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Energy Efficiency Coordination Group

Implementation of Article 15 of the EED

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Article 15 concerns energy efficiency in energy transformation, transmission and distribution → different set of actors and measures

▶ **What does Article 15 require?**

- Energy efficiency in network design, development and operation
- Energy efficiency in network tariffs
- Treatment of high-efficiency cogeneration (dispatch and connections)
- Integration of demand response

▶ **What measures need to be taken for compliance?**

- Assessment of energy efficiency potential and measures
- Review of tariff structures and regulatory framework
- Enabling demand-side integration to markets

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Energy efficiency in network design

Requirements of Article 15 Paragraph 2

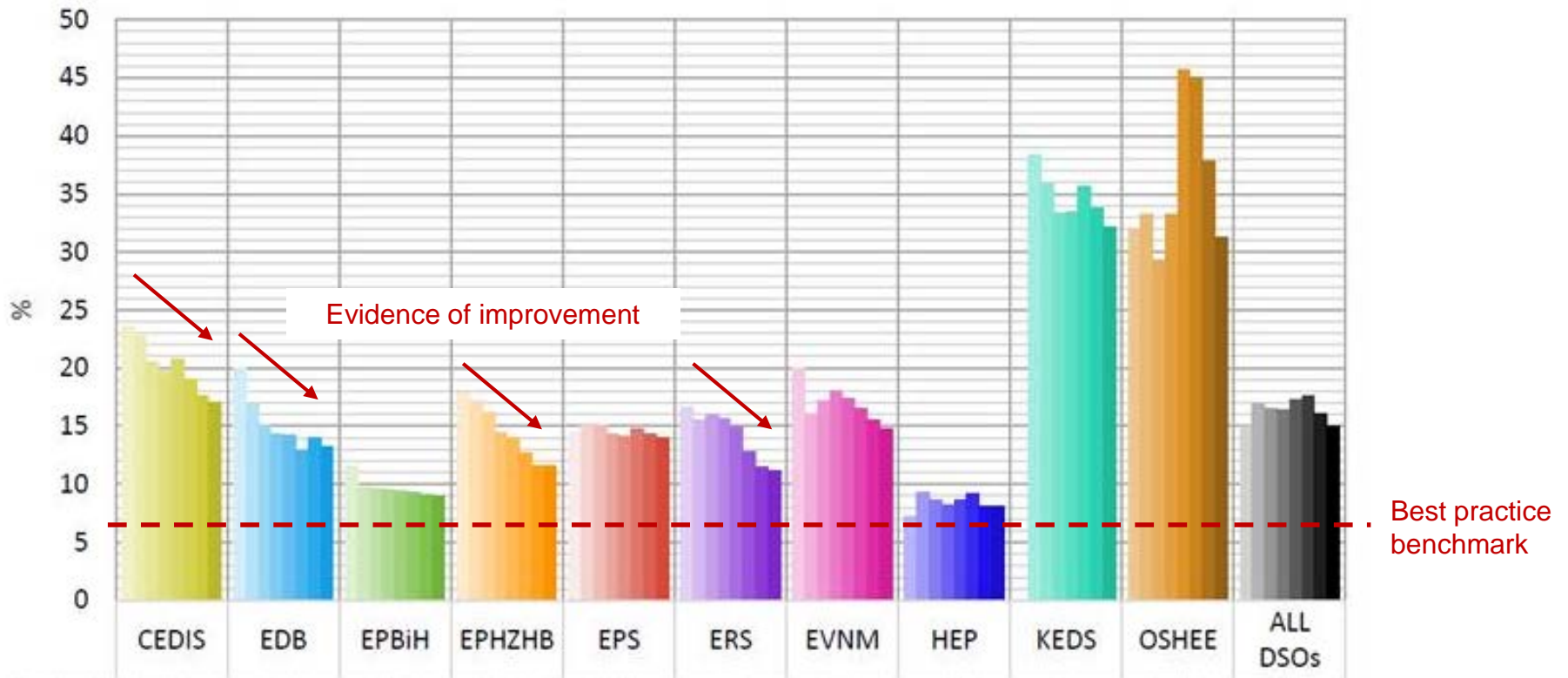
“Contracting Parties shall ensure, by 15 October 2018 that:

- (a) an assessment is undertaken of the energy efficiency potentials of their gas and electricity infrastructure, in particular regarding transmission, distribution, load management and interoperability, and connection to energy generating installations, including access possibilities for micro energy generators;**
- (b) concrete measures and investments are identified for the introduction of cost-effective energy efficiency improvements in the network infrastructure, with a timetable for their introduction.”**



→ Strategy for addressing losses (electricity)
and shrinkage (gas)

Distribution losses are a serious issue in Energy Community



Source: EIHP (2016) SEE DSO Benchmarking Study 2008-2015

Consider the incentive framework for losses reductions

▶ **How are losses currently dealt with in your regulatory framework?**

- **Either:** Handled through market adjustment factors?
 - Is there any incentive mechanism to minimise losses?
 - Are non-network solutions given fair consideration?
- **Or:** Directly paid for and responsibility of system operators?
 - Cost pass-through or revenue cap regulation? Latter signifies strong incentive

▶ **With the right incentives system operators should take measures**

▶ **But additional actions can help**

- System operators to develop a “losses strategy” frequently updated
- Use of regional working groups to share information
- Regulators can consider discretionary awards

Meeting the requirements of Article 15(2)

- ▶ Covers transmission and distribution
- ▶ Ensure correct incentives in regulatory framework
- ▶ Development of a losses strategy
- ▶ May form basis of assessment of EE potential
- ▶ Consider as a Working Group effort (who to lead?)

Case Study: EE potential of network infrastructure in GB:

- Based on losses strategy
- Describes regulatory approach
- Current level of losses
- Barriers and enablers
- Concrete measures underway
- Potential future measures
- Conclusions

https://www.ofgem.gov.uk/sites/default/files/docs/2015/06/energy_efficiency_directive_report_-_final_for_publication.pdf

Example measures in a network EE strategy



► Barriers to implementation:

- System security – impact on effect of interruptions
- Cost efficiency
- Smart devices can use greater quantities of energy
- Technical developments elsewhere in system can impact losses
- Efficient utilization of network capacity can increase losses
- Embedded generation can increase losses

Priority dispatch and simplified connection procedures

- ▶ To support high efficiency cogeneration
- ▶ Mirror existing requirements for renewable generators and at TSO level for cogeneration
- ▶ Encourage a “connect and manage” style approach
- ▶ In immediate term biggest impact is likely on:
 - The **connection conditions** within distribution grid connection agreements regarding curtailment
 - **Connection procedures** and the timely and complete provision of information (Annex XII)
- ▶ In future may impact on active management of distribution networks (“smart grid” functionality)

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Energy efficiency in network tariffs and regulation

Requirements of Article 15 Paragraph 4 and Annex XI

*“**Contracting Parties** shall ensure the removal of those incentives in transmission and distribution tariffs that are **detrimental to the overall efficiency** (including energy efficiency) of the generation, transmission, distribution and supply of electricity or those that might **hamper participation of demand response**, in balancing markets and ancillary services procurement”*

*Network tariffs shall be **cost-reflective of cost-savings in networks** achieved from demand-side and demand- response measures and distributed generation, including savings from lowering the cost of delivery or of network investment and a more optimal operation of the network”*

→ **Cost-reflective tariffs which incentivize demand response**

▶ **Article 15 requires:**

- Cost reflective tariffs which incentivise demand response
- Removal of detrimental components of tariffs

▶ **Annex XI suggests:**

- Time-of-use tariffs
- Critical peak pricing
- Real time pricing
- Peak time rebates

Example approaches of Member States

	UK	Ireland	Estonia
EE in network tariffs and regulation	<ul style="list-style-type: none"> - Control periods under 'RIIO' last for 8 years - Innovation stimulus package - Cost reflective tariffs - Tariff structure discourages peak-time use for demand - Uses locational elements - Obligation on losses for DNOs 	<ul style="list-style-type: none"> - Wholesale market based on concept of cost efficiency - Location-based tariffs - Transmission loss factors also location-based - TSO conducts annual review of network losses - Incentive-based ex-ante revenue cap regulation 	<ul style="list-style-type: none"> - Competition Authority (regulator) retains right to impose technical effectiveness obligation - Split day/night rates - Hourly purchases (limited by technology)

Principles of tariff design

- ▶ **Incentivise rational energy use via tariffs that are:**
 - Cost reflective (including public good aspects of networks)
 - Understandable by consumers
 - Consistent with metering
- ▶ **Energy efficiency derived from cost reflectivity**
- ▶ **Bound by practicalities of market**
- ▶ **Issue of design rather than level**
- ▶ **Full cost reflectivity not possible**
 - Costs may be allocated in a cost reflective way
 - But exact cost-per-use is not currently practical or desirable

Time-of-use pricing – capacity charging

▶ **Capacity (MW) or energy charge (MWh)?**

- A capacity charge is an extreme version of time-of-use

▶ **Capacity: Peak demand charge**

- Should be coincident use at system peak – not consumer peak
- Could use a “triad” or probability weighted peaks
- Ex-ante or ex-post
- Not clear when peak will occur – information asymmetry
- Alternatives are real-time or time-of-use energy charge

▶ **Real-time-pricing (RTP)**

- Allows flexible application of tariffs by TSO and DSO
- Set few days in advance
- Benefits of peak but consumers have greater control
- Common in US but not Europe
- Requires suitable metering and communication equipment

▶ **Compromise option**

- Pre-defined prices and periods but time-of-use
- Clearer and more predictable than ex-post peak
- Periods should be charged proportional to probability of peak occurring
- Decide on shoulder pricing

Allocation by voltage level

- ▶ Standard approach is based on allocating historical costs to each voltage level
 - ▶ Not necessarily cost reflective of economic value
 - ▶ Can use marginal costs and load profiles
 - May be zero or negative if over-investment occurred
 - Send forward looking signal
 - Do not ensure cost recovery so may require adjustment component
 - ▶ Choice depends on level of current constraints
- **Only recommended if load-related investments are required**

Load or generation charging

- ▶ Costs may be charged to either generators or load or both
- ▶ Consumers pay under all approaches
- ▶ Most EU countries opt for load
- ▶ Generators are more responsive to locational signals
 - Not a factor if tariffs are “postage-stamp” style
- ▶ Charging generation can distort dispatch decision

Locational tariffs

- ▶ Encouraged by EC Regulation 714/2009
- ▶ Key discussion point in EU with no consensus
- ▶ Can encourage efficient locating of new generation
 - Helps avoid transmission investment costs
- ▶ Rare at EU level
- ▶ Not compatible with postage-stamp approach, best approach is:
 - Dependent on system coverage
 - Inter-linkage to neighbouring systems

Treatment of distributed generation

- ▶ EED requires tariffs are:
 - *“cost-reflective of cost-savings in networks achieved from ... distributed generation”*
- ▶ On transmission networks:
 - May lower flows and avoid investment costs in long run
 - But create stranded assets in short run
 - Could increase tariffs for transmission customers
 - Net out-flows may have reverse effect
- ▶ Must consider what is fair treatment of stranded asset risk while giving right price signals for future development

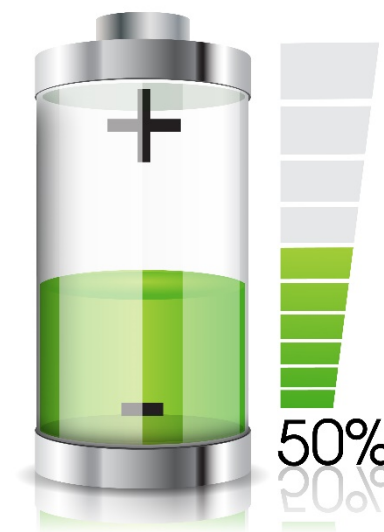
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Promotion of demand-side response

Requirements of Article 15 Paragraph 8

“Contracting Parties shall ensure that national energy regulatory authorities **encourage demand side resources**, such as demand response, to participate alongside supply in **wholesale and retail markets**.”

“Contracting Parties shall promote access to and participation of **demand response in balancing, reserve and other system services markets** and ... define technical modalities for participation in these markets”



→ Clear routes to markets and fair treatment of demand response

Demand response in wholesale and retail markets

- ▶ Driven by cost reflectivity and time-of-use tariffs at retail level
 - Regulated tariff environment may stymie innovation in new structures
 - Smart meter roll-out will facilitate demand-response at lower voltage levels
 - Focused on reactions to price signals – similar options to network tariffs
- ▶ Load shifting by larger consumers trading directly or via aggregators in market
 - Does regulatory framework allow equal market entry?
 - Is there a capacity market and can demand-response participate?
 - Are there any barriers to participation in balancing markets?

Demand response in ancillary service markets

- ▶ Can support operation at various levels:
 - Replacement (“Tertiary”) Reserve – slow response units (5 min+)
 - Frequency Restoration (“Secondary”) Reserve (30 secs+)
 - Frequency Containment (“Primary”) Reserve (<30 seconds)
 - Reactive power support
- ▶ How are these services currently procured?
 - Periodic auctions can provide route for demand-side participation:
 - Technical modalities need clearly defining
 - Demand aggregators can participate
 - Tertiary Reserve is “lowest hanging fruit” but DSR can contribute to frequency control also
 - Are there any licensing or charging arrangements which unduly affect storage and distributed generation participation?

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Summary

Demand response in wholesale and retail markets

- ▶ Article 15 encourages the **integration** of **energy efficiency in energy supply** with energy efficiency in end use
- ▶ Provides **new obligation** for National Regulatory Authorities to pursue energy efficiency in carrying out regulatory tasks
- ▶ Consistent with the EU Internal Energy Market design
- ▶ Seeks to ensure **cost efficient consideration** of energy saving measures alongside supply-side options in electricity and gas markets
- ▶ Facilitate this through provision of **clear routes to markets** (wholesale and ancillary) for demand-side response
- ▶ Provide clear rules for **access to grid** and **priority dispatch** of high efficiency cogeneration

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