electricity demand, covering all load shape and customer objectives. Demand response includes time-of-use and dynamic rates or pricing, reliability programs such as direct load control of devices and instantaneous interruptible load, and other market options for demand changes (like demand side bidding)' (*Integration of Demand Side Management, distributed generation, renewable energy sources and energy storages. State of the art report*).

use customers that are intended to alter the timing, level of instantaneous demand or the total of electricity consumption.

39. The term '*demand response*' in the Directive encompasses demand response both as a result of innovative pricing to stimulate final customers to modulate their consumption and through load shifting by e.g. industrial customers or through aggregators.
40. Demand response is at the core of the development of smart grids and the more efficient management of networks they will bring. Demand response initiatives can and should also be stimulated without a smart grid.
41. Mechanisms to remove the barriers to demand response are set out in the Electricity Directive and in the ESD. The EED builds on both and elaborates further, promoting its access to and participation in the market and the removal of existing barriers. Recitals 44 and 45 read as follows:

*'(44) Demand response is an important instrument for improving energy efficiency, since it significantly increases the opportunities for consumers or third parties nominated by them to take action on consumption and billing information and thus provides a mechanism to reduce or shift consumption, resulting in energy savings in both final consumption and, through the more optimal use of networks and generation assets, in energy generation, transmission and distribution.'*

*'(45) Demand response can be based on final customers' responses to price signals or on building automation. Conditions for, and access to, demand response should be improved, including for small final consumers. Taking into account the continuing deployment of smart grids, Member States should therefore ensure that national energy regulatory authorities are able to ensure that network tariffs and regulations incentivise improvements in energy efficiency and support dynamic pricing for demand response measures by final customers. Market integration and equal market entry opportunities for demand-side resources (supply and consumer loads) alongside generation should be pursued. In addition, Member States should ensure that national energy regulatory authorities take an integrated approach encompassing potential savings in the energy supply and the end-use sectors.'*

42. The Directive, in Article 15(8), gives a mandate to national regulatory authorities to encourage demand response; requires network operators – TSOs and DSOs – to treat demand response providers (both individual consumers and third parties acting on behalf of groups of consumers in aggregate) in a non-discriminatory way in meeting requirements for balancing and ancillary services; and ensures that the appropriate technical or contractual modalities for participation of demand response in balancing, reserve and other system services markets be defined.

## **D1. Role of national regulatory authorities, TSOs and DSOs**

43. Article 15(8) establishes that Member States must ensure that national energy regulatory authorities encourage the participation of demand side resources, including demand response, alongside supply in wholesale and retail markets. This requires the design of operational and participation rules accordingly, to enable the procurement of flexibility from the market. It also requires the adaptation of grid connection and access rules for demand side resources to meet the need for flexibility. Demand-side resources refer to the full range of consumer or customer-based resources, such as demand response, distributed generation or end-use energy efficiency, which reduce energy needs.
44. Network operators – TSOs and DSOs – must ensure that balancing services and other operational services are part of a services bidding process which is transparent and non-discriminatory. Member States must also ensure that TSOs and DSOs treat demand response providers, including demand aggregators, in a non-discriminatory way and on the basis of their technical capabilities (Article 15(8)).

## **D2. Effective price signals**

45. The Electricity Directive establishes that in order to promote energy efficiency, Member States or, where a Member State has so provided, the regulatory authority must recommend that electricity undertakings optimise the use of electricity, for example by developing innovative pricing formulas.
46. Effective price signals are important to encourage efficient use of energy and demand response. In this context, recital 45 indicates that Member States should ensure that national energy regulatory authorities are able to ensure that network tariffs and regulations support dynamic pricing for demand response measures by final customers.
47. Furthermore, and in addition to the measures described in section C2, Annex XI refers to different possibilities for network and retail tariffs to support dynamic pricing for demand response, such as:
- a) Time of use tariffs, whereby electricity prices are set for a specific time period and known in advance;
  - b) Critical peak pricing, which requires that time of use prices are in effect for certain peak days, where prices may reflect the cost of generating and/or purchasing at wholesale level;
  - c) Real time pricing, also referred to as ‘dynamic pricing’, whereby electricity prices may change as often as hourly, exceptionally more often; and
  - d) Peak time rebates, which are monetary rewards in exchange for participating in the market.

48. According to Article 15(4), Member States must ensure the removal of those incentives in transmission and distribution tariffs that might hamper participation of demand response in balancing markets and ancillary services procurement.

### **D3. Market access, participation and transparency**

49. As explained in section C, Article 15(8) establishes that demand side resources such as demand response should participate alongside supply in wholesale and retail markets. Recital 45 also indicates that market integration and equal market entry opportunities for demand-side resources alongside generation should be pursued. This includes both removing potential regulatory barriers and more direct interventions to ensure demand side participation. Participation of demand response in wholesale and retail markets shall also be possible via an aggregator.
50. Under the Electricity Directive, Member States must ensure the possibility of providing for energy efficiency/demand-side management measures through a tendering procedure or any procedure equivalent in terms of transparency and non-discrimination, on the basis of published criteria. It is also provided in this Directive that transmission system operators should facilitate the participation of final customers and final customers' aggregators in reserve, balancing and other ancillary/system services markets. This possibility of tendering for new capacity or opting for energy efficiency and demand-side measures is also acknowledged in the Energy Services Directive (and in the earlier Electricity Directive of 2003).
51. The EED establishes that market access for demand response needs to be enabled by clear network and market rules. Accordingly, Article 15(8) establishes that Member States must promote access to and participation of demand response in balancing, reserve and other system services markets.
52. To this end, Member States must arrange for the technical modalities to be defined to promote participation of demand response balancing, reserve and other system services markets, including the participation of aggregators. This may mean in practice providing a detailed description of tender specifications and of the tendering procedure - or any equivalent participation procedure - to be followed. These participation procedures will be based on the technical or operational requirements of the balancing, reserves and other system services markets and the capabilities of demand response. The aim is to guarantee that technical rules and requirements exist based on which demand response can be part of the balancing and other system services. Possible examples of technical modalities to promote participation of demand response could include providing clarity on the minimum aggregated capacity needed for participation, baseline measurement methodology, maximum duration of demand response activation, timing of demand activation, notice time for activation of demand response, frequency of demand response activation, penalty requirement, tender duration timeframe, long enough contract terms to incentivize full engagement, the option to bid on positive or negative capacity as well as clarity on information exchange, when demand response capacities are activated, between third parties (e.g. aggregators) and suppliers.

53. Depending on the requirements of the national regulatory system, Member States may require the definition of the technical modalities for market participation to be undertaken by national regulatory authorities or by transmission system operators and distribution system operators in close cooperation with demand service providers and consumers.
54. In summary, Member States must comply with the following obligations:
1. Ensure that national energy regulatory authorities encourage the participation of demand side resources, including demand response, alongside supply in wholesale and retail markets.
  2. Ensure – subject to technical constraints inherent in managing networks - that TSOs and DSOs treat demand response providers, including demand aggregators in a non-discriminatory way and on the basis of their technical capabilities.
  3. Promote - subject to technical constraints inherent in managing networks - access to and participation of demand response in balancing, reserve and other system services markets, requiring that the technical or contractual modalities to promote participation of demand response in balancing, reserve and other system services markets - including the participation of aggregators - be defined.
  4. Ensure the removal of those incentives in transmission and distribution tariffs that might hamper participation of demand response in balancing markets and ancillary services procurement.

#### **E. ENERGY EFFICIENCY IN NETWORK DESIGN AND OPERATION OF THE GAS AND ELECTRICITY INFRASTRUCTURE**

55. The Directive requires Member States to incorporate energy efficiency in network design and operation of the gas and electricity infrastructure.
56. Member States must ensure that national regulatory authorities pay due regard to energy efficiency in their decisions on the operation of the gas and electricity infrastructure (Article 15(1)).
57. Member States must also ensure that network operators have incentives to improve the efficiency of infrastructure design and operation. By June 2015, they must ensure that the energy efficiency potentials of their gas and electricity infrastructure are assessed and measures and investments for the introduction of cost-effective energy efficiency improvements in the network infrastructure are identified, with a timetable for their introduction (Article 15(2)). This assessment may look into the balance to be struck between the use of the full potential for greater flexibility within the grid of distributed generation and demand side resources (a large share of which will be connected to low and medium-voltage distribution networks) and grid optimisation, including reduced grid losses and network reinforcement. This may require a new approach to grid design, with long term network planning that properly accounts for demand side contribution to ensuring generation adequacy.

58. In accordance with Article 15(2) the assessment referred to in the previous paragraph must look in particular at energy efficiency potentials regarding transmission, distribution, load management and interoperability and connection to energy generating installations, including access possibilities for micro-generators (both for gas and for electricity infrastructure design and operation). The assessment may therefore explore an optimal utilisation of energy infrastructure assets, increased energy efficiency measures and demand side participation and upgraded or modernised infrastructure for the reduction of technical and operational losses, which in turn could allow reducing the need for investing in new infrastructure. Additional examples may be found in connection with CHP and district heating and cooling networks, natural gas vehicles, optimisation and enhanced automation and monitoring of networks.
59. In summary, Member States have the following obligations:
1. Ensure that network operators have incentives to improve the efficiency of infrastructure design and operation.
  2. By June 2015, ensure that an assessment is made of the energy potentials of their gas and electricity infrastructures and measures and investments for the introduction of cost-effective energy efficiency improvements in the network infrastructure are identified, with a timetable for their introduction.

#### **F. OTHER LINKS TO THE INTERNAL ENERGY MARKET**

60. When implementing Article 15 of the EED, Member States, national regulatory authorities and network operators should be aware of the network codes that are being developed to implement the IEM legislation and notably those on system operation, demand connection and balancing.