

Sachsen-Anhalt

Flexibility in the Clean Energy for All Europeans Package

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Agora Energiewende – Who we are



Independent think tank with more than 20 energy policy experts

Independent and non-partisan

Project duration 2012-2021

Financed by the Mercator Foundation and the European Climate Foundation

Mission: How do we make the energy transition in Germany and worldwide a success story?

Scientific assessments

Dialogue

Putting forward proposals



State of Play? Goal: To close negotiations by end of 2018





What is flexibility?

- → "Flexibility describes the ability of a power system to cope with variability and uncertainty in both generation and demand, while maintaining a satisfactory level of reliability at a reasonable cost, over different time horizons." -Danish Energy Agency (2015)
- → Flexibility measures exist both on the market side (encompassing markets for supply and demand) and on the network side (addressing issues related to grid congestion and stability)
- → Key drivers of future flexibility needs:
 - 1) Growing shares of variable renewables
 - 2) New sources of demand (e.g. EVs/HPs)



The current 2030 EU renewables target implies an average share of approximately 50% renewable electricity in the mix. *Flexibility* is the paradigm of the new power system





Own calculations on basis of Agora Energiewende (2015b)



Scenarios with higher RES/EE ambition would significantly increase the need for flexibility in the 2030 timeframe

COM 2017 modelling exercise (updated RES technology costs)



E3MLab/IIASA (2017)

Flexibility needs will be different in each EU Member State depending *inter alia* on existing dispatchable generation mix, renewables potential, interconnection, EV penetration, etc.



RES-E share in the EU generation mix 2030



Enhanced power system flexibility does not mean a less stable or potentially even a more costly power system, but requires planning, coordination and market reforms to ensure a costefficient flexibility portfolio that provides '*flexibility adequacy*'







Where is power system flexibility dealt with in the Clean Energy Package? - Almost everywhere!





Attempting to ,map' and structure the flexibility elements in the Clean Energy Package

Mapping Questions: What are key flexibility options? Why are they important? Can they be found in the package? Are they priorities of the Commission? What is the state of play in the negotiations?

Challenge: Scope of the package, broad nature of flexibility

Key Flexibility Options:

- → I. Planning and co-ordination for enhanced flexibility and efficiency: Key horizontal measures including flexibility planning, application of the efficiency first principle, system-friendly integration of variable renewables, greater co-ordination in system operation.
- → II. Demand-side integration & Consumer-engagement: Activating large and small customers with the help of ICT technologies and smart tariff design to provide flexible demand via demand response, storage or distributed generation
- III. Operational measures to enhance power system flexibility: Improving the operation and utilization of existing and technically available flexibility resources so that they cost-effectively supply flexibility when needed.



COMMISSION PRIORITIES



I. Planning and coordination for enhanced flexibility and efficiency in a system with high shares of variable renewables



CLEAR COMMISSION PRIORITY IN PACKAGE

- **Reform of distribution grid regulatory frameworks and the interface between TSOs and DSOs**
- The growth in the deployment of renewables and new sources of demand (e.g. EVs) on the distribution level, is requiring Distribution Network Operators (DNOs) to become Distribution System Operators (DSOs) and play an increasingly active role in managing the grid.
- The Commission proposal would require greater cooperation between TSOs and DSOs, establishes an EU DSO entity to strengthen cooperation between DSOs on the EU level and help to develop network codes, but leaves many important details to be clarified.
- Key: Council and EP offer significantly more detail and clarity in terms of the scope and operation of the proposed EU DSO body, the regulatory oversight needed for DSOs procurement of flexibility, as well as the particular procedure and substantive scope for the network codes. The exact role of the EU DSO body and the DSO regulatory agenda, however, is still open.

II. Demand-side integration & Consumer-engagement



CLEAR COMMISSION PRIORITY IN PACKAGE



- → Attribute value to demand response by creating a more level playing field between supply-side, storage and demand-side resources
- → Obliging TSOs and DSOs to treat demand response providers (including aggregators) in a non-discriminatory manner
- → Empower consumers to generate, store, consume and sell self-generated electricity individually or through aggregators
- Right to dynamic price contract and right to switch supplier
- → Smart metering, data management
- → Sector coupling: Support electric vehicle charging infrastructure (EPBD); RES-H target (RES)

13



CLEAR COMMISSION PRIORITY IN PACKAGE

Product Specification in Balancing Markets in the Pentalateral Forum Region

	Temporal product resolution energy bids			Contracting period for operational reserves capacity bids			
	R1	R2	R3	R1	R2	R3	Spec. DR prods.
Austria	15 mins	12 hrs (WD), 48 hrs (WND)	4 hrs	1 week	1 week, 1 day	1 week	n.a.
Belglum	15 mins	15 mins	15 mins, 4 hrs (IL)	1 month	1 month	1 year (1 month for 10% fraction)	n.a.
France	30 mins	30 mins	30 mins	n.a. ⁶	n.a.7	1 week or 1 year [®]	1 year (IL)
Germany	15 mins	12 hrs (WD), 48 hrs (WND)	4 hrs	1 week	1 week	1 day	1 month
The Netherlands	15 mins	15 mins	15 mins	1 week	1 year	1 year	n.a.
Switzerland	15 mins	15 mins	4 hrs	1 week	1 week	1 day	n.a.

- → Enhance balancing responsibility of RES producers, removal of priority dispatch (Art. 4, Art. 11)
- Remove barriers that prevent RES from market participation including system services markets (EMR Art. 5)
- → Adjust market rules to reward provision of flexible resources (EMR Art. 3-7)
- Design curtailment rules that keep investor risk low (EMR - Art. 12)
- → Enhance regional cooperation in power system, including though regional sizing of operating reserves and introduction of regional operational centres (EMR – Art. 5, 33-34)

Source: CE Delft and Microeconomix based on TSO information. Abbreviations: Y = year, MO = month, W = week, D = day, H = hour, M = minute



CLEAR COMMISSION PRIORITY IN PACKAGE

Variable renewables take on increased system responsibility

- Technological advances have greatly improved the degree to which variable renewables can individually or in aggregation play an active role in balancing supply and take on balancing responsibility. However, the fair imposition of balancing responsibility on variable renewables also requires ensuring that important technical and market framework conditions are in place, and may require exemptions for certain installations to be applied, e.g. small-scale installations.
- Key: While the Commission proposal largely maintains key de minimis exemptions from the current State Aid Guidelines, renewables integration is expected to occur before many of the proposed necessary market reforms in the Clean Energy Package have been put into place lead to temporal mismatch. The Parliament has proposed significantly higher threshold limits on exemptions for small scale RES than the Council. The Council position sends mixed signals on whether proposals of the Commission on day-ahead, intra-day and balancing markets would be implemented in such a way as to mitigate the growing risks for VRE from balancing responsibility. The Parliament will have a an important role in ensuring that these markets are fast, flexible and fit-for-purpose.



CLEAR COMMISSION PRIORITY IN PACKAGE

Clear rules for handling downward redispatch and VRE curtailment

- A limited amount of operational measures to halt renewable energy production in the form of downward redispatch or curtailment can be a necessary and cost-effective way to integrate wind and solar power, especially where demand side resources and storage are not available. At the same time, compensation for curtailment and the specific application of curtailment by the TSO are also two critical risk factors for RES projects, which in turn can have a chilling effect on investments or raise the cost of RES. Defining transparent and balanced curtailment rules is an important aspect of delivering on a cost-effective electricity system with high shares of VRE
- Key: The proposal by the Commission on redispatch and curtailment under Article 12 attempts to strike this balance. The proposal would allow system operators to take into account a limited amount of cost-efficient downward redispatch/curtailment in grid planning (maximum 5%), but they would also have to apply objective, transparent and non-discriminatory criteria and take appropriate measure to minimize downward redispatch/curtailment. In non-market-based/administrative redispatch 90% compensation is required. But, renewed temporal mismatch. Monitoring will be key.



CLEAR COMMISSION PRIORITY IN PACKAGE

* Flexible operation/participation of dispatchable resources through short-term market reform

- → Flexible operation of conventional generation plants is critical for the cost-effective integration of renewables. In particular, it helps to avoid the unnecessary curtailment of renewables resulting from the technical constraints and operational practices of conventional power plant operators. Targeted retrofits of existing plants can achieve greater flexibility in the operations of coal and gas plants at relatively low cost. However, fully exploiting flexibility potentials in the operation of conventional generation also requires reforms of day-ahead, intraday and balancing markets.
- → Key: The Commission proposal on these markets would introduce no-regret reforms that would help to reduce the amount of conventional generation being inflexibly operated. Notable changes in the Council position on the procurement of balancing reserves and gate closure for intra-day markets threaten to partially weaken this framework. The Parliament will have a an important role in ensuring that these markets are fast, flexible and fit-for-purpose. <u>Additional</u> climate measures needed in order to ensure a net-reduction in CO2 emissions through the flexible operation of fossil fuel generation plants are not part of the Package / inadequately addressed by EU ETS & 550g rule



CLEAR COMMISSION PRIORITY IN PACKAGE

Regional Cooperation on Balancing Areas and Operating Reserves

- Current Member State practices for sizing system reserves to guarantee the secure supply of electricity in real time operations are often based on simplified assumptions that overestimate reserve needs, leading to an over-procurement of reserves. Regional cooperation on sizing and procuring reserves and the application of best practices can, therefore, help to significantly reduce the cost of system operation, with tangible benefits for electricity consumers.
- Key: The Commission proposal would make regional sizing of reserves mandatory, and give concrete operative tasks to Regional Operational Centres (ROCs). This partial transfer of responsibilities from TSOs to the regional entities goes beyond the recently agreed network codes and has faced opposition from many national governments. This is reflected in the Council position, which places reserve dimensioning fully in the hands of the TSOs and gives no operative role to the ROCs. The Parliament position, on the other hand, largely reflects the Commission proposal.



Other options in Package



I. Planning and coordination for enhanced flexibility and efficiency in a system with high shares of variable renewables



NOT COMMISSION PRIORITY IN PACKAGE

- Integrated planning, monitoring and revision of flexibility measures at the system wide level
- Establishing a holistic & integrated process for planning, monitoring and revising flexibility measures is critical to ensuring the delivery of an optimal flexibility portfolio capable of cost-effectively and securely decarbonizing the power-system towards 2030 and 2050
- The integrated National Energy and Climate Plans and the Long Term Strategies proposed by the Commission in the Governance Regulation provide a good framework for Member States to voluntarily develop flexibility roadmaps and feed these into an integrated process for planning, monitoring and revising their energy and climate strategies.
- Key: The Commission proposal places little explicit focus on power system flexibility outside of reporting on market integration of renewables. Current amendments proposed by the EP would significantly strengthen and improve the integration of flexibility planning into this framework.

I. Planning and coordination for enhanced flexibility and efficiency in a system with high shares of variable renewables



MODERATE COMMISSION PRIORITY IN PACKAGE

* Making the Governance Regulation and Market Design fit for ,Efficiency First'

- *'Efficiency First* prioritizes investments in customer-side efficiency resources (including end-use energy efficiency and demand response) whenever they would cost less, or deliver more value than investing in energy infrastructure, fuels and supply alone'. EE1st is one of the 5 pillars of the Energy Union and ostensibly a key political priority, but sometimes dismissed as a slogan.
- Key: While the Commission proposal for the Market Design files includes important demonstrations of the efficiency first principle in practice (e.g. <u>EMD Art. 32</u> DSO planning, <u>EMR Art. 12</u> 5% curtailment threshold, <u>EMR Art. 19</u> EU resource adequacy assessment), the Commission proposal for the **Governance Regulation** fails to fully incorporate the principle into broader policy planning and reporting procedures. The **Parliament** proposes language that would more clearly anchor the 'efficiency first' principle in the **Governance Regulation**.



LOW COMMISSION PRIORITY IN PACKAGE

- * Economic design criteria to optimize the location and mix of renewable energy deployment
- Setting incentives/rules when deploying VRE can help enable the system-friendly integration by maximising their net system benefit E.g. technology specific support schemes (balanced mix of renewables) or locational signals (deployment of VRE in regions with less network congestion). To avoid higher investment costs and/or reduced RES deployment, these instruments should be designed so as to avoid significantly raising project risks or discriminating against new-comers.
- Key: The COM proposal most directly addresses in regards to the support scheme design (<u>RED Art.</u> <u>3</u>) for which the **Council** and **EP** use language that gives greater discretion to MS to implement technology specific auctions and auctions to incentivize regional diversification of deployment. These changes could be of relevance in the next revision of the State Aid Guidelines. Rules on grid charges (<u>EMR Art.16</u>) and curtailment (<u>EMR Art. 12</u>) leave some room for Member States to also increase project risks for RES.

II. Demand-side integration & Consumer-engagement



LOW-MODERATE COMMISSION PRIORITY IN PACKAGE

- Sector coupling the electrification of heat & transport
- Key: Decarbonization of other energy sectors / sector coupling will be supported by the package, but was not in the core focus of the Commission



Conclusions / Additional thoughts

- → What the COM has proposed represents a significant step towards making existing power markets ready to deliver flexibility, as well as to enable the development of entirely new markets, especially through the participation of DERs individually or through aggregators. The breadth/scope also suggests that the COM has proposed an integrated & European vision for delivering a more flexible power system.
- Main focus on making wholesale markets faster, more flexible and fit-for-purpose and driving regulatory and market design discussions to prepare for a world of increasing distributed resources. Some proposals related to flexibility at the DSO level are rather aimed at launching a debate on / preempting 'de-harmonization' through decentralization rather than providing final policy answers
- → Some of the proposals have to be implemented by 2025 only, and they are certainly not be "the end of the road" of short-term power market design (e.g. reduced bid sizes (1 MW), reduced product lengths (15 min.), reduced gate closure times (max. 1 hour cross-border intraday) and enabling independent aggregation can be made more granular... and better...).
- → Mismatch in the speed of market integration of renewables vs. speed of market reforms.



Conclusions / Additional thoughts

- The piecemeal approach to negotiating the Clean Energy Package, which naturally highlights specific and national interests, threatens to weaken this enabling framework. Moreover, the COM proposals leave considerable room/discretion to MS in implementation. This risks a 2-speed Europe with partial implementation of flexibility measures at best, and a fundamental clash of power system paradigms at worst. The EP position keeps the COM proposal as the reference point.
- Some overlap for the COM proposal with existing network codes and State Aid Guidelines. Some efforts to (re)politicize certain topics with different consequences.
- Regionalisation is a key aspect to cost-effective delivery of flexibility solutions and will require governance tools and structures. The tasks given to the ROCs, as well as the European Resource Adequacy Assessments, could contribute to creating an institutional structure for cost-efficient flexibility, but fierce opposition by TSOs who prefer a bottom-up approach.



Conclusions / Additional thoughts

- Need Flexibility Roadmaps based on a portfolio approach and efficient investment in a broad range of flexibility options – EP push for Flexibility Planning & Reporting, as well as 'Efficiency First' a key opportunity.
- → Flexibility does not automatically mean climate protection. Additional climate measures are needed (e.g. adequate ETS price). The COM proposal includes a 550g CO2 performance criteria for capacity markets, but proposes no measures to actively promote smart retirement.
- Decarbonization of other energy sectors / sector coupling will be supported by the package, but was not in the core focus of the Commission

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Thank you for your attention!

Haben Sie noch Fragen oder Kommentare? Kontaktieren Sie mich gerne:

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Agora Energiewende ist eine gemeinsame Initiative der Stiftung Mercator und der European Climate Foundation.



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Das ,Saubere Energie für alle Europäer' Paket – Was hatte die KOM am 30.11.2016 vorgelegt?

Politische Kommunikation: 1 Mitteilung, 2 Aktionspläne

Energieeffizienz: Überarbeitung von Richtlinie zu Energieeffizienz; Überarbeitung von Richtlinie zu Energieeffizienz von Gebäuden; neue Vorschläge zu Energieeffizienz von Produkten (Öko-Design-RL); Smart Finance for Smart Buildings-Initiative

Erneuerbare Energien: Überarbeitung EU-Richtlinie für Erneuerbare Energien inkl Bioenergie

Strommarkt-Design: Überarbeitung EU-Strommarkt-Richtlinie; Überarbeitung EU-Strommarkt-Verordnung; neue EU-Verordnung zu Stromversorgungssicherheit; Überarbeitung EU-Verordnung zu ACER; Abschlussbericht zur Sektoruntersuchung der DG Wettbewerb zu Kapazitätsmechanismen

Governance: neue EU-Verordnung über eine integrierte EU-Governance für Klimaschutz und Energie

Sonstige: 2jährige Studie zu *Energiepreisen und –kosten*; Mitteilung zur Umsetzung von *Energieförderprogrammen* (EEPR, EEEF); Mitteilung zu *sauberer Energie und Innovation*; Mitteilung zu einer *europäischen Strategie zu kooperativen, intelligenten Transportsystemen*

=> Mehr als 1000 Seiten Rechtstexte und Strategiedokumente; dazu Folgenabschätzungen & Studien



I. Planning, coordination for enhanced flexibility and efficiency in a system with high shares of variable renewables

- Integrated planning, monitoring and revision of flexibility measures
 - **GR** Art. 3, 4, 14, 15, 21, Annex I;
- * Making the Governance Regulation and Market Design fit for ,Efficiency First'
 - EMD: Art. 8, 32; EMR: Art. 12, 16, 18, 19.
- * Economic design criteria to optimize the location and mix of renewable energy deployment
 - RED Art. 4; State Aid Guidelines 2014-2020 Section 3.3.2.1; EMR Art. 12, 16;
- **Reform of distribution grid regulatory frameworks and the interface between TSOs and DSOs**
 - **EMD**: Art. 32; **EMR:** Art. 49-55



II. Demand-side integration & Consumer-engagement

- Demand response and Storage
 - **EMD**: Art. 5, 11-15, 17, 36, 54; **EMR:** Art. 3, 5, 7, 12, 16, 18, 51, 53, 55, 57;
- Citizen Engagement Self Consumers
 - ▶ RED Art. 21;
- Smart Meters and Data Management
 - EMD: Art. 19-24, 34; EPBD: Art. 8;
- **Sector Coupling Electrification of Heating & Transport**
 - RED Art. 23-25; EMD: Art. 33; EPBD: Art. 7, 8(a);



- Variable renewables take on increased system responsibility
 - > RED: Art. 4; State Aid Guidelines 2014-2020 Section 3.3.2.1; EMR Art. 4-7
- Clear rules for handling downward redispatch and VRE curtailment
 - **EMR** Art. 11,12, 55
- Flexible operation/participation of dispatchable resources through short-term market reform
 - **EMR** Art. 5-7
- Regional Cooperation on Balancing Areas and Operating Reserves
 - EMR Art. 5, 15, 33, 34



Enabling investment into enhanced power system flexibility



- Allowing for price peaks / Transparent reliability standards based on common methodology
- European resource adequacy assessment and national monitoring of resource adequacy
- Prioritising removal of market barriers over capacity interventions
- Accelerate the market-exit of stranded assets
- → Fully take into account the roles of storage in the power system, i.a. by enabling nondiscriminatory market access for storage
- → Critical monitoring of DSOs in decentralised energy transition, particularly if no unbundling
- → Bidding-zone configuration based on dynamic rather than static efficiency considerations
- → Sector coupling

Enhanced power system flexibility comes at significantly lower cost if the share of flexible resources is increased and the share of inflexible resources is decreased



Impact of thermal plant mix on plant utilisation rates and investments in a 45% RES-E system



RAP (2014) based on IEA (2014)

- → If mix remains essentially unchanged during transition all power plants have lower utilisation rates compared with shift to more flexible capacity mix
- → 40% less investment required if capacity mix is transformed towards greater flexibility
- In transformed scenario all market participants are economically better off
- System adequacy ensured at lower cost in a "transformed mix"
- → Smart and managed retirement of aged, highcarbon, inflexible resources keeps costs of transition low and adds to climate protection.



Future issues regarding electricity markets

- Design issues
 - Capacity mechanisms
 - New forms of trading (for example peer-to-peer)
 - Local markets (including DSO congestion management)
 - Role of DSOs vs. TSOs
 - Concepts for demand response
- Digitalisation
 - Cybersecurity, Internet of Things, Big data
 - Who will manage data platforms?
 - More active control of assets for balancing
- Sector coupling
 - Power to gas, power to liquids, interplay between electricity and heat, electrification of transport, etc.)