

ENTSO-E

Annual Work Programme

ENTSO-E's work on legal mandates – 2021 Edition



About ENTSO-E

ENTSO-E, the European Network of Transmission System Operators for Electricity, represents 42 electricity transmission system operators (TSOs) from 35 countries across Europe. ENTSO-E, which was established and given legal mandates by the EU's Third Legislative Package for the Internal Energy Market in 2009, aims to further liberalise the gas and electricity markets in the EU.



Contents

Introduction	4
1 System Operation	5
System Operation Guideline	5
Emergency & Restoration Network Code	5
Common Grid Model	5
European Awareness System	6
Risk Preparedness Regulation	6
Regional Coordination under SOGL and IEM Regulation	7
2 Market	10
Capacity Allocation and Congestion Management Guideline	10
Forward Capacity Allocation Guideline	11
Electricity Balancing Guideline	11
Capacity Mechanisms	11
Use of Congestion Income Methodology	12
Monitoring	12
Inter Transmission System Operator Compensation	12
3 System Development	14
Europe's Ten-Year Network Development Plan	14
Adequacy	16
Grid Connection Network Codes	18
4 Transparency Regulation	20
ENTSO-E Transparency Platform	20
5 Research & Development	22
R&D Roadmap	22
6 TSO, DSO and Demand Side Flexibility	23
7 Cybersecurity, Interoperability and Data	24
Cybersecurity	24
Interoperability & Data	24
Acronyms	26

Introduction

This Annual Work Programme covers the period from January to December 2021. It focuses on the legally mandated tasks given to ENTSO-E directly by EU regulation or through decisions taken by All Transmission System Operators (TSOs) or TSOs of a region mandating their tasks from the EU regulation to ENTSO-E. ENTSO-E continues to support European policy objectives such as the Green Deal and therefore its work programme may include initiatives as relevant to ENTSO-E objectives.

The activities foreseen in this work programme will be delivered by the ENTSO-E secretariat and the 42 members of ENTSO-E, whose staff provides the required expertise to the Association and who provide the Association with financial resources. The successful implementation of this work programme is also influenced by the input provided by stakeholders i.e. via the independent Advisory Council, via the Network Codes European Stakeholder Committees, via other stakeholder groups, and via the public consultation processes.

In accordance with Art. 32(2) of the IEM Regulation, the AWP 2021 has been published for consultation from 01 July to 14 August 2020. Following the public consultation, It is expected to be submitted to the Agency for the Cooperation of Energy Regulators (ACER) for opinion in October 2020.

Chapter 1 describes the System Operations tasks, Chapter 2 explains the Markets tasks, Chapter 3 contains the System Development tasks, Chapter 4 details the work on the Transparency Regulation, Chapter 5 describes the Research & Development tasks, and Chapter 6 explains the upcoming tasks on cybersecurity, interoperability and data. Furthermore, the individual chapters are linked with a colour code to their respective regulation:

REGULATION (EU) 2019/943 on the internal market for electricity

REGULATION (EU) 2019/941 on risk-preparedness in the electricity sector

REGULATION (EU) No 347/2013 on guidelines for trans-European energy infrastructure

REGULATION (EU) No 543/2013 on the submission and publication of data in electricity markets

Commission Regulation (EU) No 838/2010 of 23 September 2010 on laying down guidelines relating to the inter-transmission system operator compensation mechanism

1 System Operation

System Operation Guideline

The COMMISSION REGULATION (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (SOGI) sets out harmonised rules on how to ensure security of supply through efficient grid operation in a variable renewables paradigm. The implementation of the SOGI and the methodologies that stem from it entails several tasks for TSOs at the pan-European, synchronous area, and regional levels. Work at the pan-European level is facilitated by ENTSO-E, whereas synchronous areas' activities are organised by TSOs in the respective regional groups.

Starting from October 2020 and then every 6 months, ENTSO-E will deliver data to ACER to satisfy the agreement for data provision for Network Codes and Guidelines Monitoring (SOGI Annex 2). According to Art. 65 SOGI, ENTSO-E will publish the common list of year-ahead scenarios by 15 July.

ENTSO-E continues to fulfil the reporting obligations according to Art. 15 SOGI for the Incident classification scale and Art. 16 SOGI for the Load Frequency Control Annual Report. Furthermore, ENTSO-E will deliver the Annual report on regional coordination assessment in September 2021 in accordance with Art. 17 SOGI. Reporting obligations also arise from Art. 44(1) of the Coordinated security Analysis Methodology (CSAM) which requires a report to be delivered on the status on probabilistic risk management approaches and maturity. Several obligations for transparency and reporting according to the IEM Regulation will be initiated in 2021 for delivery by mid-2022, i.e. Art. 41(2) on the transparency of all relevant documentation on the websites of ENTSO-E and RCCs, Art. 46(3) on the annual report by regional coordination centres (RCCs) on the outcome of the continuous monitoring, and Art. 30(2) on the ENTSO-E report to ACER on the shortcomings identified regarding the establishment and performance of RCCs.

Emergency & Restoration Network Code

The legal mandates from the COMMISSION REGULATION (EU) 2017/2196 of 24 November 2017 establishing a network code on electricity emergency and restoration have been fulfilled. In 2021, TSOs pursuing national implementation and

the developments at Member States level will be communicated regularly through the NC ER Active Library and the System Operations Stakeholders Committee.

Common Grid Model

The Common Grid Model (CGM) is the dataset, supported by IT/communication architecture that allows for the coordination of power flows in Europe. The CGM finds its legal basis in Art. 64 SOGI, Art. 17 of the COMMISSION REGULATION (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (CACM) and Art. 18 of the COMMISSION REGULATION (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocation (FCA). The CGM, and its IT data exchange system, the Operational Planning Data Environment (OPDE),

are a prerequisite for several services harmonised in the Network Codes, including coordinated capacity calculation, operational security analysis, outage planning coordination and adequacy analysis. Regional Security Coordinators (RSCs) merge Individual Grid Models covering timeframes spanning from one year before real time to one hour before real time into a pan-European Common Grid Model and feed the merged CGM back into the system.

The CGM Programme is a major project for ENTSO-E. The Programme Schedule for 2021 is planned to manage multiple key activities:

- › Finalisation and approval of Business Requirement Specifications (BRS)
- › Scoping, approval, design and delivery of IT solutions for BRS
- › Maintenance and operation of existing IT infrastructure, including the OPDE and communication network
- › Roll-out of the Physical Communications Network (PCN) in line with the programme schedule
- › Implementation of the connection between the Pan-European Verification Platform (PEVF) and the OPDE
- › Stakeholder management with TSOs and RSCs to coordinate Readiness activities for a Go-Live CGM Build Process
- › CGM Build Process Test Planning and Implementation
- › Alignment with the RSC Project Group for CGM User Group business requirements

Merging of the Electronic Highway to the Physical Communications Network

In 2017, TSOs decided to merge the Physical Communication Network (PCN) and Electronic Highway (EH) networks. This merge will create a single physical infrastructure that will support TSO requirements from all different business areas (System Operations, Markets etc.) for real and non-real

time data exchanges in the form of different services, prioritising the OPDE/CGM. The target date for the first effective exchange of real-time data is August 2021 to allow TSOs and RSCs to check their level of compliance with the applicable security requirements.

European Awareness System

ENTSO-E will continue with the monitoring, compliance and development of service provision of the European Awareness System (EAS). ENTSO-E is also in charge of EAS system development and upgrades in collaboration with hosting

entities and the software supplier. For 2021, key activities planned are the deployment of security upgrades and a patch release for the databases.

Risk Preparedness Regulation

Following the successful approval and implementation of the Methodology to Identify Regional Electricity Crisis Scenarios during 2020, as per Article 6 of REGULATION (EU) 2019/941 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 5 June 2019 on risk-preparedness in the electricity sector, it is expected that further activities in this regard during 2021 will be limited to executing the provisions of Articles 8 and 16 of the Methodology, i.e.:

- › Within 12 months after the publication of the report (by 6 September 2021), ENTSO-E shall publish a report assessing whether there would be the need for the development of computational methods and tools to be used as a pan-European method for the assessment of regional electricity crisis scenarios.

- › ENTSO-E shall propose the use of a scenario-specific method (or methods) for evaluating the likelihood and impact measures relevant to the particular scenario not later than six months prior to the mandatory update of the regional crisis scenarios.
- › Methodology refinements and developments which follow from the post implementation review.

The approved methodology stipulates that the regional crisis scenarios must be updated at least every four years.

Regional Coordination under SOGL and IEM Regulation

ENTSO-E provides a platform for coordinating regional deliverables which affect neighbouring regions and where

addressing the matter at the pan-European level is more efficient than doing so bilaterally

Transition from RSCs to RCCs

In 2021, the work continues on the implementation of the five mandatory services by RSCs defined in Art. 77 SOGL. ENTSO-E contributes to the consistency and efficiency of implementation of the coordinated security analysis by CCRs pursuant to Art. 76 SOGL through the development of requirements and methodologies for cross-regional aspects. ENTSO-E expects ACER's decision on an amended version of the coordinated security analysis methodology according to Art. 75 SOGL in the first half of 2021.

By 1 July 2022, the RCCs shall be established as legal entities and be operational according to Art. 35 of the IEM Regulation. ENTSO-E will support the transition from RSCs to RCCs in accordance with the enhanced TSO regional coordination principles and will develop a framework for cooperation and coordination between RCCs (Art.30 of the IEM Regulation). During 2021, ENTSO-E will make proposals for each of the applicable new RCC tasks according to Art. 37 of the IEM regulation, which are not already covered by Network Codes or guidelines.

6 RSCs

- Coreso (2008)
- TSCNET (2008)
- SCC (2015)
- Nordic RSC (2016)
- Baltic RSC (2016)
- SEE RSC (2019)

■ Services obtained from several RSCs

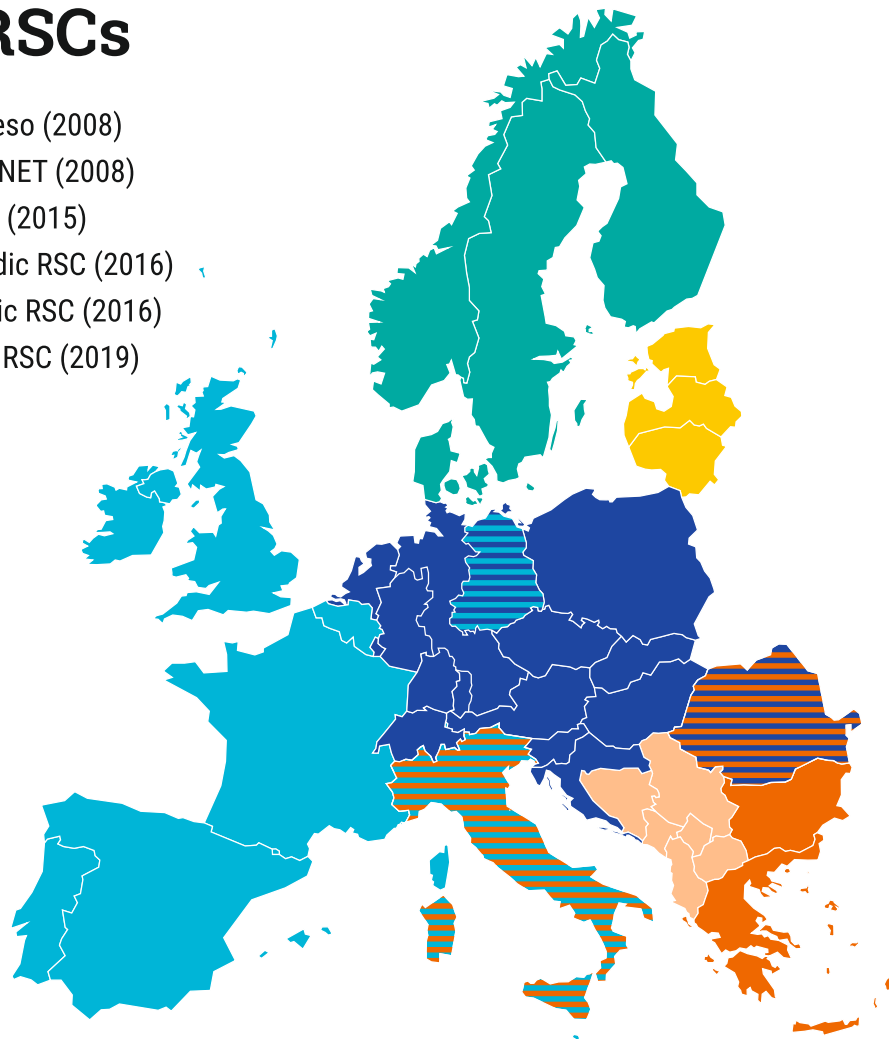


Figure 1: Geographical scope of the Six Regional Security Coordinators established according to SOGL

Tasks of Synchronous Areas

Depending on the specific arrangements with each Regional Group corresponding to Synchronous Areas (SAs), ENTSO-E supports on an ad-hoc basis or serves the Region on continuous basis.

ENTSO-E supports the Regional Group Continental Europe with implementation processes. In 2021, financial settlement for the unintentional deviations of the load-frequency control between the TSOs of Continental Europe will be introduced according to the methodologies developed pursuant to Art. 50(3) and Art. 51(1) of the COMMISSION REGULATION (EU) 2017/2195 of 23 November 2017 establishing a guideline

on electricity balancing (EBGL). In addition, work continues on the coordination of short- and long-term measures to mitigate the frequency deviations in Continental Europe, notably the deterministic frequency deviations related to the change of scheduling programmes at the early morning and late evening hours.

ENTSO-E continues to support the project of synchronisation between the Baltic TSOs and the SA Continental Europe. In 2021, the relevant procedures will be elaborated, and essential system checks for the synchronous operation will be performed.

Coordination with 3rd country TSOs

The existing operational agreements for present or future synchronous operation with the TSOs of Turkey (TEIAS), Ukraine (Ukrenergo) and Moldova (Moldelectrica) are being updated and will re-enter into force in 2021 to be compliant with the updated Operational Framework of Continental

Europe TSOs. In 2021, based on the results of ongoing studies, a decision will be made regarding the measures to be taken to ensure the dynamic stability of the interconnections with Ukraine and Moldova and whether it will be a pure synchronous or a hybrid AC/DC one.



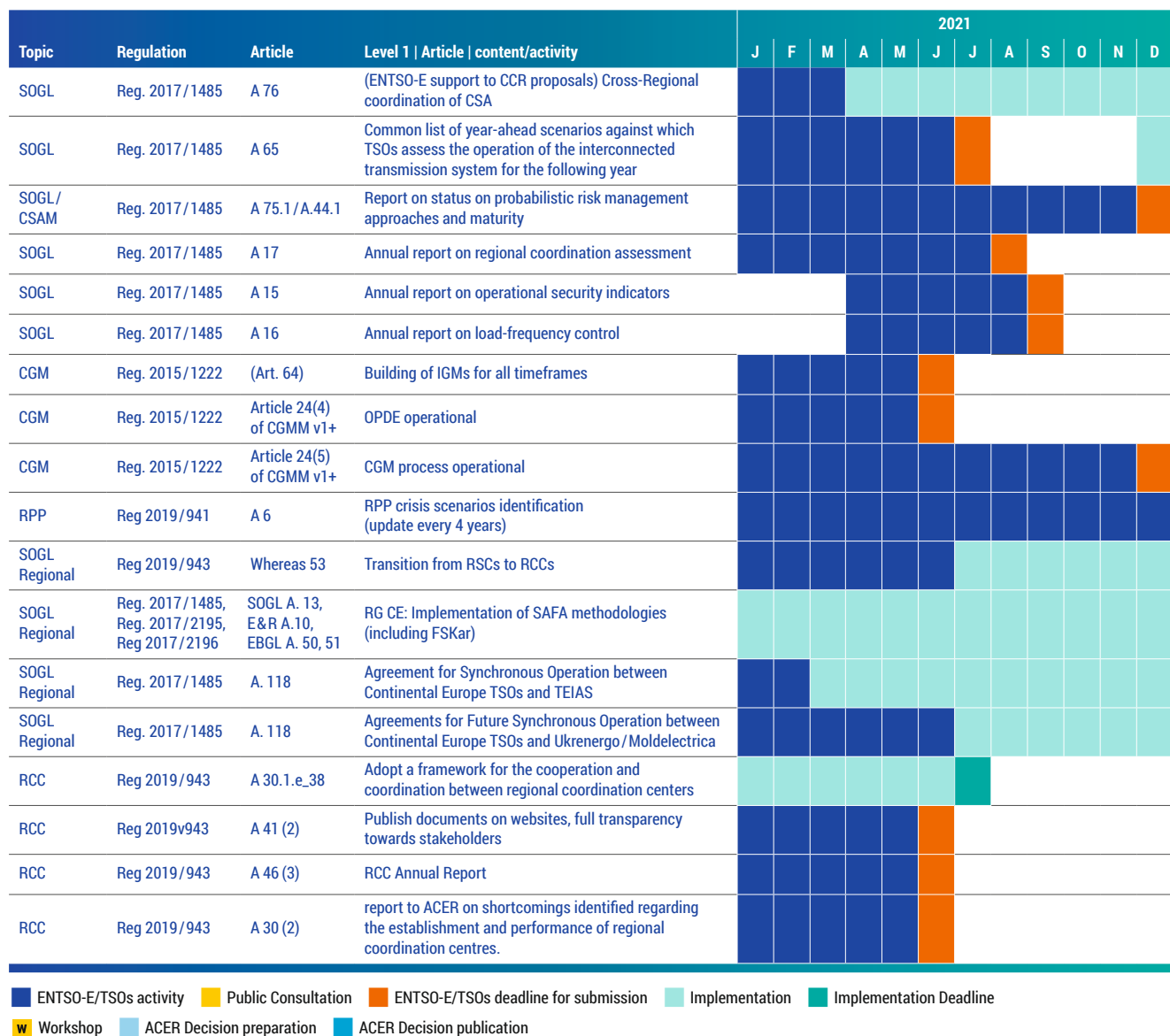


Figure 2: System Operation

2 Market

Capacity Allocation and Congestion Management Guideline

Implementation of the CACM is almost complete at the pan-European level. Nevertheless, implementation of the decisions on methodologies is still ongoing.

- › Single Day ahead Coupling and the Single Intraday Coupling governance (Art.10 CACM): The go-live of the governance structure is expected in 2021.
- › Intraday Auctions: The work on Intraday Auctions according to the decision from ACER on Pricing of intraday capacity (Art. 55 CACM regulation) will continue in 2021.
- › Capacity Calculation Methodology Art. 21(4) CACM: ENTSO-E will coordinate the work of All TSOs on a proposal for the transition towards a harmonised capacity calculation methodology for the flow-based and for the coordinated net transmission capacity approach during 2021.
- › Cost sharing Art. 74 (7) CACM: ENTSO-E will coordinate work by All TSOs of each capacity calculation region (CCR) to further harmonise the redispatching and countertrading cost sharing methodologies between the CCRs in 2021.
- › Algorithm: In accordance with the DECISION No 04/2020 OF THE EUROPEAN UNION AGENCY FOR THE COOPERATION OF ENERGY REGULATORS of 30 January 2020 on the nominated electricity market operators' (NEMOs) proposal for the price coupling algorithm and for the continuous trading matching algorithm, also incorporating TSOs' and NEMOs' proposals for a common set of requirements (Art. 37 CACM) and the deadlines set in the IEM regulation, 15-minute products will be available in the intraday market by 1 January 2021 in those Bidding Zones where the Imbalance Settlement Period is already set at 15 minutes. Work on the implementation of 15-minute products in Day Ahead will continue in 2021. All TSOs and all NEMOs will review the operation of the price coupling algorithm and continuous trading matching algorithm according to Art. 37.6 CACM and submit the report to the Agency early 2022.
- › Capacity Calculation Regions: The work on CCR assessment and definition might continue in 2021, due to new interconnectors coming into operation and the General Court ruling of 24 October 2019 (Case T 333/17 and case T-332/17).
- › Technical Report (Art. 14[2] of the IEM Regulation): In Q3 2021, ENTSO-E will submit a report on structural congestions and other major physical congestions between and within bidding zones in the years 2018 to 2020 including the location and frequency of such congestions. In addition, the technical report shall assess the fulfilment of the linear trajectory of cross-zonal trade capacity pursuant to Art. 15 or the minimum capacity pursuant to Art. 16 of the IEM regulation.
- › Bidding zone review (Art. 14[6] of the IEM regulation): In 2021, ENTSO-E will coordinate the Bidding zone review undertaken by the bidding zone review regions, coordinate a common data set and scenarios, facilitate stakeholder engagement, organise consultations and ensure consistency.
- › Implementation of the 70 % obligation in capacity calculation (Art. 16 of the IEM regulation): ENTSO-E will continue in 2021 to coordinate the implementation and the monitoring of the obligation among TSOs, ACER, National Regulatory Authorities (NRAs) and the EC.

Further to the implementation of the decisions, ENTSO-E expects in 2021 an amendment process of CACM to amend the market coupling operator (MCO) function.

Forward Capacity Allocation Guideline

Implementation of the FCA is almost complete at the pan-european level. The harmonised allocation rules

pursuant to Art. 51 FCA will be revised in 2021 according to the bi-yearly rhythm.

Electricity Balancing Guideline

For the full implementation of the EBGL, ENTSO-E will be active in 2021 on the following methodologies:

- › Co-optimised allocation process (Art. 40[1] EBGL): all TSOs proposed to perform an implementation impact assessment for the co-optimised allocation process. In 2021, ENTSO-E will continue investigating implementation aspects, such as linking between standard balancing capacity bids and between these and day-ahead market bids.
- › Cross-zonal capacity calculation within the balancing timeframe for the exchange of balancing energy or for operating the imbalance netting process (Art. 37[3] EBGL): During 2021, ENTSO-E will support the TSOs of the CCRs to develop a methodology for submission in December 2022.
- › Allocation process of cross-zonal capacity for the exchange of balancing capacity or sharing of reserves per timeframe (Art. 40, 41 and 42 EBGL): During 2021, TSOs will analyse harmonisation opportunities, which will serve as a basis for the proposal pursuant Art. 38(3) EBGL, to be submitted by December 2022.

All TSOs have endorsed four implementation projects to establish the European balancing energy platforms, i.e. the Platform for Replacement Reserves (RR), the Platform for manual Frequency Restoration Reserves (mFRR), the Platform for automatic Frequency Restoration Reserves (aFRR) and the Platform for Imbalance Netting (IN), in accordance with Art. 19-22 EBGL. In 2021, All TSOs will continue establishing the platforms, including a common capacity management module for all European balancing energy platforms, a common invoicing operator for all platforms, a common entity to perform the optimisation and settlement functions of the aFRR- and IN-Platforms and the publication of data of all platforms in the Transparency Platform (TP) to meet the legal deadlines. ENTSO-E will organise at least one annual public workshop and aims to identify further efficiency opportunities for the cooperation of the platforms.

Capacity Mechanisms

Art. 26 of the IEM regulation requires common rules, methodologies and terms of operation which aims to facilitate the implementation of direct cross-border participation in capacity mechanisms. Art. 26(11) requires a methodology for calculating the maximum entry capacity for cross-border participation as referred to in Art. 26(7), a methodology for sharing the revenues referred to in Art. 26(9), common rules for carrying out availability checks referred to in Article 26(10)(b), common rules for determining when a non-availability payment is due, terms of the operation of the registry as referred to in Article 26(10)(a), and common rules for identifying capacity eligible to participate in the capacity mechanism, as referred to in Article 26(10)(a) according to Art. 26(11). ENTSO-E submitted the methodologies referred to in Art. 26 (11) to ACER in July 2020.

In 2021, ENTSO-E will follow-up on the ACER decisions and on the implementation of the common rules and terms of operation. ENTSO-E will also setup, implement and ensure the operation of the Registry of capacity providers, a tool used for the storage, exchange and management of the data used in capacity mechanisms relevant to cross-border participation processes.

Use of Congestion Income Methodology

Congestion income represents the revenue TSOs collect when allocating (scarce) cross-zonal capacity to the market. Art. 19 of the IEM Regulation requires a methodology on the use of revenues for the purposes referred to in Art. 19(2) and the conditions under which those revenues may be placed on a separate internal account line for future use for those purposes, and for how long those revenues may

be placed on such an account line. The TSOs submitted the methodology to ACER in 2020. The ACER decision is expected by 5 January 2021. In 2021 ENTSO-E will continue supporting TSOs in this field, following-up the ACER decision and TSOs' implementation of the approved methodology at national level.

Monitoring

ENTSO-E is responsible for implementation monitoring as per the legal provisions included in each Network Code and Guideline. To fulfil this obligation, ENTSO-E elaborates monitoring plans and publishes reports. Following Art. 82(2)(b), Art. 31(2) CACM, Art. 63(1)(b) and 26(2) FCA, ENTSO-E will draft the 2021 Capacity Calculation and Allocation report and submit it by June 2021 upon ACER request. Furthermore, the yearly Market report will be submitted in June 2021. This report considers obligations from Art. 82(2)(a) CACM, Art. 63(1)(a) FCA and Art. 63(1)(b) EBGL. In accordance with Art. 82 CACM, All NEMOs and all TSOs develop a yearly report

on costs of establishing, amending and operating single day-ahead and intraday coupling. The publication of the report is expected by mid-2021. In accordance with Art. 59(2) (b) EBGL, ENTSO-E and the four balancing platforms shall publish by June 2021 a summary report on the progress made after the submission of the 2020 ENTSO-E Balancing report and update the performance indicators. The publication of the report on the costs of establishing, amending and operating the European balancing energy platforms (Art. 23[1] EBGL) is foreseen by mid-2021.

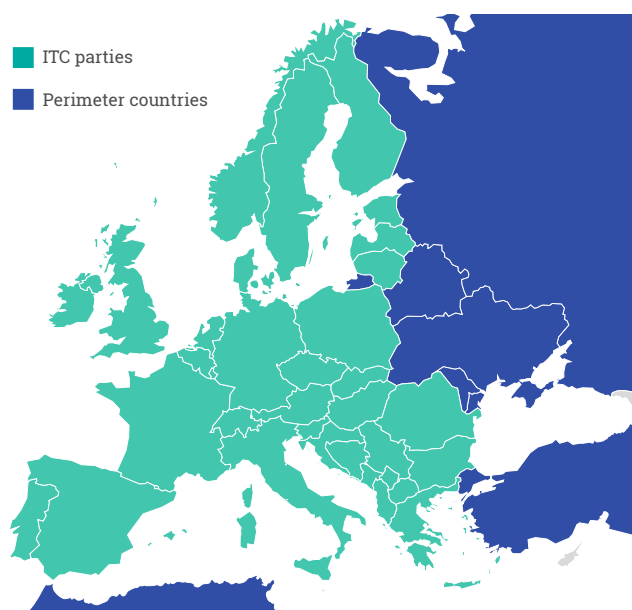
Inter Transmission System Operator Compensation

The Inter Transmission System Operator Compensation (ITC) Agreement is a multiparty agreement concluded between ENTSO-E and its member TSOs plus KOSST. It offers a single frame to compensate European TSOs for costs associated with hosting transit flows. The ITC mechanism is governed by Article 49 of the IEM Regulation. It is further specified by Commission Regulation (EU) No 838/2010 of 23 September 2010 on laying down guidelines relating to the ITC mechanism and a common regulatory approach to transmission charging.

The ITC covers both the utilisation of the grid infrastructure by transits and the losses caused by transits. The ITC Funds are financed by all importing and all exporting ITC Parties, including fees applied to the Perimeter Countries (Belarus, Moldova, Morocco, Russian, Turkey, Ukraine) for scheduled energy exchanges with ITC Parties.

Amprion and Swissgrid are the Data Administrators (DAs) of the ITC Agreement implementing the legislated tasks of ENTSO-E and its member TSOs. They are in charge of the Compilation Report, the Report on Capacity Allocated in a Manner not Compatible with Congestion Management Guidelines, the Report on the Snapshots, the Report on Transit Losses and monthly Preliminary and Final Settlement Notifications, which are then sent by ENTSO-E to ITC parties for their signature. Each DA covers a specific geographical area.

Every year the ITC parties provide and check the values for the calculation of the annual perimeter fee, such as cost of losses, vertical load and capacity allocated not compatible with CACM. ENTSO-E publishes the perimeter fee and the ITC Transit Losses Data Report on its website. In addition, ENTSO-E on behalf of the ITC parties provides information to ACER upon request, which ACER uses for their monitoring report on ITC.



Topic	Regulation	Article	Level 1 Article content/activity	2021											
				J	F	M	A	M	J	J	A	S	O	N	D
CACM	Reg. 2015/1222	A 10	Day-to-day management of the single day-ahead and intraday coupling												
CACM	Reg. 2015/1222	A 55.3	Intraday auctions in accordance to ACER decision on Intraday capacity pricing												
CACM	Reg. 2015/1222		CACM amendments												
DA	Reg 2019/943	A 8.4	Implementation of the 15 minutes products in ID and DA												
BZ	Reg 2019/943	A 14 (2)	Bidding Zone technical report												
BZ	Reg 2019/943	A 14 (6)	Bidding Zone review												
EBGL	Reg. 2017/2195	A 20.6	Implementation of mFRR Platform												
EBGL	Reg. 2017/2195	A 21.6	Implementation of aFRR Platform												
EBGL	Reg. 2017/2195	A 22.5	Implementation of IN Platform												
EBGL	Reg. 2017/2195	A 23.1	Report on costs of establishing, amending, operating European platforms												
EBGL	Reg. 2017/2195	A 40.1	Proposal for a methodology for co-optimised CZC allocation												
CM	Reg 2019/943	A 26.11.b	Methodology for sharing the revenues from CMs XB participation Income												
CM	Reg 2019/943	A 26.11.d	Common rules for determining when a non-availability payment is due;												
CM	Reg 2019/943	A 26.11.c	Common rules for the carrying out of availability checks referred to in point (b) of paragraph 10												
CM	Reg 2019/943	A 26.11.f	Common rules for identifying capacity eligible to participate in the capacity mechanism												
CM	Reg 2019/943	A 26.11.e	Draft terms of the operation of the registry as referred to in point (a) of paragraph 10												
CM	Reg 2019/943	A 26.15	CM registry: setup and operation of registry (IT tool)												
Use of Congestion Income	Reg 2019/943	A 19.4	Prepare Methodology for the Use of Congestion Income												
Monitoring CACM	Reg 1222/2015	A.31.2	Capacity Calculation and allocation report												
Monitoring CACM	Reg 1222/2015	A 82.2	Monitor the implementation of single day-ahead and intraday coupling/(a) progress and potential problems with the implementation												
Monitoring CACM	Reg 1222/2015	A 80.2	Annual CACM cost report												
Monitoring FCA	Reg 2016/1719	A.26.2	Capacity Calculation and allocation report												
Monitoring FCA	Reg 2016/1719	A 63.1	Monitor the implementation of forward capacity allocation and the establishment of single allocation platform/(a) the progress and potential problems with the implementation												
Monitoring EBGL	Reg 2017/2195	A 59.2.b	European report on integration of balancing markets (High-level)												
Monitoring EBGL	Reg 2017/2195	A 63.1	Monitoring of the implementation of the EB GL												

■ ENTSO-E/TSOs activity
 ■ Public Consultation
 ■ ENTSO-E/TSOs deadline for submission
 ■ Implementation
 ■ Implementation Deadline
 W Workshop
 ■ ACER Decision preparation
 ■ ACER Decision publication

Figure 3: Market

3 System Development

Europe's Ten-Year Network Development Plan

The Ten-Year Network Development Plan (TYNDP) (Art. 30[1] [b] and Art. 48 of the IEM Regulation and TEN-E Regulation) is a pan-European network development plan which provides a long-term vision of the power system. 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). It is published every two years by ENTSO-E, the 2020 edition is expected to be published in June 2021. 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, identifying synergies when relevant between European, regional, and national studies, and making use of the expertise of the regional and local conditions of TSOs.

Building scenarios for the TYNDP 2022 in line with Annex V(1)(a) of the TEN-E Regulation is the main focus during odd years such as 2021 (see diagram). Furthermore, in 2021, ENTSO-E and ENTSG will reinforce the collaboration on the scenarios with Associations of European Distribution System Operators in line with Art. 55(2)(b) of the IEM Regulation. In 2021, ENTSO-E and ENTSG will keep working on a new approach for the dual system assessment of relevant projects (including a screening method to identify which electricity and gas projects have a significant impact on the other sector and should be subjected to a dual system assessment). In the longer term, a multi sectorial planning strategy in collaboration with the European industry should extend to considering how the CBA methodology should evolve to enable the assessment of new types of projects, for instance where artificial gas made from renewables can be used for a transport fleet, a peak electricity production unit or injected into the gas grid.

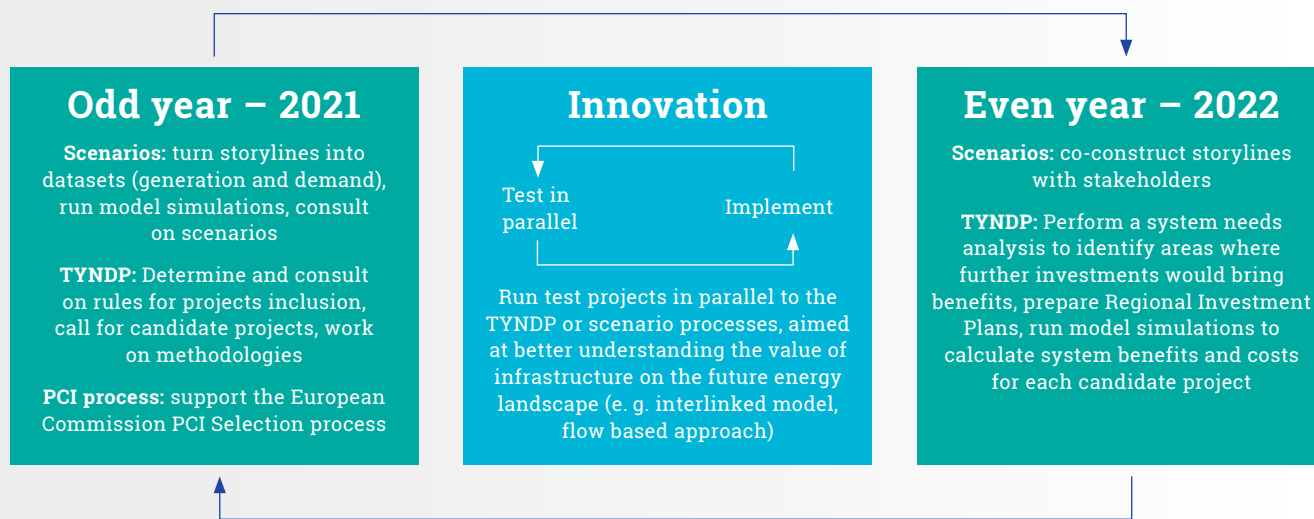


Figure 4: TYNDP two-year process

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 and published by the European Commission (Art. 11[1] TEN-E Regulation). The CBA results are also used as the basis of the PCI selection process.

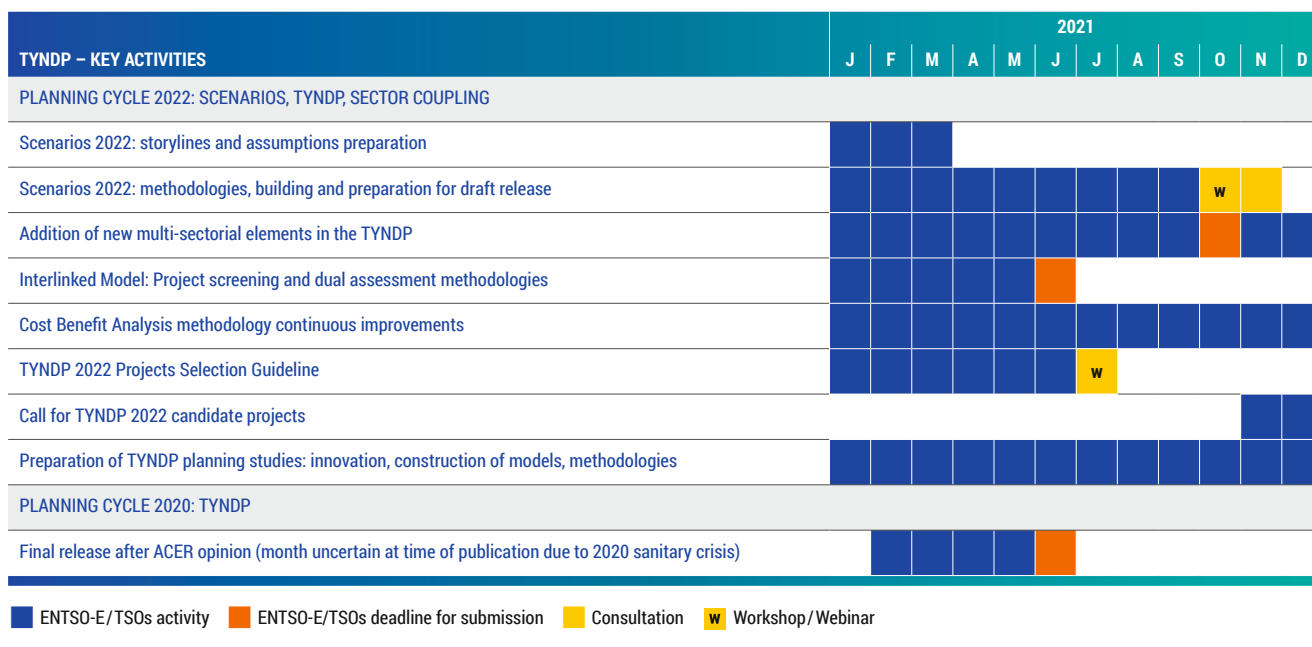


Figure 5: Planning



Adequacy

The European Resource Adequacy Assessment

Under Art. 23 of the IEM Regulation, ENTSO-E has been mandated to develop every year a European resource adequacy assessment (ERAA) with a significantly extended scope compared to the previous Mid-term Adequacy Forecasts (MAFs). 'Resource adequacy' can be defined as the continuous balance between net available generation on the one hand and net load levels on the other. In 2021, ENTSO-E will create the first edition of the ERAA, which enhances significant parts of the previous MAF.

At the end of each year, a report is consulted and released that summarises the main findings of the study, together with a description of the process, input data, main assumptions and methodological advancements.

European Resource Adequacy Assessment Methodology Implementation – Principle Roadmap

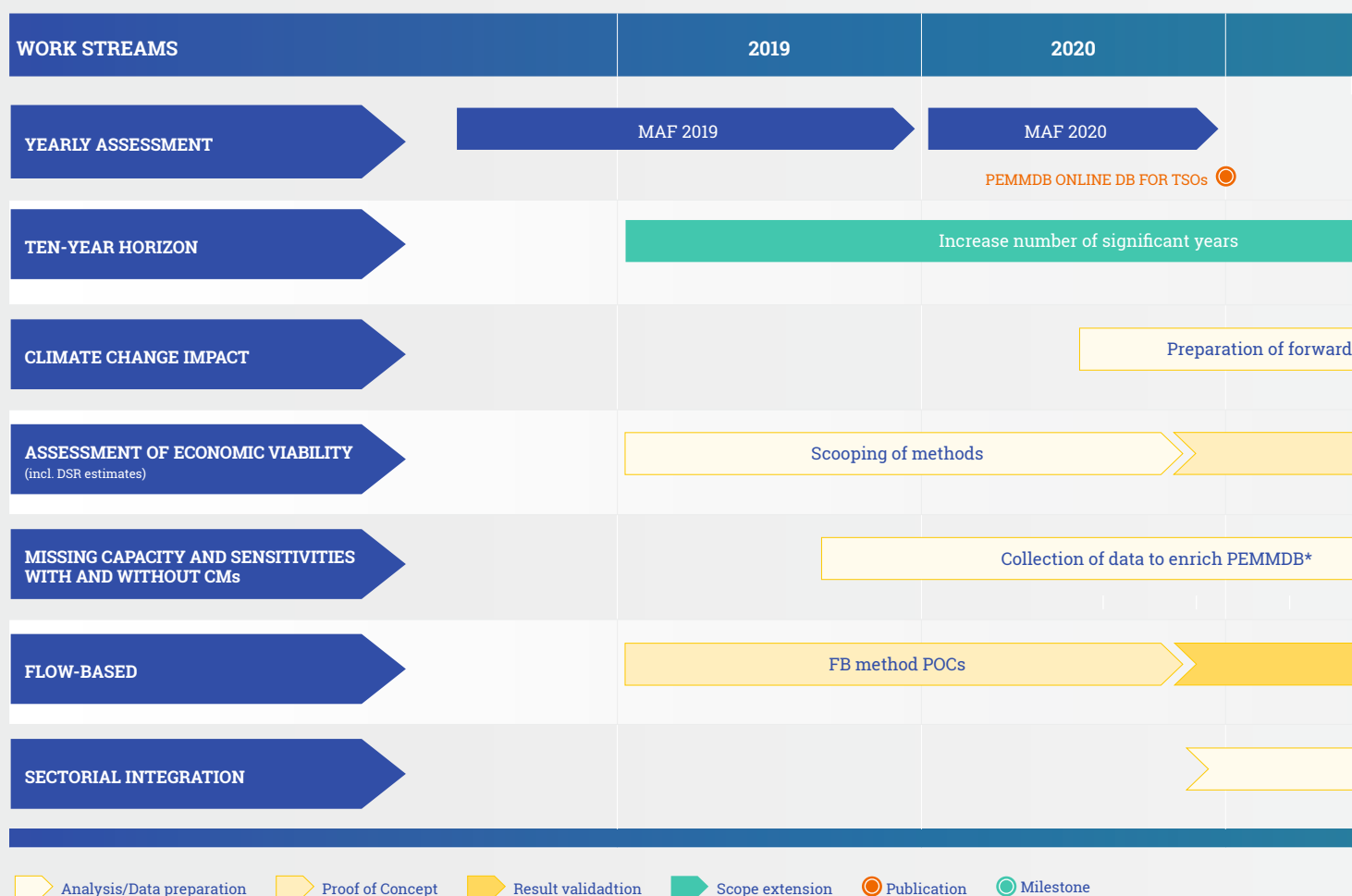
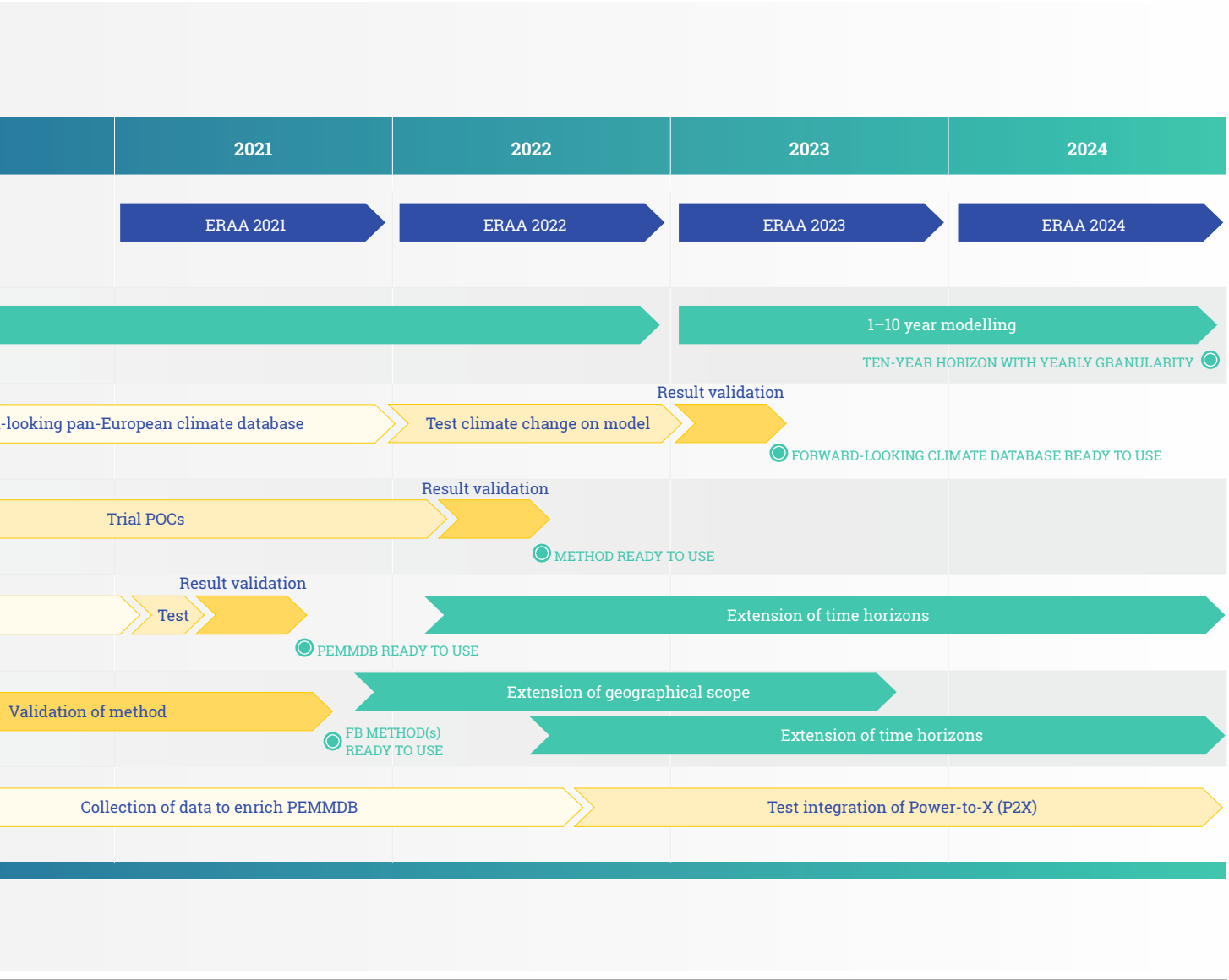


Figure 6: Implementation roadmap towards ERAA (preliminary)

The ERAA 2021 will be the first assessment based on the target ERAA methodology. The ERAA 2021 assessment will already contain a major set of advances that are summarised in the implementation roadmap. Such changes include a gradual increase in modelling years (from 2 target years to up to 10 Years), and the run of Proof-of-concept trials on an economic viability assessment that evaluates the revenue streams to generators/flexible resources from an economic standpoint. In addition, the flow-based market-coupling approach will replace the current Net Transfer Capacity

(NTC) methodology for better representation of the grid in the models. The year 2021 will also see investigations initiated in a forward-looking climate data-set including the impact of climate change. Further advancements on the modelling of sector coupling and missing capacity are also planned to start from 2021.

The ERAA will be consulted with stakeholders in the last quarter of the year. The input data and the assumptions of each ERAA will be published.



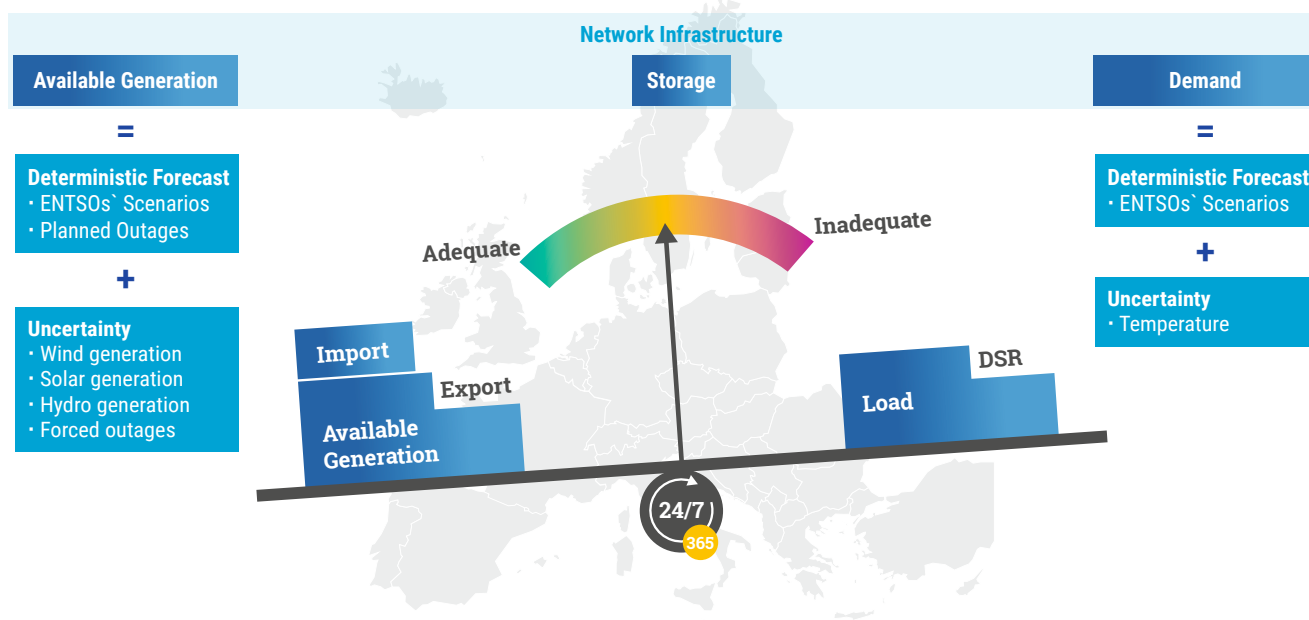



Figure 7: Assessing system adequacy

Seasonal outlooks

ENTSO-E's [Winter and Summer Outlooks](#)  (Article 30(1) f, IEM Regulation) are pan-European, system-wide analyses of risks to the security of the electricity supply. They present TSOs' views on the risks to security of supply and the countermeasures planned for the coming season, either individually or in cooperation. Analyses are performed twice a year to ensure a comprehensive view regarding the summer and winter, the seasons in which weather conditions can be extreme and strain the system.

ENTSO-E publishes a Summer Outlook before 1 June and a Winter Outlook before 1 December. Each outlook is

accompanied by a review of events for the previous season. The review is based on qualitative information by TSOs that present the most important events that occurred during the past period and compare them to the forecasts and risks reported in the previous Seasonal Outlook. Important or unusual events or conditions of the power system as well as the remedial actions taken by the TSOs are included. The outlooks are based on data collected from TSOs and on a probabilistic methodology. ENTSO-E uses a common database and tool structure for Seasonal Outlooks, as it does for ERAA (e.g. the Climate Database, Pan European Market Modelling Data base and demand forecast tool).

Grid Connection Network Codes

The three Connection Network Codes (CNCs) – COMMISSION REGULATION (EU) 2016/1388 of 17 August 2016 establishing a Network Code on Demand Connection (DC), COMMISSION REGULATION (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators (RfG), and COMMISSION REGULATION (EU) 2016/1447 of 26 August 2016 establishing a network code on requirements for the grid connection of high voltage direct current systems and direct current-connected power park modules (HVDC) – define the technical capabilities of system users (power generating modules, distribution systems, demand facilities and HVDC systems) to provide a system-supportive performance under all system operation conditions contributing to preserving or restoring system security, especially in the event of exceptional out-of-range contingencies.

Based on ENTSO-E's monitoring reports, new tasks from the IEM Regulation, experiences from national implementations and issues discussed in the European Stakeholder Committees (ESCs) or their Expert Groups, ENTSO-E is preparing detailed proposals for amendments of the CNCs. In 2021, ENTSO-E will conclude the CNCs assessment, including the GC ESC Expert Groups.

ENTSO-E is planning to publish an updated list of the Implementation Guidance Documents (IGDs) in early 2021, according to Art. 58 RfG, Art. 56 DC and Art. 75 HVDC which stipulate a revision every two years. The IGDs are non-binding reports, mainly for TSOs and other system operators, which give guidance and clarification on both technical and non-technical issues with a view to enhancing coordination and harmonisation where appropriate.

ENTSO-E monitors the CNC Implementation in each Member State in accordance with the scope defined in Art. 59 RfG, Art. 57 DC and Art. 76 HVDC. An annual report is produced by the

shows the evolution of Power Generating Modules and HVDC installations compliant to CNCs.



4 Transparency Regulation

ENTSO-E Transparency Platform

EU Regulation 543/2013 of 14 June 2013 (TR) on the submission and publication of data in electricity markets sets out the criteria for data submission and its publication on a centralised platform, namely the ENTSO-E Transparency Platform (TP). To facilitate the harmonised data submissions to the platform, ENTSO-E developed a Manual of Procedure (MoP) comprised of technical guides in which data definitions and the technicalities related to data exchanges are elaborated. Market related fundamental information on generation, consumption, transmission and balancing is published on the TP, which is collected through various sources such as TSOs, power exchanges and other third parties including XBID, and the Single Allocation Platform. ENTSO-E signed a Memorandum of Understanding (MoU) with its TSO members, which outlines the quality requirements and checks on the data which TSOs submit to the TP. The revision of the MoP and the MoU data quality requirements are envisaged for 2021, further improving the TP data quality and its completeness. As part of earlier MoP revision, the platform is expected to receive and publish a full evolution of intraday offered capacities from the XBID platform.

In addition to the requirements from the TR, the TP will be used for further publications and data collections:

Transparency requirements from Art. 12 EBGL and Title 11 SOGL will be published.

- › Transparency requirements by the implementation frameworks of the European balancing platforms will be published.
- › Information to be made available to ACER for monitoring activities according to the list of informations of Art. 82 CACM and Art. 63 FCA will be collected and maintained within the perimeters of the TP. The FCA list of information is expected to be elaborated on 2021.
- › Information related to the financial settlement of energy exchanges between the Continental European TSOs will be collected and maintained for internal purposes.

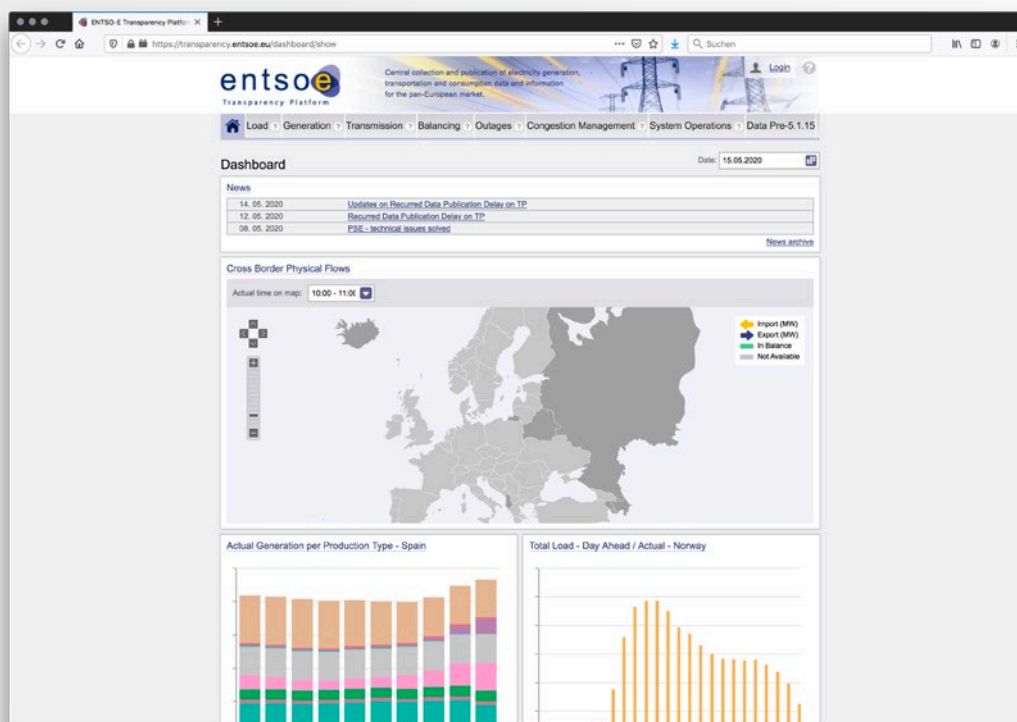


Figure 10: Old Transparency Platform

ENTSO-E will also closely monitor the progress related to the publication of inside information, as required by Regulation (EU) No 1227/2011 (REMIT).

Further plans for 2021 include the re-design of the Transparency Platform Graphical User Interface and the completion of a study on how to improve efficiency and performance of the current back-end architecture of the TP considering the increasing amount of data to be stored and published.

Art.	TP – KEY IMPLEMENTATON ACTIVITIES	Responsible body	2021											
			J	F	M	A	M	J	J	A	S	O	N	D
PAN-EUROPEAN TASKS														
82(4) CACM and 63(3) FCA	Development of the TP for the ACER data provision purposes	ENTSO-E												
50(3) and 51(1) EBGL	Development of the platform for the FSkar purposes	ENTSO-E												
	Review of Memorandum of Understanding on data quality requirements	ENTSO-E												
	Graphical User Interface Re-design	ENTSO-E												
	TP Architectural Study and Re-design	ENTSO-E												

ENTSO-E/TSOs activity ENTSO-E/TSOs deadline for submission

Figure 9: Transparency Platform

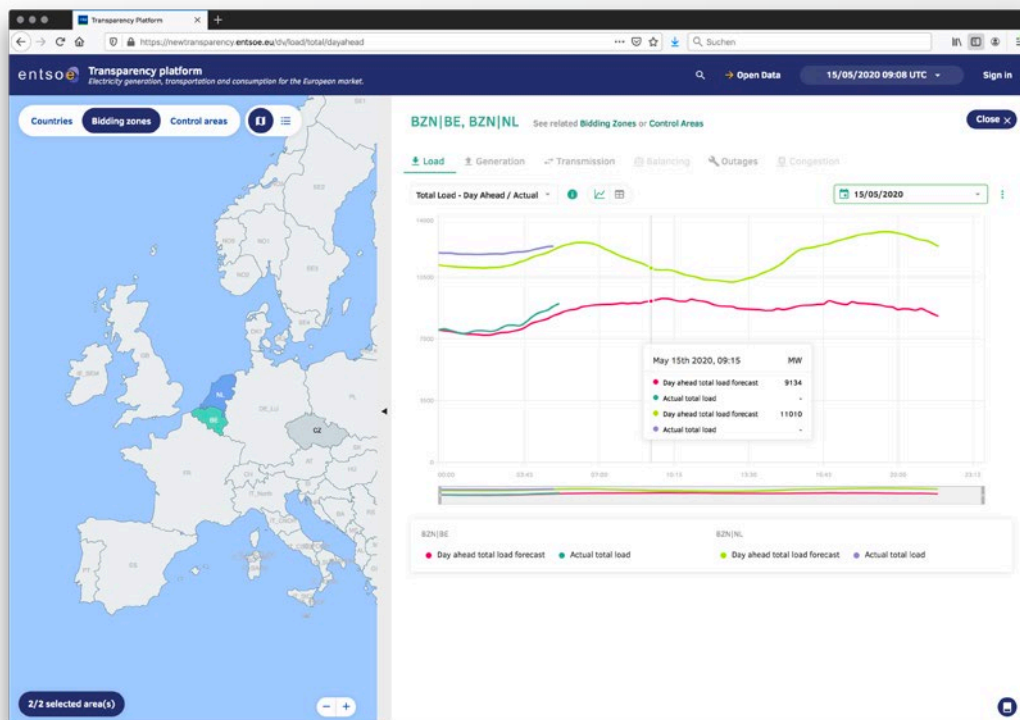


Figure 11: New Transparency Platform

5 Research & Development

R&D Roadmap

ENTSO-E's R&D activities, as legally mandated by the IEM Regulation and IEM Directive, involve promoting and coordinating the research, development and innovation activities of TSOs. In 2020, ENTSO-E developed the RDI Roadmap 2020-2030 reflecting the TSOs' research and innovation needs for the decade to come. The Roadmap considers major trends stemming from the political framework and technological developments as well as the needs of TSOs for operations, market and infrastructure deployment. The RDI Roadmap defines three clusters, including six flagship projects:

1. **One System:** Optimised cross sector integration and ecosystem for deep electrification
2. **Smart Grids & Services:** Enhanced grid use and development for pan-EU market, enable large scale offshore wind energy into the grid, and enable secure operation of the widespread hybrid AC/DC grid
3. **Cyber-physical System:** Enhance control centres' operation and interoperability

The EU-level flagship projects led by TSOs are to be initiated in 2021. The projects will be key to reaching the milestones of the RDI Roadmap and to achieving a cyber-physical grid which serves as the backbone to reaching the EU climate targets.

ENTSO-E will also maintain strong cooperation with policy makers and stakeholders in research and innovation. ENTSO-E participates in the European Technology & Innovation Platforms on Smart Networks for Energy Transition (ETIP SNET) Platform under the umbrella of the European Commission's Strategic Energy Technology (SET), as well as the Horizon2020 calls. In 2021, ENTSO-E will continue to facilitate proposals for the Horizon Europe calls and foster TSO participation.

ENTSO-E is involved in the following projects:

1. **INTERFACE**, which gathers TSOs, DSOs, aggregators and IT providers to conceive a digital solution to support new flexibility markets. Participating TSOs are Elering, AST, Fingrid, ESO, Transelectrica, Eles and REN.
2. **OneNet**, which is the largest project of its kind with 72 partners, of which 14 are TSOs. The main objective of the project is to develop an open and flexible architecture to make the European electricity system smarter and more efficient. The project is a continuation of earlier research and innovations carried out in projects such as INTERFACE.

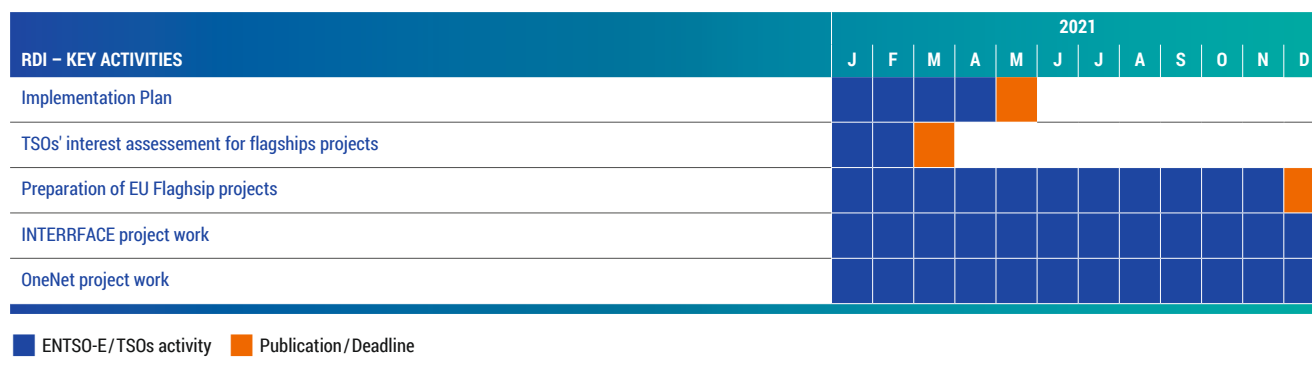


Figure 12: RDI

6 TSO, DSO and Demand Side Flexibility

ENTSO-E will pursue its activities with the DSOs' associations and the EU DSO Entity as soon as established, based on the requirements stemming from Art. 59(1)(d, e) of the IEM Regulation and Art. 31(9) of the DIRECTIVE (EU) 2019/944 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 5 June 2019 on common rules for the internal market for electricity (IEM Directive).

A joint cooperation agreement between the new EU DSO Entity and ENTSO-E should be developed by mid-2021. A key area for cooperation is to follow-up on the development of demand side response, distributed resources as a flexibility source and their integration to the electricity system and markets. ENTSO-E focuses on leveraging the current Network Codes and Guidelines to unleash the potential of all flexibility resources. Furthermore, ENTSO-E is performing a gap analysis to assess the inclusion of new technical requirements such as demand side flexibility and storage in the existing Network Codes and Guidelines. The results will be reported to the European Commission under the TSO–DSO platform.

Concepts are being tested 'on the field' in the frame of Horizon 2020 projects such as INTERRFACE or OneNet, and the findings will be discussed and compared with similar sandboxes in dedicated workshops. Other initiatives include further coordination in system planning for network infrastructures and smart grids. ENTSO-E will keep working with DSO associations (and with the EU DSO entity, once established) to share best practice at the national level and to include DSOs' assumptions and know-how in the building of scenarios for the TYNDP Plan (assumptions of generation, demand side response, and storage assets connected at DSO level). Furthermore, the associations will follow-up on the set of 'smart grid indicators' proactively developed and proposed to the European Commission and National Regulatory Authorities in 2020, in accordance with Article 59(1) of the IEM Directive.



7 Cybersecurity, Interoperability and Data

Cybersecurity

During 2020, initial proposals for a Cyber Security Network Code will be discussed within European associations (ENTSO-E, CEDEC, GEODE, EURELECTRIC, EDSO) in an informal consultation process. A drafting team composed of TSO and DSO Cyber experts will provide guidance to the European Commission (DG ENER) on more precise recommendations.

In 2021, ENTSO-E expects the EC to launch a formal request to draft a network code on cybersecurity, which would be followed by the drafting of Framework Guidelines by ACER and the start of the drafting of the Network Code by ENTSO-E, potentially together with the EU DSO entity. The formal Network Code process will involve wider consultation with stakeholders.

Interoperability & Data

ENTSO-E maintains the Electronic Data Interchange library and Common Grid Model Exchange Standard (CGMES) library, which gather documents and definitions for the harmonisation and implementation of standardised electronic data interchanges between actors in the electrical industry in Europe.

Main activities in 2021 will include the development of the Common Information Model (CIM) and implementation guides to support data exchanges required from the Network Codes, work on international standards, updating the CGM Exchange Standard, maintaining the harmonised role model, following-up on the implementing acts on data and interoperability, implementing Art. 55(2)(a, b, c) of the IEM regulation and Art. 24 of the IEM Directive, and training activities for the TSO–RSC community.



Acronyms

Acronym	Definition	Acronym	Definition
ACER	Agency for the Cooperation of Energy Regulators	MAF	Mid-term Adequacy Forecast
aFRR	Automatic Frequency Restoration Reserves	MCO	Market Coupling Operator
aFRRIF	Automatic Frequency Restoration Reserves Implementation Framework	mFRR	Manual Frequency Restoration Reserves
CACM	Capacity Allocation and Congestion Management	mFRRIF	Manual Frequency Restoration Reserves Implementation Framework
CBA	Cost-Benefit Analysis	MoU	Memorandum of Understanding
CCR	Capacity Calculation Region	NEMO	Nominated Electricity Market Operator
CGM	Common Grid Model	NRA	National Regulatory Authority
CGMES	Common Grid Model Exchange Standard	NTC	Net Transfer Capacity
CIM	Common Information Model	OPDE	Operational Planning Data Environment
CSA	Coordinated Security Analysis	PCN	Physical Communication Network
DSO	Distribution System Operator	PCI	Project of Common Interest
EAS	European Awareness System	PECD	Pan-European Climate Database
EB	Electricity Balancing	PEMMD	Pan-European Market Modelling Database
EBGL	Electricity Balancing Guideline	PEVF	Pan-European Verification Platform
ENTSOG	European Network of Transmission System Operators for Gas	R & D	Research and Development
ERAA	European Resource Adequacy Assessment	RDI	Research, Development and Innovation
ETIP SNET	European Technology and Innovation Platform Smart Networks for Energy Transition	RfG	Requirements for Generators
FCA	Forward Capacity Allocation	RR	Replacement Reserves
HVDC	High-Voltage Direct-Current	RSC	Regional Security Coordinator
IEM	Internal Electricity Market	SA	Synchronous Area
IN	Imbalance Netting	SOGL	System Operation Guideline
ITC	Inter Transmission System Operator Compensation	TP	Transparency Platform
		TSO	Transmission System Operator
		TYNDP	Ten-Year Network Development Plan
		XBID	Cross-Border Intraday



European Network of
Transmission System Operators
for Electricity

