ENTSO-E ANNUAL WORK PROGRAMME 2019

Final version | January 2019

European Network of
Transmission System Operators
for Electricity

entsoe

ABOUT ENTSO-E

ENTSO-E, the European Network of Transmission System Operators for Electricity, represents 43 electricity transmission system operators (TSOs) from 36 countries across Europe.

ENTSO-E was established and given legal mandates by the EU's Third Legislative Package for the Internal Energy Market in 2009, which aims to further liberalise the gas and electricity markets in the EU.

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EXECUTIVE SUMMARY

ABOUT THIS ANNUAL WORK PROGRAMME 2019

This Annual Work Programme covers the period from September 2018 to the end of 2019. It firstly focuses on the actions taken to implement ENTSO-E's legal mandates, and secondly portrays ENTSO-E's coordinator and facilitator role in the TSO community, as well as the roadmap as defined by the Board.

Regarding ENTSO-E's legal mandates, this programme focuses largely on the implementation of those tasks listed in the Third Legislative Energy Package, and addresses new mandates foreseen in the draft Clean Energy for all Europeans Package (CEP) where relevant. All references to the CEP are based on the version of the draft legislation as proposed by the European Commission.

In March 2018, ENTSO-E's Board approved a Roadmap identifying areas for development by 2022: to provide leadership on the future power system and facilitate market design solutions; to develop a new Information and Communication Technology approach and capability, including cyber security; to develop the DSO partnership; to coordinate and facilitate regional developments and to improve transparency. These strategic objectives are broken down into implementation targets, that will be assessed and updated on a yearly basis. This work programme reflects the implementation targets identified for 2019.

The activities foreseen in this work programme will be delivered thanks to the expertise of ENTSO-E's 43 members, who provide ENTSO-E's financial resources and whose staff composes the approximately 100 bodies – Assembly, Board, the committees and their subgroups – of the association. The successful implementation of this work programme also hinges on the input provided by stakeholders, via the Advisory Council, the Network Codes European Stakeholder Committees and other stakeholders groups, and via the public consultation processes.

This work programme has been submitted for stakeholders' views in a public consultation in August-September 2018. The comments received were considered and the work programme was submitted to ACER's opinion (see ACER Opinion 01-2019). The work programme was finalised based on the feedback received. This work programme was developed in coordination with ENTSO-E's budget for 2019, in a spirit of budgetary stability and sound management of the Association's resources.

The accomplishment of this work programme will be assessed by ENTSO-E's Annual Report 2019, to be released in early 2020.

2019 WILL MARK ENTSO-E'S 10TH ANNIVERSARY

ENTSO-E builds on the experience and lessons learnt from its 10 years of existence. One main lesson learnt during this time is the importance of involving stakeholders for the quality of ENTSO-E's work products. ENTSO-E has improved its engagement practices since 2009, as exemplified by the results of our yearly stakeholder surveys. Our 2019 work programme builds on this experience, with renewed engagement practices and a focus on improving transparency.

In 2019 ENTSO-E enters a second phase of its development, with a potential growing number of mandates. Over the years TSOs and ENTSO-E have gained recognition as technical experts. The CEP recognizes this expertise by potentially entrusting ENTSO-E with new mandates. Once the CEP has entered into force, ENTSO-E will update its work products, notably in the area of system adequacy and regional cooperation.

Since ENTSO-E's creation, the association's resources, both financial and human, have increased to meet the challenge posed by the growing workload. Other challenges faced by ENTSO-E in the accomplishment of its mandates include those relating to the pan-European nature of its activity: like EU member states, the 43 TSOs from 36 countries composing ENTSO-E's working bodies must reach agreements on complex subject matters. Ensuring the pan-European interoperability of technical solutions and tools is also demanding.

REPORT STRUCTURE AND MAJOR PROJECTS IN 2019

Chapter 1: Implement the network codes

The role of network codes and guidelines within ENTSO-E's mandates cannot be underestimated. To flag out the importance and the workload related to the codes this work programme puts them centre stage. Regarding CACM, now that all pan-EU and most regional methodologies have been submitted to regulators, TSOs are addressing jointly with Nominated Electricity Market Operators (NEMOs) the organisation of the day-to-day management of the day-ahead and intraday market coupling. The approval of all regional capacity calculation methodologies will trigger the countdown for the delivery of several deliverables under the CACM and FCA regulations, including the set-up of coordinated capacity calculators. By end 2019, the single allocation platform for forward capacity allocation will be in use for AC and DC interconnectors.

Following the entry into force of the Electricity Balancing Guideline in December 2017, all TSOs submitted implementation frameworks and will set up the European platforms for replacement reserves and for imbalance netting by end 2019. Implementation of the System Operation Guideline will take pace, as the roll-out of the five tasks by RSCs is under way and the related methodologies are being developed. The OPDE, the foundation of the data exchange platform for running the five tasks, is foreseen to be operational within end of 2019.

Chapter 2: Conceive the future power system

Chapter 2 provides an overview of all future-planning activities. ENTSO-E will release jointly with its gas counterpart ENTSOG new gas and electricity scenarios. The CEP is likely to bring additional responsibilities for ENTSO-E and RSCs as regard system adequacy. The Mid-Term Adequacy Forecast and the seasonal outlooks will be adapted to the CEP standards once these are finalised. As regard the future of market design and of system operation, ENTSO-E will deliver its vision for 2030 by end 2019.

One cannot conceive the power system of the future without investing in innovation. ENTSO-E will be developing its work on innovation beyond its mandate of promoting and coordinating TSOs' innovation activities, with the setting up of an inter-TSO tool to promote exchanges of best practices and synergies on innovation within the TSO community, as well as a business network for innovation putting TSOs in touch with innovating companies. TSOs and ENTSO-E will also continue to take part in several projects awarded by the Horizon2020 funding programme, including TDX-assist and Intensys4EU.

Chapter 3: Transform Europe's electricity ICT architecture

The future power system will require a new ICT architecture, to reap the benefits of digital for system operations, market design and regional cooperation. With extensive experience of developing European-wide IT tools to operate the grid, such as the EAS and the Common Grid Model, TSOs and ENTSO-E are ready to enable this transformation. Considerable challenges will have to be addressed, most notably in terms of cyber-security and standardisation.

Chapter 4: Develop the DSO partnership

TSOs' partnership with DSOs will be put centre stage in years to come. Cooperation is ongoing on active system management and the use of distributed flexibility, and ENTSO-E and the four DSOs associations – Geode, E.DSO, CEDEC and Eurelectric – are organising the modalities of the future cooperation.

Chapter 5: Coordinate and facilitate regional development

The development of variable generation and increased interconnections renders regional coordination among TSOs more important than ever. Regional Security Co-ordinators, TSOs' answer to the coordination challenge, cover the whole of Europe and are tasked with additional responsibilities in the CEP.

Chapter 6: Deliver on transparency

Finally, ENTSO-E and TSOs are working towards improving transparency. In mid-2018 TSOs entered into a Memorandum of Understanding on ENTSO-E's Transparency Platform, setting requirements for data quality and allowing users to re-use data without any restriction. The Platform will also be transformed to be more user-friendly. Another ongoing project aims to improve stakeholders' understanding of TSOs' capacity calculations. Finally, transparency must also translate into better stakeholder engagement. ENTSO-E will apply reviewed rules of procedure to its public consultations from 2019 onwards.

A few key dates for ENTSO-E in 2019

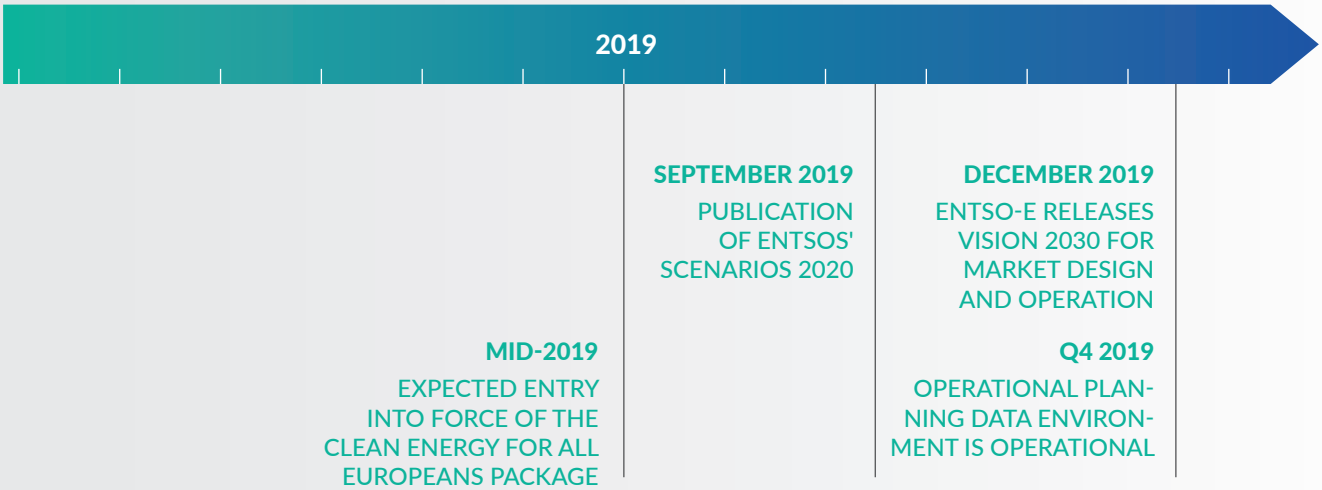

Figure 1: A few key dates for ENTSO-E in 2019

1. IMPLEMENT THE NETWORK CODES

Working further on a secure, competitive and low-carbon European electricity sector and the internal energy market are ambitious targets, which need a common set of rules. The European network codes are technical rules, that complement existing legislation by defining a common basis for all stakeholders and market parties to adopt the same practices and business processes across Europe. Between 2009 and March 2017, ENTSO-E has developed, jointly with ACER and stakeholders, eight network codes.

Network codes are expected to contribute in delivering benefits in terms of sustainability (e.g. connection of solar and wind generation capacity to the EU networks), security of supply (via Regional Security Coordinators), competitiveness and social welfare (e.g. market coupling).

All codes have entered into force and ENTSO-E's resources are now focused on their implementation, detailed hereafter. The network codes are grouped in three families:

- Market codes move market integration forward, for more competition and resource optimisation. They set rules for capacity calculation and allocation, day-ahead and intraday markets, forward markets and balancing markets.
- Operational codes reinforce the reliability of the system through state-of-the-art and harmonised rules for operating the grid. They cover system operation, regional cooperation and emergency situations.
- Connection codes set the EU-wide conditions for linking all actors safely to the grid, including renewables and smart consumption. They include the technical requirements for generation and demand facilities and high-voltage direct current (HVDC) connections.

In order to keep network codes up-to-date with market and technological developments they may be reviewed jointly with ACER.

WHAT IS ENTSO-E'S ROLE IN THE IMPLEMENTATION?

Implementation requires a combination of national, regional and pan-European implementation measures and tools. All market participants, DSOs, TSOs, NEMOS and regulators, at the EU, regional and national levels, are involved in various ways. The codes define which entity is responsible for each implementation task.

Task attributed to...	Objective	Status
ENTSO-E	ENTSO-E	ACER
Pan-European 'All TSOs'	All TSOs (with ENTSO-E acting as facilitator)	All NRAs
Regional 'All TSOs'	TSOs of the region (with ENTSO-E acting as facilitator for some tasks)	NRAs of the region
National	Depending on national legislation (TSO, DSO ...) (ENTSO-E may provide supporting documents and guidance)	National NRAs

Figure 2: Network codes - Entities responsible for pan-European, regional and national tasks

'All TSOs' refers to the TSOs of all EU countries (pan-European 'all TSOs'), or to the TSOs of a specific EU region (regional 'all TSOs'). Because TSOs have decided that ENTSO-E's structures are the most suitable vehicle to facilitate the delivery of pan-European tasks and some regional tasks, ENTSO-E facilitates the European implementation process.

The codes beyond the EU

Besides all EU countries, ENTSO-E's membership includes Energy Community countries Albania, Bosnia and Herzegovina, Montenegro, FYR of Macedonia and Serbia, EEA countries incl. Iceland, Norway and eventually, Switzerland. Turkish TSO TEIAS has observer status within ENTSO-E. Non-EU countries, depending on the legal framework governing their relationship with the EU may have to implement the network codes and guidelines. For example, Norway has committed to implementing the Third Energy Package and the network codes. Similarly, the Energy Community has already begun the transposition of the network codes and guidelines in its acquis and with those in the contracting parties' national legal orders. In the absence of a specific agreement between the EU and Switzerland, the application of the network codes and guidelines by the Swiss TSO Swissgrid will be done on a voluntary basis.

To ensure the smooth implementation of the network codes in non-EU countries in the future, TSOs member of ENTSO-E whose countries are not member of the EU participate in the development of 'all TSOs' (pan-European and regional) deliverables. However, only EU TSOs formally approve the proposed deliverables before their submission to regulators.

Monitoring the implementation

ENTSO-E is entrusted with the tasks of monitoring and analysing the implementation of the network codes and guidelines, and their effect on the harmonisation of applicable rules aimed at facilitating market integration (Article 8(8) of Regulation (EC) No 714/2009). Monitoring activities entail the elaboration of monitoring plans and monitoring reports, as well as the collection of data (so-called 'Lists of information'), including the identification of data to be collected and the design and implementation of interfaces for data collection. The specific monitoring activities in 2019 for each code are detailed in the following sections.

ENTSO-E plans to launch in end 2019 the interface for the collection and provision of the data to ACER. The interface will at first be used for the monitoring of the CACM, and then should be extended to other network codes and guidelines.

The European Stakeholder Committees

ACER and ENTSO-E have set up European Stakeholders Committees, whose role is to monitor progress in implementation of the network codes, contribute to inform the decision-making process for the implementation deliverables, and serve as a platform to share general views. The Market Stakeholders Committee, the Grid Connection Stakeholders Committee and the System Operations Stakeholders Committee will meet regularly throughout 2019. The Balancing Stakeholder Group also meets regularly to discuss the implementation of the Electricity Balancing Guideline.

ENTSO-E supports the committees by taking charge with ACER of the preparation and development of meetings. ENTSO-E also maintains, with the support of ACER, the European Commission, and Committees members, the Issue Logger Tool, where the questions raised by members of the Committees are centralised and answered in a transparent manner.

In addition to the Stakeholder Committees, the TSO-DSO Network Code/Guideline Implementation Group, set up in Q3 2018 under the TSO-DSO Platform chaired by the European Commission, will discuss issues of interest to DSOs related to the implementation of network codes.

Spreading knowledge of network codes

To help improve the understanding of the network codes, of the stakeholders involved and the related challenges and solutions, ENTSO-E has encouraged and supported the Florence School of Regulation to develop online training, addressing the codes 'family by family'. While the market codes have already been addressed, courses on the grid connection codes and operational codes are still in the making. In addition, the focus in 2019 will be on providing stakeholders with easy access to all information around network codes, via our website and a dedicated app.

MARKET CODES: COMPETITIVENESS AND SOCIAL WELFARE

The Capacity Allocation and Congestion Management Regulation

The rules set by the CACM Regulation provide the basis for the implementation of a single energy market across Europe. The CACM Regulation sets out the methods for allocating capacity in day-ahead and intraday timescales and outlines how capacity will be calculated across the different zones. Putting in place harmonised cross-border markets in all timeframes will lead to a more efficient European market and will benefit customers.

CACM was the first code to enter into force in August 2015 and its implementation is well advanced. All pan-EU methodologies and most of the regional methodologies have been submitted in 2018. The following main implementation steps are ongoing:

Art.	CACM - KEY IMPLEMENTATON ACTIVITIES	Responsible body	2018 S	O	N	D	2019 J	F	M	A	M	J	J	A	S	O	N	D
	PAN-EUROPEAN TASKS																	
10	Organise Day Ahead and Intraday coupling - TSOs and NEMOs meeting to discuss governance	All TSOs																
	Support the implementation of the SDAC and SIDC requirements																	
31	Report on capacity calculation and allocation	ENTSO-E																
	Report on the progress and potential problems with the implementation of forward capacity allocation, single day-ahead coupling and single intraday coupling	ENTSO-E																
80	Report on the costs of single day-ahead and intraday coupling	TSOs and NEMOs																
	REGIONAL TASKS																	
27(2)	Set up the coordinated capacity calculators and establish rules governing their operations	TSOs of CCR	By 4 months after the approval of all capacity calculation methodologies															
21(4)	Begin regional harmonisation	All TSOs																

ENTSO-E / TSOs activity | Publication / Deadline | Consultation | ACER / NRAs Opinion | W Workshop / Webinar

Figure 3: CACM key implementation activities

Coupling of day-ahead and intraday markets

As per Art. 10 CACM, TSOs cooperate with NEMOs to organise the day-to-day management of the single day-ahead and intraday coupling. ENTSO-E facilitates the discussion. While the overall governance structure of the single intraday and day-ahead coupling has been agreed in 2018, work will continue in January and February 2019 to further detail the principles. This work will help to jointly organise the further development of the market coupling by defining the responsible bodies and elaborating a classification of the decisions to be taken by each body, as well as helping to define the criteria for prioritising the functionalities to be developed.

Regional methodologies

At regional level, the proposed capacity calculation methodologies for each capacity calculation region have been submitted to NRAs. Some NRAs requested amendments to these methodologies. Approval of the methodologies is a prerequisite for several other implementation deliverables under the CACM and FCA regulations. In particular, it triggers a four-month delay for the TSOs of each CCR to jointly set up the coordinated capacity calculators (i. e. regional security coordinators) needed for the deployment of the Common Grid Model (Art. 27(2) CACM).

Regarding the countertrading and redispatching methodologies and cost sharing methodologies, most regions submitted them to their NRAs for approval in 2018. The approval process may be extended to 2019 if amendments are requested.

Harmonisation of regional deliverables

By 31 December 2018[1], all TSOs within each CCR should harmonise as far as possible between the regions the redispatching and countertrading cost sharing methodologies (Art. 74(7) CACM). In addition, all CCRs shall use a harmonised capacity calculation methodology by end of 2020 (Art. 21(4) CACM). ENTSO-E will facilitate both processes. CCRs' methodologies are still in the approval process at the time of finalisation of this work programme, a plan for their harmonisation will be developed as a next step.

Implementation monitoring

In August 2019, ENTSO-E will issue the 5th edition of the annual report on the progress and potential problems with the implementation of forward capacity allocation (for the second time), single day-ahead coupling and single intraday coupling (for the fifth time) in pursuance of Art. 82(2)(a) CACM and Art. 63(1)(a) FCA. A biennial joint report on capacity calculation and allocation is expected to be released in August 2019 in accordance with Art. 82(2)(b) and 31(1) of CACM and Art. 63(1)(c) and 26(1) FCA. ENTSO-E is following up on implementation monitoring through a data exchange initiative with ACER. ENTSO-E plans to launch in end 2019 the interface for the collection and provision of the data to ACER.

Finally, TSOs and NEMOs are discussing in view of delivering a joint report on the costs of the single day-ahead and intraday coupling (Art. 80 CACM). The timeline for delivery of this yearly report is yet to be decided.

The Forward Capacity Allocation Regulation

The FCA Regulation, which entered into force on 17 October 2016, sets out rules regarding the type of long-term transmission rights that can be allocated via explicit auction, and the way holders of transmission rights are compensated in case their right is curtailed. The overarching goal is to promote the development of liquid and competitive forward markets in a coordinated way across Europe, and provide market participants with the ability to hedge their risk associated with cross-border electricity trading.

The FCA Regulation entered its third year of implementation in October 2018. Implementation activities in 2019 include the following.

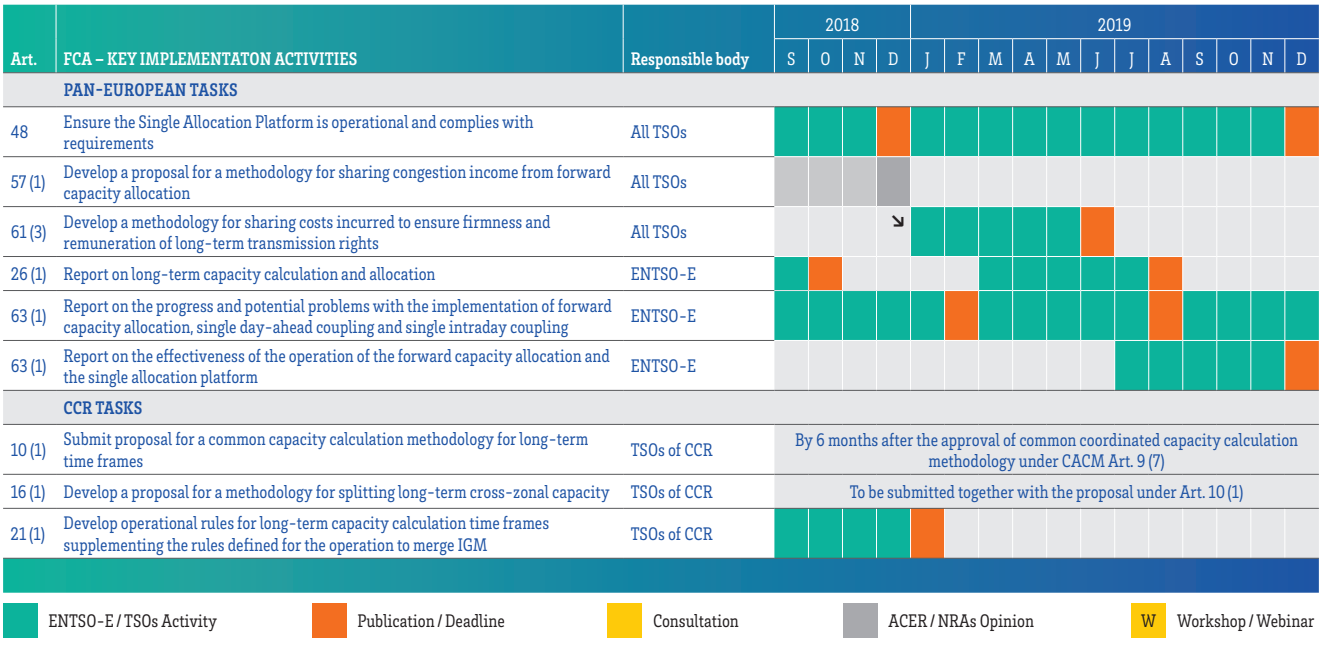

Figure 4: FCA key implementation activities

1 Since the approval of the Capacity Calculation methodologies is pending, these deadlines will be delayed in accordance with the approval of the methodologies.

Following the approval by NRAs in end 2017 of all TSOs' proposal for the establishment and development of the Single Allocation Platform (SAP), all TSOs must ensure the Platform is operational and complies with requirements. The development (and operation) of the SAP is performed by the Joint Allocation Office (JAO) – a joint service company of 20 TSOs from 17 countries, performing the yearly, monthly and daily auctions of transmission rights on 27 borders in Europe – who had been proposed by TSOs as the entity in charge. According to Article 48 FCA, forward capacity allocation must take place on the Platform by December 2018 for Alternating Current interconnectors, and by December 2019 for Direct Current interconnectors. Forward capacity allocation is effectively taking place on the SAP since October 2018 for both AC and DC interconnectors.

All TSOs submitted a joint proposal for a methodology for sharing congestion income from forward capacity allocation in June 2018 (Art. 57(1) FCA), all NRAs' sent a request for amendment in December 2018. All TSOs are working on an updated proposal. Once NRAs approve the congestion income methodology, all TSOs will have six months to jointly develop a methodology for sharing costs incurred to ensure firmness and remuneration of long-term transmission rights (Art. 61(3) FCA).

Regarding the implementation tasks at regional level, the development by CCRs of common capacity calculation methodology for long-term time frames will begin after the approval of the same methodologies under CACM. At the end of 2018 they were being reviewed by NRAs. Alongside with this proposal, CCRs must also submit a proposal for a methodology for splitting long-term cross-zonal capacity (Art. 16(1)).

Additionally, CCRs will develop operational rules for long-term capacity calculation time frames supplementing the rules defined for the operation to merge individual grid models. These must be submitted by January 2019/by six months after the approval of the CGM and GLDPR methodology for the FCA Regulation, which was approved by all NRAs in June 2018.

Implementation monitoring

In August 2019, ENTSO-E will issue the 5th edition of the annual report on the progress and potential problems with the implementation of forward capacity allocation (for the second time), single day-ahead coupling and single intraday coupling (for the 5th time) in accordance with Art. 82(2)(a) CACM and Art. 63(1)(a) FCA.

ENTSO-E delivered to ACER the first report on capacity calculation and allocation for FCA in August 2018, as per Art. 63(1)(c) and 26(1) FCA. From 2019 onward, this report will be merged with the report on capacity calculation and allocation as per Art. 82(2)(b) and 31(1) CACM into one single report, expected to be delivered to ACER in August 2019. ENTSO-E is following up on implementation monitoring through a data exchange initiative with ACER.

The Electricity Balancing Guideline

The Guideline sets a framework for common European rules and European platforms for cross-border balancing markets for imbalance netting, frequency restoration reserves with automatic activation (aFRR), frequency restoration reserves with manual activation (mFRR) and replacement reserves. The Electricity Balancing Guideline entered into force on 18 December 2017. Ongoing or planned implementation activities include the development of several methodologies by all TSOs, with ENTSO-E acting as facilitator, and the establishment of the European balancing platforms.

Art.	EBGL – KEY IMPLEMENTATON ACTIVITIES	Responsible body	2018				2019											
			S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
	PAN-EUROPEAN TASKS																	
A.29.3	Proposal for activation purposes	All TSOs	W															
A.30.1	Proposal for pricing method for all products	All TSOs	W															
A.50.1	Proposal for TSO-TSO settlement of intended exchanges of energy	All TSOs																
A50.3 50.4 51.1 51.2	Proposals for TSO-TSO settlement ramps and FCR and unintended exchanges within and between SA	All TSOs /TSOs of SA for Art 51.1																
A.52.2	Proposal for harmonisation of certain features of imbalance calculation & pricing	All TSOs	W															
A.25.2	Proposal for list of Standard Balancing Capacity Products	All TSOs													W			
A.37.3	Methodology for calculating cross-zonal capacity for balancing	All TSOs																
A.38.3	Proposal to harmonise the methodology for cross-zonal capacity allocation within CCRs	All TSOs																
A.40.1	Methodology for cooptimised cross-zonal capacity allocation	All TSOs													W			
A.19.1	Proposal for implementation framework for Platform RR	Concerned TSOs																
A.19.5	Implementation of Platform	Concerned TSOs																
A.20.1	Proposal for implementation framework for Platform mFRR	All TSOs																
A.20.6	Implementation of Platform	All TSOs																
A.21.1	Proposal for implementation framework for Platform aFRR	All TSOs																
A.21.6	Implementation of Platform	All TSOs																
A.22.1	Proposal for implementation framework for Platform IN	All TSOs																
A 22.5	Implementation and making operational of Platform	All TSOs																
A.63.2	ENTSO-E monitoring plan	ENTSO-E																
A.63.3	List of relevant information to be communicated, in cooperation with ACER	ENTSO-E																
	CCR TASKS																	
A.41.1	Methodology for market based cross-zonal capacity allocation	TSOs of CCR														W		
A 42.1	Proposal for a methodology for the allocation of cross-zonal capacity based on an economic efficiency analysis	TSOs of CCR														W		

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Figure 5: EBGL key implementation activities

The European balancing platforms

European platform for replacement reserves (Art. 19 EBGL): All TSOs performing the replacement reserve process submitted a proposed implementation framework to all NRAs on 18 June 2018, which was approved by NRAs. All TSOs performing the replacement reserves now have six months to designate the entity/ies responsible to operate the platform. By one year after approval, i.e. December 2019, all TSOs performing the reserve replacement process, and that have at least one interconnected neighbouring TSO performing the replacement reserves process, must have implemented and made operational the platform.

European platform for Imbalance netting (Art. 22 EBGL): All TSOs submitted the proposed implementation framework to all NRAs on 18 June 2018, NRAs sent request for amendments in December 2018 and all TSOs are currently reviewing their proposal. Once the implementation framework is approved, all TSOs will have six months to designate the entity/ies responsible to operate the platform. By one year after approval of the implementation framework, TSOs performing the automatic frequency restoration process must have implemented and made operational the platform and use it to perform the imbalance netting process at least for the Continental Europe synchronous area.

European platforms for mFRR (manual Frequency Restoration Reserves) and aFRR (automatic Frequency Restoration Reserves (Art. 20 and 21 EBGL): All TSOs submitted proposed implementation frameworks by the legal deadline of 18 December 2018. Following NRAs' approval, all TSOs will have six months to designate the entity/entities that will operate the platform.

Implementation monitoring

ENTSO-E submitted the monitoring plan for the EBGL to ACER for opinion on 6 June 2018. Next steps include the elaboration with ACER of the list of relevant information to be communicated to ACER.

SYSTEM OPERATION CODES: REGIONAL COOPERATION & SECURITY OF SUPPLY

The System Operation Guideline

The System Operation Guideline (SOGL) sets out harmonised rules on how to operate the grid to ensure the security of supply with increasing renewables. Its implementation entails several challenging tasks for TSOs at pan-European, synchronous area, and regional (CCR) levels[2]. Work at pan-European level is facilitated by ENTSO-E, while synchronous areas' activities are decided by TSOs in the respective regional groups within ENTSO-E.

The SOGL entered into force on 14 September 2017, the following implementation activities are ongoing or will begin in 2019:

Art.	SOGL – KEY IMPLEMENTATON ACTIVITIES	Responsible body
	PAN-EUROPEAN ACTIVITIES	
A 75.1	Develop a proposal for methodology for coordinating operational security analysis	All TSOs
A 67.1	Develop a proposal for methodology for building the year-ahead common grid models from the individual grid models and for saving them	All TSOs
A 70.1	Develop a proposal for methodology for building the day-ahead and intraday common grid models from the individual grid models and for saving them	All TSOs
A 65	Develop a common list of year-ahead scenarios against which TSOs assess the operation of the interconnected transmission system for the following year (yearly, due on 15 July)	All TSOs
A 40.6	Agree on key organisational requirements, roles and responsibilities in relation to data exchange	All TSOs
art. 114.1	Implement and operate the ENTSO-E OPDE for the storage, exchange and management of all relevant information	ENTSO-E
A 15	Report on operational security indicators	ENTSO-E
A 16	Report on load-frequency control	ENTSO-E
	ACTIVITIES AT SYNCHRONOUS AREA LEVEL	
A 84.1	Methodology for assessing the relevance of assets for outage coordination	TSOs of SA
art.118.1	Synchronous area operational agreements	TSOs of SA
A 39.3.a	Conduct a common study per SA to identify whether the minimum required inertia needs to be established taking into account the costs and benefits as well as potential alternatives	TSOs of SA
A 39.3.b	Develop a methodology for the definition of minimum inertia required to maintain operational security and to prevent violation of stability limits	TSOs of SA
A 13	Agreement with non-EU TSOs setting the basis for their cooperation concerning secure system operation and setting out arrangements for the compliance of non-EU TSOs with the obligations set in the SOGL	TSOs of SA
A 38.2	Coordinate dynamic stability assessments on synchronous area level	TSOs of SA
art. 156.11	Assumptions and methodology for a cost-benefit analysis to be conducted to assess the minimum activation time of FCR - in CE and Nordic SAs	TSOs of SA
art. 156.11	CBA suggesting the minimum FCR activation period (CE and Nordic SAs)	TSOs of SA
	CCR TASKS	
art. 76.1	Common provisions for regional operational security coordination (timing conditioned by Art 75.1)	TSOs of CCR

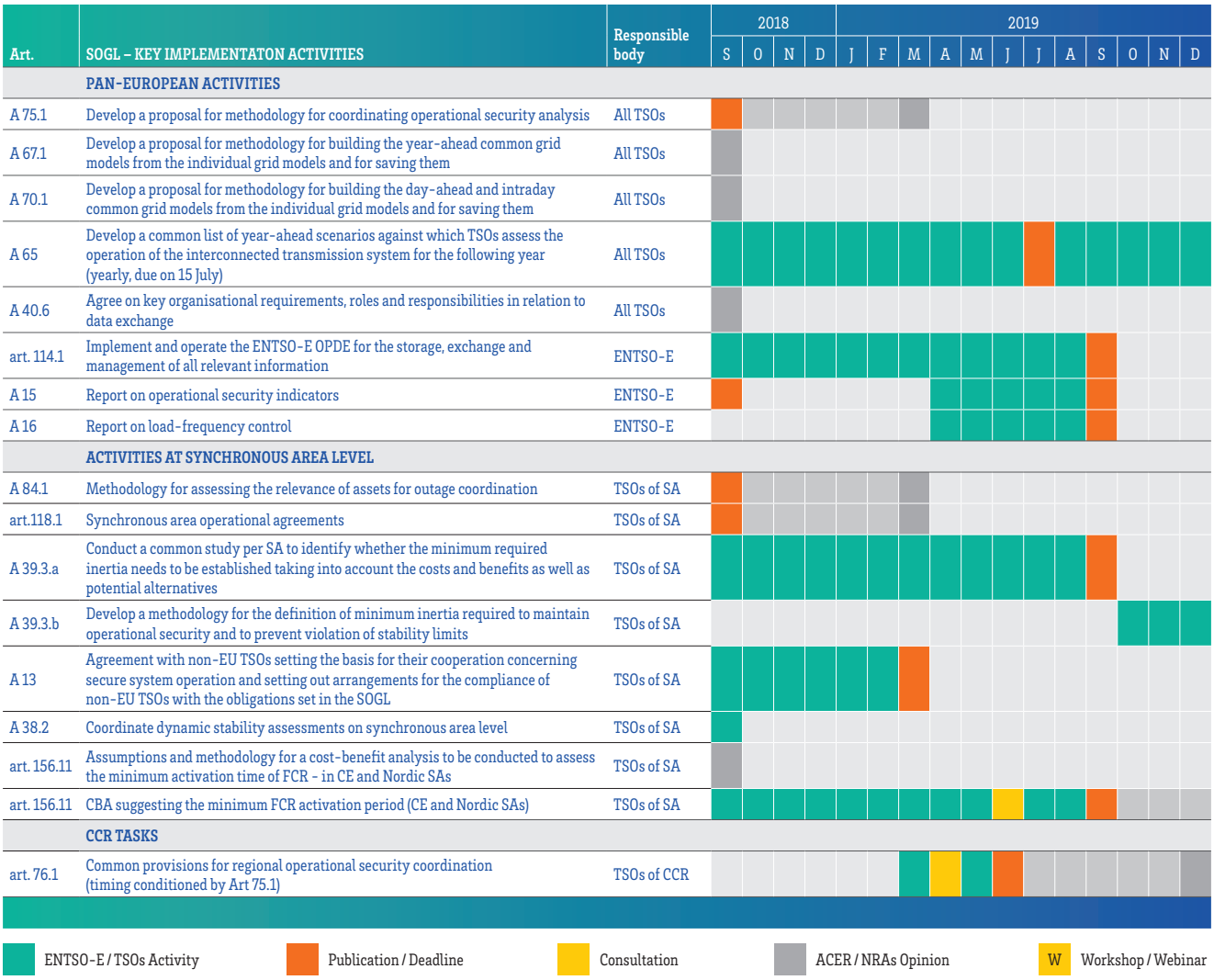

Figure 6: SOGL key implementation activities (SA: synchronous area)

2 The SOGL sets a number of implementation tasks at regional - meaning Capacity Calculation Regions – level. These are not the same as the areas covered by Regional Security Coordinators. The tasks rollout by RSCs is a pan-European task, steered by ENTSO-E.

A large part of the implementation of the SOGL is prepared through the rollout of the five standard tasks of Regional Security Coordinators, detailed in Figure 7.

Five tasks	Objective	Status
Regional operational security coordination	Identify operational security violations in the operational planning phase. Identify the most efficient remedial actions and recommend them to the concerned TSOs.	All RSCs are performing the task. It will evolve once the methodology for coordinating the security analysis (Art. 75 SOGL) is approved by NRAs (expected in March 2019). Once the methodology for coordinating the security analysis is approved, the TSOs of each CCR will have three months to develop a joint proposal for common provisions for regional operational security coordination, to be applied by the RSCs and the TSOs of the CCR (expected in June 2019).
Regional outage planning coordination	Detect outage planning incompatibilities and the solutions to solve the incompatibilities.	A common methodology for all synchronous areas for assessing the relevance of assets for outage coordination (Art. 84.1 SOGL) will be the basis for TSOs identifying which power generating modules, demand facilities and grid elements located in a transmission system or distribution system need to be considered in the outage coordination process. The methodology is expected to be approved by NRAs in March 2019. RSCs will support TSOs in coordinating the outages of all the identified relevant assets. For that purpose, a coordinated outage planning process was developed in 2017, and a tool common to all RSCs will be developed by 2019.
Coordinated capacity calculation for CACM	Calculate available electricity transfer capacity across borders (using flow-based or net transfer capacity methodologies). Maximise the capacity offered to the market.	All RSCs are already performing the capacity calculation task, which will evolve after the approval of the capacity calculation methodologies developed regionally according to CACM. Once all regional capacity calculation methodologies are approved, TSOs of each CCR will have four months to jointly set up the coordinated capacity calculators (Art. 27(2) CACM).
Regional adequacy assessment	Provide TSOs with short (day-ahead) to medium (up to week-ahead) adequacy forecast, in order to be able to foresee possible critical grid situations and deal with these accordingly.	RSCs shall perform adequacy assessments for at least the week-ahead timeframe, with the aim of detecting situations where a lack of adequacy is expected in any of the control areas or at regional level, considering possible cross-border exchanges and operational security limits. To do so, a common methodology for coordinated week ahead adequacy assessment was developed in 2017. Beyond the legally required regional adequacy assessment, the methodology foresees that RSCs will perform cross-regional adequacy assessment on a rotating basis. For the purpose of the cross-regional adequacy assessment, a tool common to all RSCs will be developed by 2019.
Building of common grid model	Provide the common grid model for all timeframes and applications, to all TSOs which are served by an RSC.	The proposed methodologies for building year-ahead/day-ahead/intraday common grid models from individual grid models (Art. 67(1) and 70(1) SOGL) were approved by all NRAs in June 2018. In July 2018 all TSOs delivered the first set of Y-1 scenarios, for the year 2019 (Art. 65 SOGL). TSOs' IGMs, and consequently the CGMs, are being built in accordance with the defined scenarios. The IGMs and CGMs serve several purposes, including seasonal security calculations, operational planning coordination, capacity calculation and other applications such as computation of the influence factors for observability area or OPC relevant asset definition. (More on the CGM in Chapter 3)

Figure 7: Five tasks of RSCs and status of implementation

The Operational Planning Data Environment (OPDE)

The OPDE, specified by Art. 114 of the SOGL, is the information platform that will support the data exchange associated with the common grid model merging process. It is also the foundation of the data exchange platform for performing the five core tasks of RSCs. ENTSO-E is in the process of delivering the main software components of the OPDE, which must be operational by 14 September 2019.

Tasks at synchronous area level

Main activities in 2019 include:

- By September 2019, the TSOs of each synchronous area will conduct a study to identify whether the minimum required inertia needs to be established (Art. 39(3) SOGL). In the event a study identifies a need to define minimum required inertia, the TSOs of the concerned synchronous area will develop a methodology for that purpose;

- A cost-benefit analysis suggesting the minimum FCR (Frequency Containment Reserves) activation period in the Continental Europe and Nordic synchronous areas (Art. 156 (11) SOGL).

Implementation monitoring

ENTSO-E will report in September 2019 on operational security indicators, in the Incident Classification Scale annual report (Art. 15 SOGL). We will also release in September 2019 a report on load-frequency control (Art. 16 SOGL).

The Emergency and Restoration Code

The Emergency and Restoration Network Code sets out harmonised rules on how to deal with emergency situations and restore the system as efficiently and as quickly as possible. It entered into force on 18 December 2017, and is primarily subject to implementation at a national or TSO level. Implementation is planned to be extended until 2022.

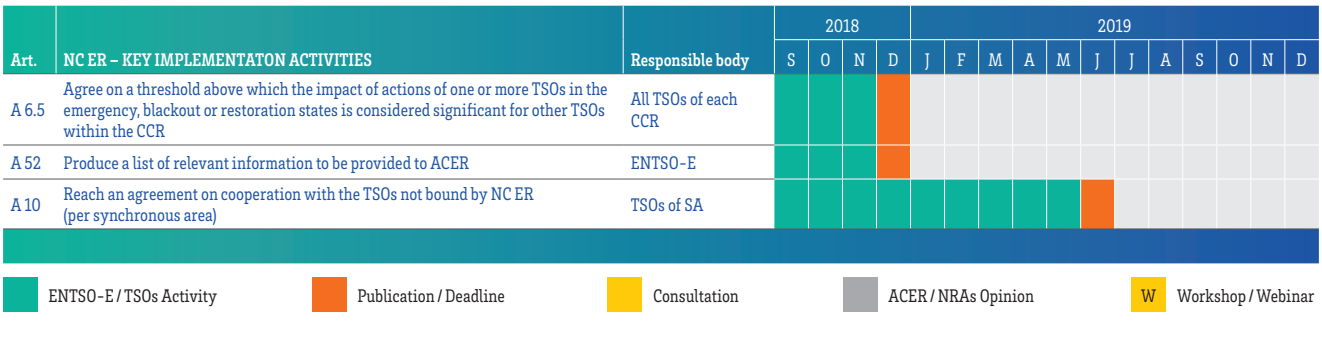

Figure 8: NC ER key implementation activities

An expert team supported by ENTSO-E has been drawn from TSO representatives involved in drafting the original Code. The particular and legally mandated aim is to facilitate the rollout of the "6th legally mandated task of the RSCs" which (in line with Article 6(2–4) of NC ER) relates to consistency assessments of the measures of system defence and restoration plans of those TSOs which are served by a given RSC. Moreover, the expert team will also establish widely applicable guidelines for the rules for the situations in which the market activities are suspended and restored, which in turn are in the responsibility of each TSO to be implemented.

CONNECTION CODES: INTEGRATING RENEWABLES

The implementation of connection codes is the responsibility of each EU member state. ENTSO-E acts as a platform to share information and good practices, especially through the development and delivery of non-binding written guidance – Implementation Guidance Documents (IGDs) – to its members and other system operators.

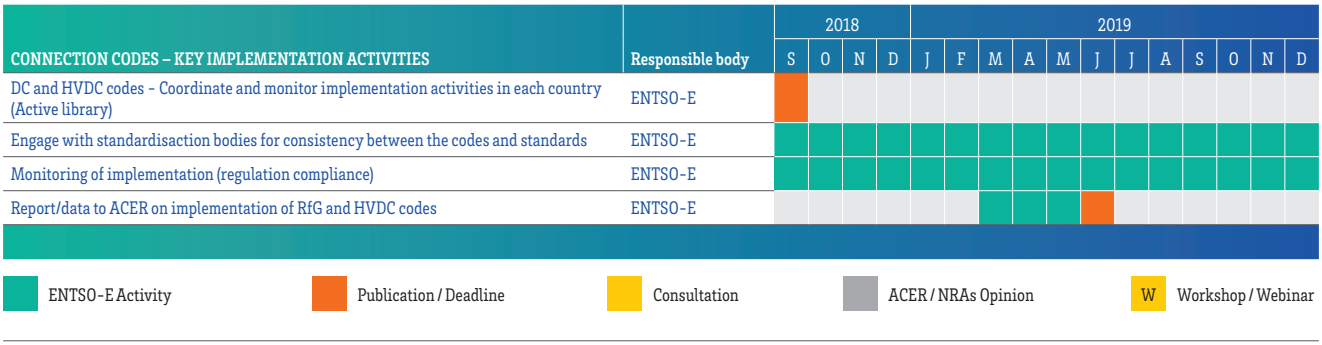

Figure 9: Connection codes key implementation activities

The development of IGDs is fuelled by discussions with stakeholders from the drafting phase onward, via dedicated expert groups and the Grid Connection Stakeholder Committee. Work in 2019 will also include engaging with standardisation bodies (CENELEC) to ensure consistency between the codes and standards.

Implementation monitoring

ENTSO-E monitors the implementation activities in each country via its Active library, looking in particular at divergences in national implementation. Monitoring activities and the submission of the requested "list of Information" to ACER will begin in 2019. A monitoring report is foreseen in the first half of 2019. each country via its Active library, looking in particular at divergences in national implementation. Monitoring activities and the submission of the requested "list of Information" to ACER will begin in 2019. A monitoring report is foreseen in the first half of 2019.

2. CONCEIVE THE FUTURE POWER SYSTEM

The power system is in a profound process of change. Renewables are replacing thermal, demand-side response and storage provide a new dynamic, and digitalisation influences the entire electric value chain. ENTSO-E aims at providing leadership for the future power system, by contributing its vision of market design and operations, grid planning and development with the TYNDP, supporting innovation and, in the shorter term, ensuring system adequacy in line with the new mandates set in the Clean Energy Package.

To follow Europe's progress towards transforming its energy system and achieving its climate goals, ENTSO-E will release for the first time in January 2019 a report providing a factual state-of-play of Europe's energy transition, based on the data gathered by TSOs and by other actors of the energy sector.

IMAGINE AND MODEL FUTURE ELECTRICITY AND GAS SYSTEMS SCENARIOS

The starting point to understand what new investments or measures would be the most effective in the future is defining scenarios that depict the energy system which the EU is striving to achieve.

The storylines form the basis of the scenarios. They are co-constructed every two years with stakeholders, NRAs and EU member states through a series of dedicated consultations and workshops, and are developed jointly with the European network of TSOs for gas, ENTSOG. The ENTSOs later use their own data and advanced modelling tools to "build" the scenarios outputs by simulating the market and network behaviours of the system. Dedicated collaboration will also be developed with external organisations (including IRENA, the Renewables Grid Initiative, and industry associations) to strengthen the input used to build the scenarios.

This joint gas and electricity approach brings a more integrated view of the electricity system, and will in time allow a better understanding of how infrastructure in both energies impact on each other. In this regard, it is also far more complex and challenging to put together.

Figure 10: Scenarios key activities

For the first time, the new set of scenarios will not be formally attached anymore to the TYNDP but will become a standalone product of the ENTSOs. Although the TYNDP is a major user of these scenarios, and the development processes of the TYNDP and scenarios are closely interlinked (see development cycle in the following section), ENTSO-E wants to highlight with this measure how the scenarios can and should be used for studies on all future aspects of the European energy system (internal and external to the ENTSOs). ENTSO-E will make all necessary data available and is happy to discuss with any party interested (academics, institutions or private sector) what support can be provided for the use of these scenarios in studies. The new set of scenarios will also consider the national climate and energy plans.

Five storylines were proposed in 2018 and should serve as the basis to build the scenarios, covering a wide range

of possible futures, in different time horizons. The final set of storylines will be proposed by the ENTSOs once the stakeholder engagement process is complete. The storylines are likely to evolve, and not all of them should become an actual scenario.

The ENTSOs will realise a qualitative analysis of the storylines, examining their compliance with the CO_2 emissions reduction objective set by the COP21. To define the scenarios, ENTSOs will consider in particular the following figures: heating and cooling; transport; power & gas; distributed generation and storage; and ancillary services.

The proposed scenario timeframes will be the same as for the 2018 scenarios: 1 scenario looking at 2020, 2 scenarios for 2025, 3 scenarios for 2030 and 3 scenarios for 2040. In building the scenarios, the ENTSOs will coordinate with other organisations with recognised expertise in this field, such as IRENA. This will help to fill gaps, create consistency and build bridges with the industry.

Five storylines

National trends

National focus on climate change, driven by ETS and national subsidies. Moderate economic growth. Growth of RES but depending on National Policies.

Global ambition

Sustainable growth. Global emission trading. Low-carbon technologies competitive without subsidies. Wind & solar become leading sources of electricity. Carbon-free gas (P2G) replaces fossil gas

European focus

Favourable economic environment. Global emissions scheme. RES is built on commercial conditions. RES is built where the best resources are found. High growth of P2G and Bio Methane

Smart prosumer

High economic growth. High innovation of small-scale generation and commercial storage. Strong climate policy. Electricity and renewable gases covering residential heating demand.

Delayed transition

Behind Targets. Low economic growth. Low climate action and limited national subsidies. Low potential for growth of renewable technologies. Gas and oil significant in the shipping and heavy good transport sectors, oil and hybrid technologies for transport

PLAN THE GRID OF TOMORROW

The Ten-Year Network Development Plan

The TYNDP is a pan-European network development plan, providing a long-term vision of the power system. A legally mandated deliverable (Art. 8(10), Regulation 714/2009), published by ENTSO-E every two years, it is the foundation of European grid planning and the basis for transmission projects that are eligible to be labelled as 'projects of common interest' (PCI).

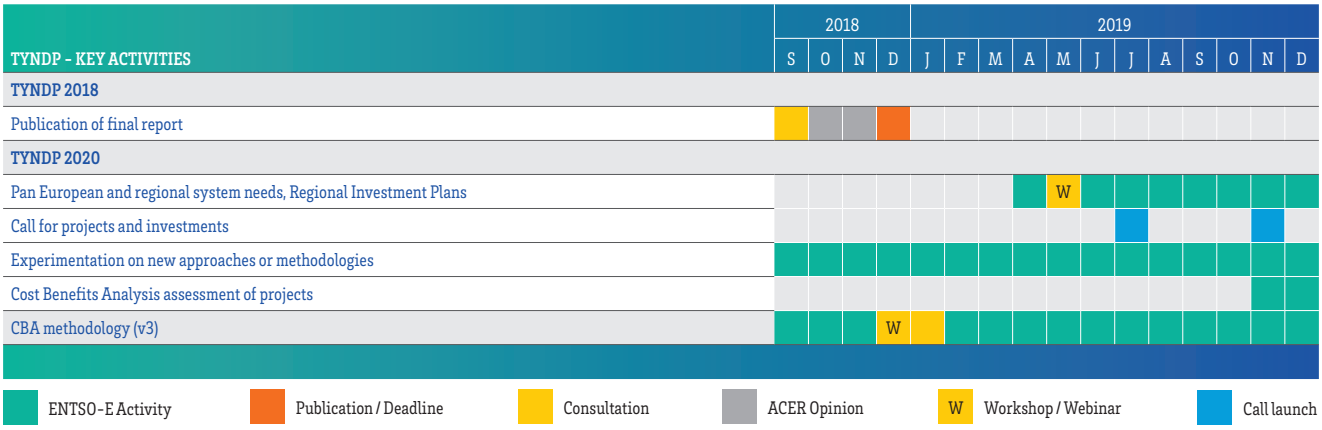

Figure 11: TYNDP key activities

The TYNDP aims to provide a benchmark for transmission network development (scenarios, system needs, development solutions, and project assessment). Pan-European system development is coordinated and linked with national needs, finding synergies when relevant between European, regional, and national studies, and making use of the expertise of the regional and local conditions of TSOs.

The elaboration of each TYNDP which shares teams, methods and project management with the creation of scenarios is a two-year process, as shown in figure 12.

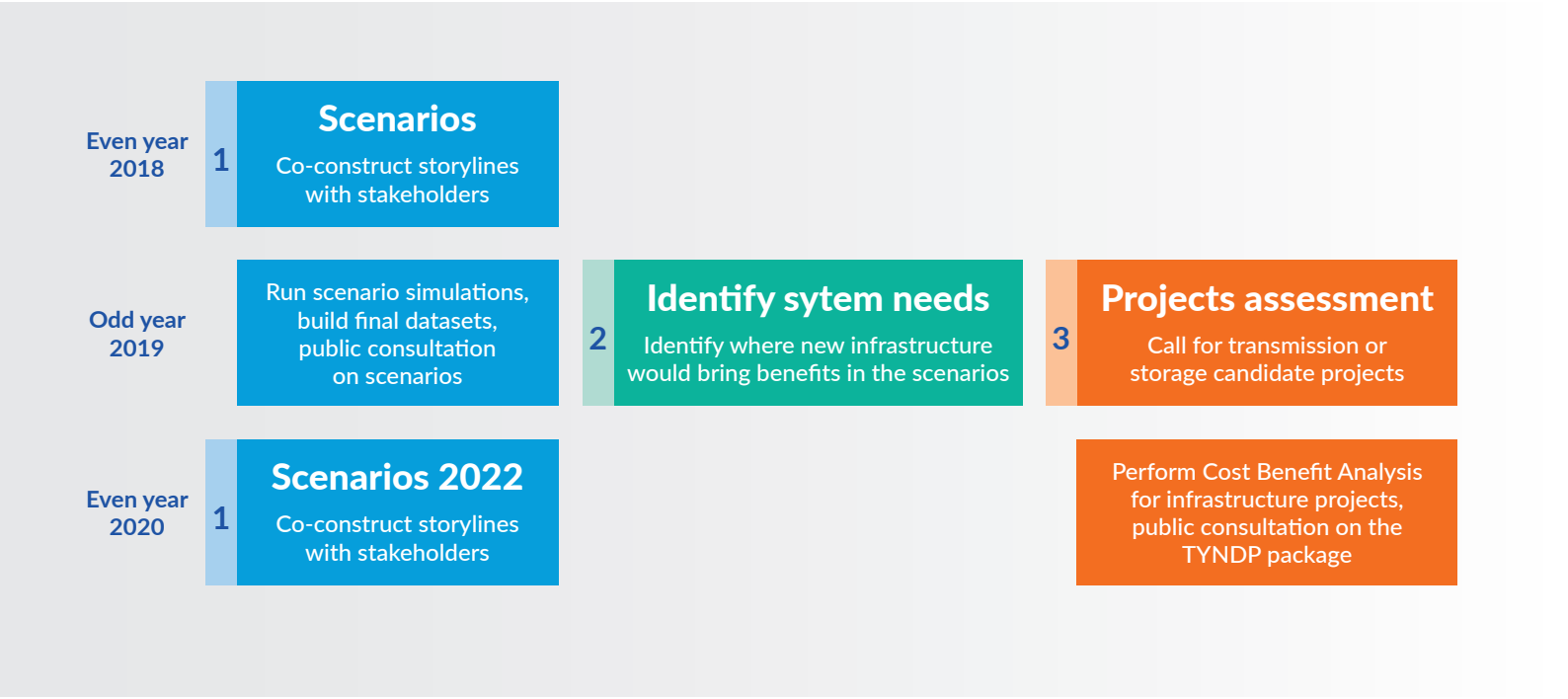

Figure 12: TYNDP two-year process

Stakeholders shaping the future grid

Public consultations and workshops will be organised throughout 2019 to engage all interested stakeholders in the process (more information on the timeline in the gantt charts on the scenarios and TYNDP above). In addition, the Network Development Stakeholder Group involves distribution system operators as well as representatives of various actors, including electricity generators, traders, consumers, and NGOs. This group has a consultative role, working as an oversight committee for the selection of projects and will be involved in the selection of the content to be included in the various deliverables.

The cost-benefit analysis methodology

The assessment of infrastructure and storage projects performed in the TYNDP uses a Cost Benefit Analysis (CBA) methodology drafted by ENTSO-E, in consultation with stakeholders. The methodology when ready is proposed to the European Commission who issues an opinion confirming or not the proposal. The CBA results are also used as the basis of the PCI selection process.

Over 2017 and 2018 ENTSO-E developed a third version of the CBA methodology, which improves on the previous versions in its consideration of security of supply, socio-economic welfare and storage. The CBA 3.0 will be submitted to public consultation in Q1 2019, and submitted to the European Commission in the course of 2019. If approved, it will be used for building the TYNDP2020.

Electricity and gas: an interlinked model

The gas and electricity sectors are both impacted by the same transition towards decarbonisation and developments in one sector can affect the other. Interlinkages cover from household energy use to electricity production and storage, as well as infrastructure.

ENTSO-E has been working with ENTSOG since 2015 in developing a common set of scenarios, with the gas sector providing input to the electricity sector and vice-versa. ENTSO-E and ENTSOG are now investigating further the interlinkage between gas and electricity scenarios and infrastructure project assessment with a joint focus study, examining all possible interactions between the gas and electricity sectors (including on the end-user side, or interactions related to electricity and gas prices), and relevant gas and electricity infrastructure interactions. The study was supported by an ad hoc group of interested stakeholders representing European organisations. It will be further discussed with ACER and the European Commission in 2019. If successful, the study could allow the ENTSOs to propose new elements to the interlinked model in the form of new TYNDPs CBA methodologies (which would undergo public consultation).

Innovate to better understand the needs and benefits of international infrastructure

With each edition of the TYNDP, ENTSO-E strives to develop the tools and methods used for the scenarios and TYNDP. This guarantees the most accurate assessment of future network investments. In turn, well-informed decisions can therefore be made by investors and policy makers, for Europeans to benefit from the most cost-effective grid matching with policy objectives such as decarbonisation and security of supply.

All European countries develop and follow National Development Plans. However, European-level planning obeys to different technical, financial and regulatory rules as national grid planning. The modelling of a zone that is the size of a continent also creates numerous scaling challenges.

In the TYNDP and scenarios 2018, ENTSOs focused on better representing demand and new flexibility (smart grids, demand response, electric vehicles). In parallel to the implementation of these improvements, ENTSO-E ran a number of experimentations as test projects. Two of the experimentations conducted have been considered successful and should be implemented in the TYNDP 2020 (regarding the assessment of security of supply through a probabilistic approach, and a flow-based modelling approach for the identification of system needs).

Possible other areas of exploration are the valorisation of system services, and trying to better understand how the mechanisms of market design may prevent the understanding of the value of capital-intensive infrastructure. Stakeholders will be asked to provide their views on which areas are worth exploring.

ENSURE SYSTEM ADEQUACY

Assessing system adequacy – the ability of a power system to cover demand in all conditions – is part of TSOs' tasks, and, consequently, one of ENTSO-E's most important mandates. Resource adequacy requires advanced methodologies to capture and analyse rare events with adverse consequences for the supply of electric power. ENTSO-E issues the following adequacy reports on a yearly basis, looking from the next season to the next decade. The Electricity Regulation recast and the Risk Preparedness Regulation is likely to entrust ENTSO-E, in cooperation with RSCs, with several additional deliverables.

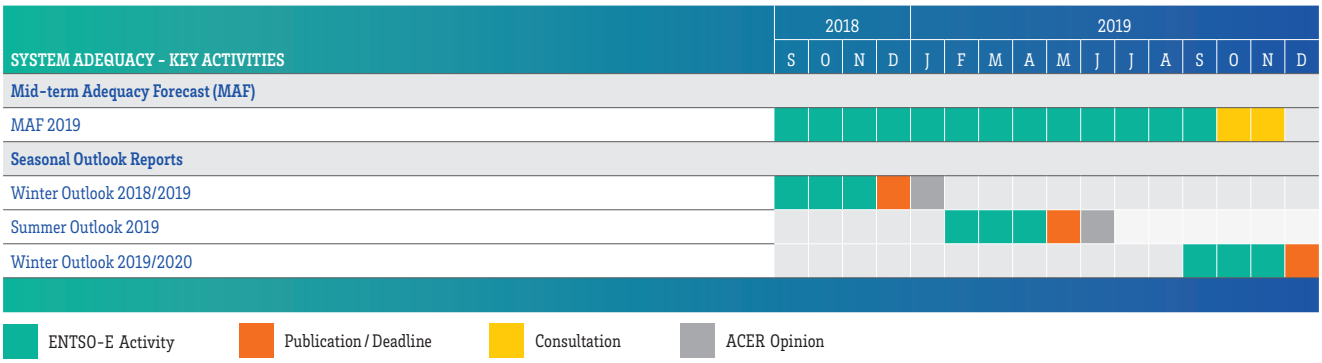

Figure 13: Adequacy key activities

The Mid-term Adequacy Forecast

To account for a growing number of disruption risks related to the evolution of the energy mix – growing development of renewable energy sources, reduction of conventional power plants, availability of interconnection capacity – Europe needs a regular assessment of the adequacy situation, at time horizons of up to ten years ahead. After several years of publishing the predecessor reports 'Scenario Outlook and Adequacy Forecast', based on a simpler methodology, the 'Mid-term Adequacy Forecast' (MAF), published for the first time in 2016, aims to provide a pan-European adequacy assessment of the risks to security of supply and the need for flexibility for the coming decade. Art. 8(3)b of Regulation 714/2009 requires ENTSO-E to develop a European generation adequacy outlook every two years as part of the TYNDP, the MAF goes beyond that legal mandate to answer to new needs identified by the Electricity Coordination Group[3]. The MAF 2018 forms part of the TYNDP 2018 package.

The MAF is based upon a probabilistic analysis conducted using sophisticated market modelling tools. The methodology of the MAF has been considerably improved upon since 2016 and can be considered as mature.

To prepare for the implementation of the Electricity Regulation recast, the MAF 2019 edition will focus on results analysis, flexibility needs and specific sensitivities in line with future ENTSO-E scenarios (more on adequacy and the Clean Energy for all Europeans Package below). In addition, the input data quality will be further improved, with the setup of pan-European databases related to hydro, thermal generation, demand, etc.

ENTSO-E relies on the feedback received from stakeholders to identify the needs for improvements. Each edition of the MAF is released for public consultation in the last quarter of the year. In early 2019 we will release the stakeholder consultation report of the MAF 2018. Stakeholder comments will be considered as far as possible in the elaboration of the MAF 2019, while the comments received on the MAF 2019 will build into the MAF 2020, and so forth.

3 The SOGL sets a number of implementation tasks at regional - meaning Capacity Calculation Regions – level. These are not the same as the areas covered by Regional Security Coordinators. The tasks rollout by RSCs is a pan-European task, steered by ENTSO-E.

The Seasonal Outlooks

ENTSO-E's winter and summer outlooks (Art. 8(3)f, Regulation 714/2009) are pan-European, system-wide analysis of risks to electricity security of supply. They present TSOs' views on the risks to security of supply and the countermeasures they plan for the coming season, either individually or in cooperation.

ENTSO-E is seeking to improve the methodology used in the seasonal outlooks, to further align with the one used for the MAF. This implies a switch from a mostly deterministic approach to an hourly probabilistic approach. The change is being done following a step-by-step process, as it requires the implementation of new tools, methodologies and models. The Winter Outlook 2019/2020 will be the first seasonal outlook to be fully probabilistic, with hourly modelling.

ENTSO-E is also looking to extend the coordination with the week-ahead adequacy assessment performed by Regional Security Coordinators. This implies a common methodology for assessing short-term adequacy (covered in Art. 8 of the draft Risk Preparedness Regulation, see below), and sharing of data.

As usual, each outlook will be accompanied by a review of what happened during the previous season, based on qualitative information by TSOs presenting the main events that occurred during the past period and comparing them to the forecasts and risks foreseen in the corresponding outlook.

ENTSO-E's new adequacy mandates in the Clean Energy for all Europeans package

The legislative package will probably bring additional responsibilities for ENTSO-E and RSCs as regards adequacy. Upon entry into force of the Electricity Regulation and of the Risk Preparedness Regulation, a plan will be established to improve the MAF deliverables over the next few years.

Article 19 of the draft Electricity Regulation is likely to require ENTSO-E to develop and submit to ACER a methodology for a European resource adequacy assessment. The methodology used to develop the MAF, as developed and improved upon since 2016, currently satisfies most of the requirements set by the draft Regulation.

ENTSO-E may also be required to submit a methodology to calculate the value of lost load, the cost of new entry for generation or demand response, and the reliability standard expressed as 'expected energy not served' and the 'loss of load expectation' (Art. 19.5).

Regarding short-term adequacy, the Risk Preparedness Regulation may also require ENTSO-E to submit to ACER a methodology for assessing short-term adequacy, including seasonal, week-ahead to intraday (Art. 8 Risk preparedness regulation), which seems well aligned with the new fully probabilistic method currently developed for ENTSO-E's future seasonal outlooks.

Finally, ENTSO-E, in cooperation with RSCs, may be required to propose to ACER a methodology to identify the most relevant electricity crisis scenarios in a regional context (Art. 5 Risk Preparedness Regulation), by two months after entry into force of the Regulation. Based on this methodology, ENTSO-E is likely to be tasked with identifying the most relevant crisis scenario for each region by 10 months after entry into force (Art.6).

To support the elaboration of the above methodologies and adequacy assessments, ENTSO-E will perform in 2019 a review of existing tools and processes to assess what needs to be adapted. The tools to be assessed include e.g., the European Awareness System (EAS), a tool used by TSOs for system alerts, but also ENTSO-E's internal Crisis Communication Tool.

DELIVER ON POWER SYSTEM INNOVATION

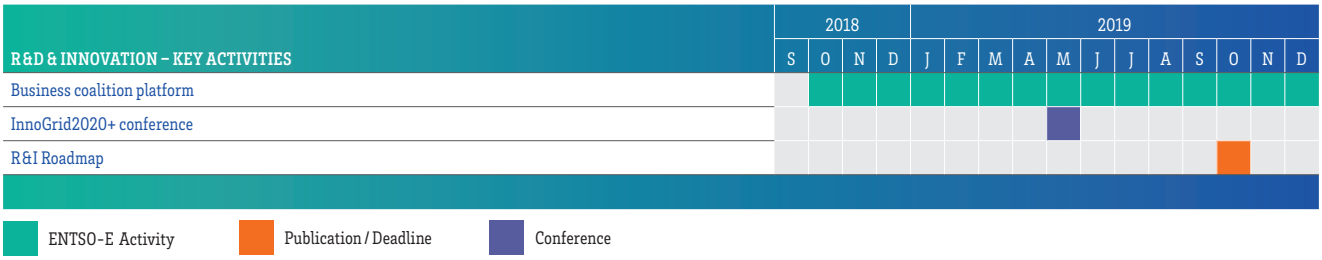

Figure 14: R&D and innovation key activities

The European grid, built for the needs of a very different paradigm, has to be adapted to the arising energy transition power system, characterised by high and increasing variable RES shares, flexibility, and decentralised co-existing with centralised in one system. Innovative solutions on the physical side – like dynamic line rating – and on the increasing use and availability of digital technologies for the optimisation of the grid - are to be applied. The power system will see new players emerge, such as aggregators, and the customers moving centre stage. ENTSO-E strongly supports the Mission Innovation claim to double the involved governments' clean technology and research funding by 2021, and has reached out to policy makers, together with EDSO for smart grids, with Ten Innovation Actions to deliver the Energy Union.

ENTSO-E promotes and coordinates TSOs' innovation activities to transform the European energy system into an integrated one, with emphasis on flexibility (including demand-side response, storage, etc.) and end-to-end digitisation to integrate different technologies and market services.

ENTSO-E will advocate for the dissemination and sharing of best practices of R&I through its business coalition platform, launched in Q4 2018, where innovative business players, start-ups and thought leaders from academia and industry are invited to exchange their views on the steps that need to be taken for a successful European energy transition. In addition, ENTSO-E organises, jointly with E.DSO, the yearly InnoGrid2020+ conference where innovative TSO and DSO projects are showcased.

ENTSO-E is also working on developing innovation sharing within the TSO community, via e.g. the mapping of TSOs' innovation projects, the organisation of events and field trips and the setting up of an online tool for TSOs to exchange information.

In 2019 ENTSO-E will publish a new R&I Roadmap, outlining the methodology that contributes to achieving the European climate energy objectives and in line with the European Commission's Roadmap 2050. In addition, ENTSO-E will strengthen its role in the European Technology Innovation Platform on Smart Networks Energy Transition (ETIP SNET), through active participation in its working groups and Governing Board, of which ENTSO-E will continue to hold the vice chairmanship. ENTSO-E is also engaged in the integrated ETIP SNET 2050 vision of the energy system and will contribute to its 2020-2029 Roadmap and further development of R&I building blocks.

The ETIP SNET Platform falls under the umbrella of the European Commission's Strategic Energy Technology (SET), as well as the Horizon2020 calls, in which ENTSO-E participates. In 2019, ENTSO-E will continue to facilitate proposals for the Horizon2020 call and to foster TSO participation. ENTSO-E is involved in the following projects:

- **INTENSYS4EU,** jointly developed with the ETIP SNET, aims at supporting the further integration of innovative solutions and at extending the existing R&I Roadmaps, through permanent and direct interactions with the impacted stakeholders and EU member states.

- **TDX-Assist**, which aims to design and develop novel ICT tools and techniques that facilitate scalable and secure information systems and data exchange between TSOs and DSOs. Participating TSOs include Eles (Slovenia) and REN (Portugal).

- **INTERRFACE**, which groups TSOs, DSOs, aggregators and IT providers in the conception of a digital solution to support new flexibility markets.

One additional project is awaiting confirmation from the Horizon2020 programme, Patchwork, a capacity-building initiative for innovation in Eastern Europe.

DELIVER A VISION FOR 2030

ENTSO-E launched two parallel and coordinated projects in 2018, to develop visions for 2030 from the perspectives of market design and of system operations. To address current challenges and meet future needs, different options for market design models – ranging from simple evolutions of the current EU target model to more substantial changes – are being identified and will be evaluated. From a system operations perspective, the project aims to build on existing ENTSOE project work to provide a consensual and proactive TSO vision for operation in 2030, which will better shape future public debate. For this purpose, dialogue with interested stakeholders is foreseen in Q2-Q3 2019.

Both projects are expected to conclude with the publication in end 2019 of a joint market and system operations vision for 2030, including the findings of the market qualitative and quantitative analysis, policy recommendations, and a proposed roadmap for implementation.

ASSESSING THE IMPACT OF THE *CLEAN ENERGY FOR ALL EUROPEANS* PACKAGE ON ENTSO-E AND TSOs

The European Commission's proposed *Clean Energy for all Europeans* package, which was tabled in November 2016, is expected to be adopted in early 2019. The CEP represents an important and significant update to Europe's electricity market design, TSO cooperation and ENTSO-E's tasks. Once the package is adopted, ENTSO-E will start an assessment with regards to its impact on the association's various tasks and responsibilities and its role in coordinating TSOs. It will propose a timeline for the development of the new associated products in consideration of its five year plan budget directions. While the scope of this review is not yet defined, it may also analyse the CEP's impact on TSOs in some specific areas. ENTSO-E expects to complete the assessment within six months after adoption.

3. TRANSFORM EUROPE'S ELECTRICITY ICT ARCHITECTURE

The digital infrastructure supporting the power grid plays an increasingly important role, as exemplified by the rise of smart grids and the development of tools such as the Common Grid Model. A digital power system provides new opportunities for system operations, market design, and regional cooperation. The IT architecture must adapt to this transformation to support Europe's energy transition. In particular, the future IT architecture should ensure interoperability and enable cyber-security. ENTSO-E elaborated an IT strategy, spanning the period from 2017 to 2020 and including as a first concrete step the creation in 2018 of a Digital committee to advise ENTSO-E's Board on digital.

THE COMMON GRID MODEL

The Common Grid Model (CGM) finds its legal basis in three of the network codes: the SOGL (Art. 64), the CACM Regulation (Art. 17) and the FCA Regulation (Art. 18). The CGM, and its data exchange system the Operational Planning Data Environment (OPDE), are indeed a prerequisite for several processes harmonised in the network codes, including coordinated capacity calculation, operational security analysis, outage planning coordination and adequacy analysis.

The CGM compiles the individual grid model of each TSO, covering timeframes going from one year before real time to one hour before real time. TSOs' individual (in most cases, national) grid models are picked up by RSCs, who, following a quality assessment and pan-European alignment process, merge them into a pan-European Common Grid Model and feed the merged Common Grid Model back into the system.

The CGM is a major project for ENTSO-E, at full deployment the overall operating costs will reach 10 M€ per year (representing in the long term more than 32 % of ENTSO-E's budget, without counting the total cost of local projects).

Methodologies

Implementation of the CGM needs to be consistent throughout the various processes set in the SOGL, CACM and FCA regulations, and this is why all TSOs have been tasked with the preparation of two methodologies: a CGM methodology for all three codes and a generation and load data provision methodology for CACM and FCA. As from June 2018, the versions of both methodologies for all three codes have been approved by all NRAs. Discussions with ACER are ongoing to determine whether a consolidation of the various versions of the methodologies is appropriate and needed.

CGM Security Plan

ENTSO-E approved in June 2018 the security plan for OPDE and ATOM. The Plan is effective as of August 2018. By February 2019 TSOs will perform a self-assessment and by August 2019 they should be fully compliant with the Security Plan.

Operational Planning Data Environment

The OPDE, specified by Art. 114 of the SOGL, is the information platform that will support the data exchange associated with the CGM merging process. It is also the foundation of the data exchange platform for fulfilling the five core tasks of RSCs. The roll out of the initial set up of OPDE is expected to be completed in 2018. The OPDE will then be further developed in steps. By September 2019, all TSOs will be able to exchange data securely via the OPDE. It is foreseen that, by end of 2020, the OPDE will be fully operational with all functionalities available for all TSOs.

ATOM: All TSOs' network for non-real-time operational and market-related data communication network

The OPDE will run on a dedicated communication network called ATOM. The full ATOM backbone will be progressively set up using TSOs' own communication lines and will be the core of a secure reliable communication network. The deployment of the ATOM infrastructure in 2019 will be phased according to TSOs' proximity to the core network infrastructures as well as ENTSO-E's 2019 validated budget envelope.

COMO, THE PHYSICAL INFRASTRUCTURE

Since 1999, 38 TSOs have been physically connected via the Electronic Highway, a meshed router network (separate from the internet) designed for real-time data exchange between TSOs. In parallel, ENTSO-E started developing a data exchange communication network to support the Common Grid Model, called ATOM. ATOM is a pan-European private network based on TSOs' owned backbone network. It allows for the exchange of non-real-time operational and market-operations related data.

In 2017, the decision was taken to merge the Electronic Highway with ATOM. This will create one single physical infrastructure for TSOs' communication network. The new infrastructure will be called COMO – Communication Network for Market and Operations – and will support multiple services, including, as a priority, the Operational Planning Data Environment/Common Grid Model. The COMO network roll-out and migration will be phased throughout 2019, 2020 and 2021 to smoothen the associated budget impact for ENTSO-E.

DATA EXCHANGE STANDARDS: ENSURING PAN-EUROPEAN INTEROPERABILITY

Standards facilitate cross-border exchange and allow for efficient and reliable identification of different objects and parties relating to the internal energy market and its operations. Standards support the implementation of network codes in various ways and several of ENTSO-E's IT tools and data environment, such as the OPDE, rely on standards.

ENTSO-E maintains the Electronic Data Interchange library, which regroups documents and definitions for the harmonisation and implementation of standardised electronic data interchanges between actors in the electrical industry in Europe.

Main standardisation activities in 2019 will include the following:

- Development of the Common Information Model (CIM) and implementation guides to support data exchanges required from the network codes. This will include support to the Common Grid Model (SOGL, CACM), coordinating operational security analysis (SOGL), outage planning coordination (SOGL) and capacity calculation (SOGL, CACM). A gap analysis of network codes will also be performed, to ensure their full coverage by the standards.
- Development of the CIM and implementation guides to support the data exchange required for the TYNDP and for the Pan-European Market Model process
- Continue the ongoing work on the international standards IEC 62325 series (CIM for Market), including developing the UML model for the European market profile, defining the core components needed and generating the relevant documentation for IEC standards
- Maintain the harmonised role model for the European electricity market in order to ensure a common vocabulary and views on the different roles
- Extract a European electricity market role model based on the network codes and guidelines
- Support future data exchange requirements between TSOs and DSOs.

CYBER-SECURITY

Protecting TSOs' systems and network operation tools against cyber-attacks is obviously of paramount importance for the security of electricity supply. For several years now, ENTSO-E has been acting as a platform for sharing the best practice between TSOs. ENTSO-E also supports operational training, with the organisation of a yearly 'red team blue team' training event attended by TSOs' operational staff.

ENTSO-E is in the process of re-assessing its cyber-security strategy, to further support TSOs and RSCs in the identification, prevention, detection and restoration from cyber-attacks. In June 2018 ENTSO-E approved the CGM Security Plan, which defines the cyber-security requirements of the OPDE platform. Future additional activities may focus on risk management, the development of guidelines and recommendations for IT architecture, training and resilience building.

IT tools instrumental in the implementation of network codes, such as the Common Grid Model and the European balancing platforms, will also have to apply a set of common standards. Following a risk assessment, ENTSO-E will develop architectural guidelines and recommendations to secure these IT systems.

In addition, ENTSO-E is participating in the European Commission Smart Grid Task Force, EG 2 – Working group on Cybersecurity. The working group focuses on the energy sector and prepares the ground for a possible future network code on cyber security, which would cover minimum common requirements on cyber-security for TSOs.

4. DEVELOP THE DSO PARTNERSHIP

The energy transition corresponds to a change from a centralised system to a more complex integrated electricity system, with decentralised and centralised co-existing. The new system also sees new actors, like aggregators, active customers, demand side response and decentralised flexibility. The TSO-DSO interface has to be redefined.

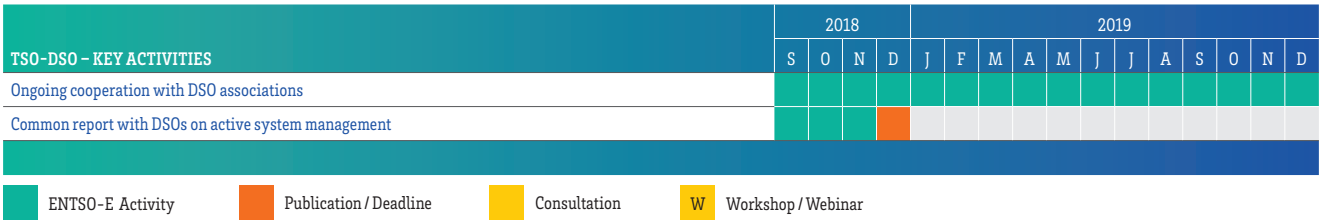

Figure 15: TSO-DSO key activities

A key area for cooperation is active system management and the coordinated use of distributed flexibility. Storage, distributed generation and customer participation through demand-side response have the potential to generate new services for the grid and the system. These are known as distributed flexibilities, and they will be key to efficiently managing the electrical system of the future and developing new market products. A common report with DSOs on active system management is planned to be released by early 2019, aiming to define the use of distributed flexibilities in active system management and analyse the interactions between TSOs, DSOs and market parties, in particular for balancing and congestion management. This report will issue recommendation and assess whether common European guidelines will be required.

The core question being addressed is the interaction between balancing the electrical system and managing congestions on the grid. TSOs and DSOs work together to understand their respective challenges and responsibilities towards creating an internal energy market (IEM). Several expert workshops, some of which also involved stakeholders, were conducted to share best practices, define upcoming challenges and design possible solutions. These exchanges will feed into the final report.

In addition to the above, ENTSO-E contributes to the European Commission Expert Group on demand side response, under the Smart Grid Taskforce, which focuses on the deployment of explicit demand-side response in Europe, contractual arrangements between different players and market solutions for accessing and using distributed flexibilities.

A TSO-DSO Network Code/Guideline Implementation Group, set up in Q3 2018 under the TSO-DSO Platform chaired by the European Commission, will discuss issues of interest to DSOs related to the implementation of network codes.

Organising the cooperation between ENTSO-E and the future EU DSO Entity

Until now, cooperation between TSOs and DSOs has involved ENTSO-E and the four associations representing DSOs at European level: EDSO for Smart Grids, CEDEC, Geode and Eurelectric. All five associations have taken part since 2015 in a TSO-DSO platform hosted by the European Commission. The creation of the EU DSO Entity, as foreseen in the Clean Energy Package, triggers a need for a new architecture for the cooperation between TSOs and DSOs.

ENTSO-E is reviewing its internal framework for addressing TSO-DSO issues, with the replacement by 2019 of the existing TSO-DSO project group, set up on a temporary basis, by a permanent steering group for TSO-DSO cooperation supported by several taskforces.

Once it is established, ENTSO-E will cooperate with the EU DSO Entity to set the guiding principles of its interaction with ENTSO-E and the main areas of interaction.

5. COORDINATE AND FACILITATE REGIONAL DEVELOPMENT

Cooperation at regional level is a building block for ensuring security of supply and implementing the Internal Energy Market. The development of variable generation and increased interconnections render regional coordination among TSOs more important than ever. Regional Security Coordinators (RSCs) are TSOs' answer to the coordination challenge.

REGIONAL SECURITY COORDINATORS: LEVERAGING THE POWER OF REGIONS

RSCs are entities owned and appointed by TSOs to fulfil five tasks. Through their recommendations to TSOs, RSCs contribute to increasing efficiency in system operation; minimising risks of wide area events, such as brownouts or blackouts; and lowering costs through maximised availability of transmission capacity to market participants. (For the detailed implementation status of the five tasks, see in Chapter 1 under System Operation Guideline.)

A multilateral agreement signed in 2015 by ENTSO-E and TSOs made it mandatory for ENTSO-E members to participate in RSCs or to contract the five tasks from them. The agreement also ensured RSCs develop in a harmonised way under ENTSO-E's coordination, regarding their tools, standards and methodologies. The System Operation Guideline, that entered into force in September 2017, formalised the role of the RSCs and made it legally binding for TSOs to procure at least the five core tasks from one of the RSCs.

Five RSCs are now operational, covering the whole of Europe.

Regional Security Coordinators and the Clean Energy Package

The Electricity Regulation recast includes a number of tasks and deliverables, for ENTSO-E and RSCs, that may be addressed after the date of entry into force of the Package.

The draft Electricity Regulation will most likely task ENTSO-E with adopting a framework for the cooperation and coordination between RSCs (Art. 27.1.e), as well as reporting on the establishment of the RSCs (Art 27.2) and a proposal defining the system operation region covered by each RSC (Art. 27.1 f).

In addition, the draft Electricity Regulation (Art. 34) will likely foresees new tasks for RSCs beyond the six currently specified in the network codes and guidelines, while Art. 5 of the draft Risk Preparedness Regulation involves RSCs in the elaboration of electricity crisis scenarios at regional level (read more in Chapter 2 under System adequacy).

SYSTEM ANALYSIS OF A POSSIBLE SYNCHRONISATION OF BALTIC COUNTRIES TO THE CONTINENTAL EUROPE SYNCHRONOUS AREA

The power transmission systems of Estonia, Latvia and Lithuania are embedded in the IPS/UPS systems with numerous synchronous interconnections to Russia and Belarus. In addition, the Baltic States are connected via DC links to Sweden (NordBalt) and Finland (Estlink 1 and Estlink 2) and Poland (LitPol).

PSE, Litgrid, AST and Elering launched a technical study on the possibility to synchronize the Baltic States via Poland with Continental Europe and desynchronize from IPS/UPS. The findings of this analysis were presented to ENTSO-E's Regional Group Continental Europe (RGCE) end of 2018 and the RGCE will trigger an in-depth analysis according to the established procedures for system extension requests.

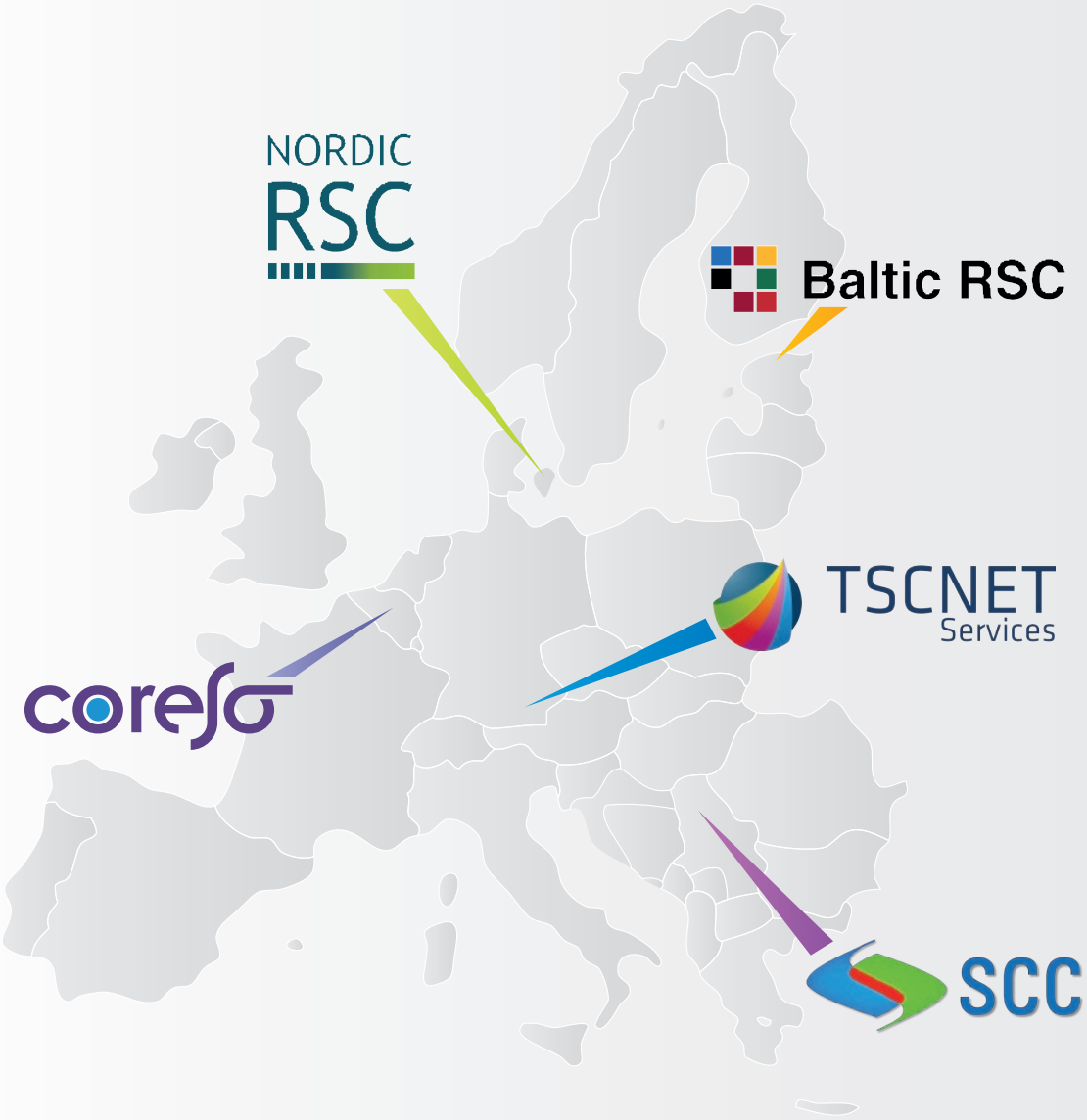

Figure 16: Five RSCs covering the whole of Europe

6. DELIVER ON TRANSPARENCY

TSOs, as regulated monopolies working for society at large, are bound to implement and committed to high transparency standards. This translates into making the highest quality information available, and into constant engagement with stakeholders, regulators and the general public.

ENTSO-E collects TSOs' data, via its Transparency Platform and a number of yearly publications, including the Statistical Factsheet (Q2), the Overview of Transmission Tariffs in Europe (Q2), or the ITC Transit Losses Data Report (Q3). Network datasets are also made available upon request (see Online Application Portal for Network Datasets).

ENTSO-E'S TRANSPARENCY PLATFORM: DATA FOR MARKET PARTICIPANTS AND MORE

ENTSO-E's Transparency Platform (Art. 3, Regulation 543/2013) centralises data relating to the generation, transportation and consumption of electricity at European level. The data is collected from data providers, including TSOs and other qualified third parties. Depending on the users' needs, this data can serve various purposes, such as market analysis, research or trading. The Platform is also instrumental for the monitoring and regulation of power markets. In mid-2018 it had over 11000 users, of which 2000 download data on a daily basis. The system processes about 10 million files per year. Start-ups and new players increasingly use the Platform's wealth of data for delivering more value to customers, for example through shedding light on life-CO_2 emissions by country, wind generation and more.[4]

The Transparency Platform is undergoing a transformation to become a user-friendly, market-serving platform centralising data related to the entire internal electricity market. This development was triggered by new obligations, such as reporting provisions in network codes, and by the feedback received from users pointing to the need to increase data quality and readability.

The Transparency Platform has been updated to be in line with the requirements stemming from the updated Manual of Procedure (version December 2016). The year 2018 was a transitory year during which the data providers updated their systems too. In 2018 the Platform was compatible with both Manual of Procedures (old and updated).

Regarding data quality, several improvements have already been implemented over 2017 and 2018, including updates on several data items and improved workflows to address cases of missing data, questionable data quality and delay of publication. ENTSO-E members entered into a Memorandum of Understanding (MoU) setting requirements for the quality of the data provided by TSOs and for the checks by ENTSO-E of these requirements. The MoU also ensures that TSOs' data can be re-used by Transparency Platform users without any restriction. The MoU covers data provided by TSOs but also by Transmission Capacity Allocators, such as the Joint Allocation Office (JAO). ENTSO-E and the JAO, which is among the largest data provider to the Platform, are discussing ways of improving data quality further. ENTSO-E intends to regularly inform stakeholders, NRAs and ACER, e.g. within the ENTSO-E Transparency Platform User Group, on the progress in the improvement of the quality of the data on the Transparency Platform. All of this is in line with the new Data Policy recently adopted by ENTSO-E (see below).

In parallel, ENTSO-E, in close cooperation with the Transparency User Group, is working on the design of the new interface to make the Platform more user-friendly. Some parts went live in 2018, the work will continue in the first half of 2019.

ENTSO-E will continue improving the Platform in 2019 and over the following years, based on regulators and stakeholders input, received in particular via the Transparency Platform User Group.

4 Tomorrow electricity map as one example for life CO_2 emissions https://www.electricitymap.org/?page=map&solar=false&remote=true&wind=false, or WindEurope

ENTSO-E DATA POLICY AND OPEN DATA LICENSING

To satisfy growing stakeholder expectations for transparency on grid and market data, ENTSO-E aims to have a systematized approach towards the availability of fit-for-purpose quality data to third parties.

ENTSO-E adopted a new Data Policy at the end of 2017, aiming to increase data quality and data re-use with the ultimate objective of ensuring, when relevant, open data license. ENTSO-E is implementing this policy first and foremost on the Transparency Platform, as explained above. ENTSO-E will continue implementing it in 2019.

TRANSPARENCY OF CAPACITY CALCULATION BY TSOS

Several legal texts provide for transparency in capacity calculation: Regulation 714/2009, Regulation 543/2013, but also the CACM and FCA regulations and the SO Guideline. In 2018 ENTSO-E investigated the status of data available to market parties in different CCRs and possible new indicators. ENTSO-E also consulted stakeholders on their expectations, which are to understand, ex ante, how capacities are calculated and optimised and, ex post, what limited the capacity, how the grid was used and which measures were taken to mitigate contingencies.

Several improvement opportunities were identified, for TSOs and CCRs regarding indicators and for ENTSO-E to improve stakeholders' access to the data. ENTSO-E is currently developing an action plan. Future actions may include measures to harmonise access to the data, potentially by including additional data on ENTSO-E's Transparency Platform. Transparency and timely implementation of the above-mentioned network codes are seen as paramount for achieving the optimal integration of the European market.

REVIEWED PUBLIC CONSULTATION PROCEDURES

To deliver on ENTSO-E's tasks and responsibilities, the expertise of stakeholders is as indispensable as that of TSOs. ENTSO-E's success depends on effective public stakeholder involvement and consultations. ENTSO-E has gradually enhanced its stakeholder engagement beyond the requirements set by the Third Energy Package. The independent Advisory Council, set up in 2016, gives opinions on ENTSO-E's work programme and deliverables (its minutes and recommendations to ENTSO-E are available here).

Regulation (EC) 714/2009, and the Electricity Regulation recast, require ENTSO-E to conduct "an extensive consultation process in an open and transparent manner". ENTSO-E's Consultations Process, issued in 2011, further details how ENTSO-E organises its public consultations in practice, including timelines and scope, and how stakeholders can take part. This document focuses mostly on the network codes deliverables. However, as ENTSO-E's tasks have increased in the past years in quantity and complexity, the current consultation process is no longer adequate and requires a full update. The update will consider the stakeholder feedback received on our consultation processes and the experience we have gained over the past few years.

ENTSO-E has informally started collecting feedback on our consultation practices through the independent Advisory Council. We continue these exchanges with stakeholders through the Council and beyond it – encompassing all stakeholders – until early 2019.

Based on this feedback, ENTSO-E will draw up a full draft of our new consultation policy. This update will also consider all required changes to ENTSO-E's mandates and responsibilities that are still subject to adoption in the CEP.

As soon as the CEP is adopted in 2019, ENTSO-E will run through all formal adoption steps of its new consultation policy, including an extensive formal public consultation and submission of the document to the European Commission and ACER.

ANNEX 1:
ENTSO-E IS EUROPE AT WORK

ENTSO-E provides a forum in which European power transmission system operators work together, with stakeholders and EU institutions, to find forward-looking solutions to common problems, anticipate and adapt to future challenges, share experiences, best practices and innovation to develop a cleaner, cost-effective and secure power system for Europeans.

ENTSO-E is a top down and bottom up association that interacts with a multiplicity of stakeholders.

The Assembly is the highest body of the association. It gathers the 43 CEOs of ENTSO-E's member TSOs and adopts the strategic orientations of the association. The Board, elected by the Assembly, gathers 12 members. It defines the strategic orientations of the association to be agreed by the Assembly and oversees the overall work of the association.

An independent Advisory Council, composed of representatives of important institutional and business stakeholders of ENTSO-E, provides opinions on the association's work programme and achievements.

The structure of expertise is organised through three vertical thematic committees, plus three horizontal committees/groups relating to digital, research and innovation, and legal and regulatory matters.

Vertical structures

The three vertical committees deliver the work programme through projects, mandated work products, and policy suggestions, supported by the Secretariat and over 90 working groups. They are:

1) **'System Development'** – developing a strong and adequate grid. The System Development Committee coordinates network development at European and regional level and prepares the Ten-Year Network Development Plans, the regional investment plans and adequacy forecasts. It also coordinated the drafting of the connection network codes and supports their implementation.

2) **'System Operations'** – guaranteeing secure and reliable power system operations. The System Operations Committee is in charge of technical and operational standards, including operational network codes, as well as of power system quality. It ensures compliance monitoring and develops tools for data exchange, network models and forecasts, and oversees the grid security from physical, organisational and cyber security points of view.

3) **'Markets'** – promoting a fully developed internal electricity market. The Market Committee works towards an integrated and seamless European electricity market and is in charge of developing methodologies, mostly in the context of network codes, and innovative solutions for cross-border congestion management, integration of balancing markets and ancillary services. It also oversees the inter-TSO compensation mechanism.

Horizontal structures

4) 'Research, Development, and Innovation' Committee – ensures the effective implementation of ENTSO-E's mandate in the area of innovation and R&D, largely focusing on strong and smart grids and the empowerment of consumers. It also steers ENTSO-E's leading participation in several EU large scale research projects. It acts as an innovation hub, fostering inter TSO cooperation on innovation projects and technologies. Finally, it encourages innovation exchanges between the TSOs and other business communities through a Business Network for Innovation @ENTSO-E.

5) 'Digital' – The Digital committee advises the Board on digital matters and ensures the sound, coherent and cost-effective technical management, development and operation of large scale IT projects enabling the link between the national, regional and pan-European levels. Flagship IT projects that are partly funded by the EU include the Common Grid Model and the Transparency Platform.

6) 'Legal and Regulatory Group' – ensures that ENTSO-E fulfils its legal mandates in accordance with the applicable requirements and with a high level of legal robustness. It also ensures legal consistency of ENTSO-E deliverables across the three vertical committees.

Under the supervision of the Secretary-General, the ENTSO-E Secretariat supports the delivery of ENTSO-E's strategic objectives. The Secretariat ensures consistency, horizontality and impact. Because of its role at the centre of the association and its location in Brussels, the Secretariat actively contributes to keeping the association at the cutting edge of policy thinking. It delivers targeted policy advice to support member TSOs. The Secretariat leads on outreach strategy, enhances ENTSO-E's dialogues and engagement with stakeholders and ensures optimal management of corporate services and support to the Secretary General, the Committees, the Board and Assembly.

ANNEX 2: RESOURCES

In assessing our resources requirements, we analysed the workload of the tasks required by our legal mandates. Additionally, resources are needed for policy work, communication activities, general management and support of the tasks performed by our main bodies and working groups. We emphasise project management practices and resources optimisation to ensure faster and better delivery.

Budget

ENTSO-E AISBL[5] is a non-for-profit organisation governed by Belgian law. Our financial resources come from our member TSOs.

ENTSO-E's budget for 2019 is €28,65 million, stable from 2018. This work programme was developed in coordination with ENTSO-E's budget for 2019 approved in December 2019, in a spirit of budgetary stability and sound management of the Association's resources.

Staff

Our human resources include permanent staff and secondment from TSOs as well as outsourced "on site" services (such as the IT support services). This is in addition to the numerous TSO staff members who bring their expertise to the Association via the approx. 100 bodies (Assembly, Board, Committees and subgroups).

At the end of 2018 ENTSO-E had 104 staff (or full-time equivalent, FTEs). This number is expected to remain stable in 2019.

5 International not-for-profit association (Association internationale sans but lucratif)

GLOSSARY

Acronym	Definition
aFRR	Automatic Frequency Restoration Reserves
AISBL	Association Internationale Sans But Lucratif (International Not-For-Profit Association)
ATOM Network	All TSO network for non-real time Operational and Market-related data
BRP	Balancing Responsible Parties
BSP	Balancing Service Provider
CACM	Capacity Allocation and Congestion Management
CBA	Cost-Benefit Analysis
CCR	Capacity Calculation Region
CENELEC	European Committee for Electrotechnical Standardisation
CGM	Common Grid Model
CGMES	Common Grid Model Exchange Standard
DCC	Demand Connection Code
DSO	Distribution System Operator
EB	Electricity Balancing
ENTSOG	European Network of Transmission System Operators for Gas
ETIP SNET	European Technology and Innovation Platform Smart Networks for Energy Transition
FCA	Forward Capacity Allocation
HVDC	High-Voltage Direct-Current
IEC	International Electrotechnical Commission
IEM	Internal Electricity Market

Acronym	Definition
ICS	Incident Classification Scale
IGM	Individual Grid Model
JAO	Joint Allocation Office
MAF	Mid-term Adequacy Forecast
mFRR	Manual Frequency Restoration Reserves
MRC	Multi Regional Coupling
MoU	Memorandum of Understanding
NEMO	Nominated Electricity Market Operator
NRA	National Regulatory Authority
OPDE	Operational Planning Data Environment
PCI	Project of Common Interest
Prosumers	Neologism that designates producers and consumers
RES	Renewable Energy Sources
RfG	Requirements for Generators
RGCE	Regional Group Continental Europe
RR	Replacement Reserves
RSC	Regional Security Coordinator
SAP	Single Allocation Platform
SET Plan	Strategic Energy Technology Plan
TSO	Transmission System Operator
TYNDP	Ten-Year Network Development Plan
XBID	Cross-Border Intraday

European Network of
Transmission System Operators
for Electricity

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