

# ENTSO-E Annual Work Programme

2024 Edition – ENTSO-E's work on legal mandates



# ENTSO-E Mission Statement

## Who we are

ENTSO-E, the European Network of Transmission System Operators for Electricity, is the **association for the cooperation of the European transmission system operators (TSOs)**. The **39 member TSOs**, representing 35 countries, are responsible for the **secure and coordinated operation** of Europe's electricity system, the largest interconnected electrical grid in the world. In addition to its core, historical role in technical cooperation, ENTSO-E is also the common voice of TSOs.

ENTSO-E **brings together the unique expertise of TSOs for the benefit of European citizens** by keeping the lights on, enabling the energy transition, and promoting the completion and optimal functioning of the internal electricity market, including via the fulfilment of the mandates given to ENTSO-E based on EU legislation.

## Our mission

ENTSO-E and its members, as the European TSO community, fulfil a common mission: Ensuring the **security of the interconnected power system in all time frames at pan-European level** and the **optimal functioning and development of the European interconnected electricity markets**, while enabling the integration of electricity generated from renewable energy sources and of emerging technologies.

## Our vision

ENTSO-E plays a central role in enabling Europe to become the first **climate-neutral continent by 2050** by creating a system that is secure, sustainable and affordable, and that integrates the expected amount of renewable energy, thereby offering an essential contribution to the European Green Deal. This endeavour requires **sector integration** and close cooperation among all actors.

Europe is moving towards a sustainable, digitalised, integrated and electrified energy system with a combination of centralised and distributed resources.

ENTSO-E acts to ensure that this energy system **keeps consumers at its centre** and is operated and developed with **climate objectives** and **social welfare** in mind.

ENTSO-E is committed to using its unique expertise and system-wide view – supported by a responsibility to maintain the system's security – to deliver a comprehensive roadmap of how a climate-neutral Europe looks.

## Our values

ENTSO-E acts in **solidarity** as a community of TSOs united by a shared **responsibility**.

As the professional association of independent and neutral regulated entities acting under a clear legal mandate, ENTSO-E serves the interests of society by **optimising social welfare** in its dimensions of safety, economy, environment and performance.

ENTSO-E is committed to working with the highest technical rigour as well as developing sustainable and **innovative responses to prepare for the future** and overcoming the challenges of keeping the power system secure in a climate-neutral Europe. In all its activities, ENTSO-E acts with **transparency** and in a trustworthy dialogue with legislative and regulatory decision makers and stakeholders.

## Our contributions

**ENTSO-E supports the cooperation** among its members at European and regional levels. Over the past decades, TSOs have undertaken initiatives to increase their cooperation in network planning, operation and market integration, thereby successfully contributing to meeting EU climate and energy targets.

To carry out its **legally mandated tasks**, ENTSO-E's key responsibilities include the following:

- › Development and implementation of standards, Network Codes, platforms and tools to ensure secure system and market operation as well as integration of renewable energy;
- › Assessment of the adequacy of the system in different timeframes;
- › Coordination of the planning and development of infrastructures at the European level (**Ten-Year Network Development Plans, TYNDPs**);
- › Coordination of research, development and innovation activities of TSOs;
- › Development of platforms to enable the transparent sharing of data with market participants.

ENTSO-E supports its members in the **implementation and monitoring** of the agreed common rules.

**ENTSO-E is the common voice of European TSOs** and provides expert contributions and a constructive view to energy debates to support policymakers in making informed decisions.

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# Introduction

## Policy context

### Electricity market design reform

In reaction to a severe energy price crisis, the European Union (EU) set the objective of reforming market design for more robust energy pricing in future crises.

In parallel, the drive to develop renewables energy capacity led to the ambitious goal of establishing an independent and green energy supply for Europe by 2030. As the 2024 European Elections grow near, decision-makers are seeking to finalise agreements on policy initiatives before the end of the current European Commission and European Parliament mandates mid-2024. In 2022, Russia's invasion of Ukraine and the subsequent gas supply shortages highlighted the need to improve a key element of EU energy policy: the integrated electricity market design. After implementing emergency measures addressing security of supply, high energy prices and acceleration of permitting procedures for renewable

energy infrastructure throughout 2022, on 14 March 2023 the EU proposed a targeted reform to the current system. The Electricity market design reform proposal revises parts of the 2019 Electricity Directive, Electricity Regulation and ACER Regulation to protect consumers against volatile prices, improve energy price stability and predictability, and increase renewable energy investment. This includes incentivising longer-term contracting such as Power Purchase Agreements (PPAs) and two-way Contracts for Difference (CfDs), enhancing the role of flexibility and introducing measures to empower consumers.

### Fit for 55

In November 2018, the EU set its objective for a climate-neutral economy by 2050. Moreover, as an intermediate step towards climate neutrality, the EU has also raised its 2030 climate ambitions and committed to cutting greenhouse gas emissions by at least 55 % by 2030 compared to 1990 levels.

Both the 2030 and 2050 emission reduction targets have become legally binding following the adoption of the European Climate Law in June 2021. The 'Fit for 55' Package contains a series of important initiatives that will enable the 2030 goal to be reached. ENTSO-E follows with particular interest the legislative development of some of these initiatives:

- › The revision of the **Renewable Energy Sources Directive (RED III)**: The European Commission put forward this proposal to increase the target of renewable energy sources in the overall energy mix at the EU level to at least 40 % by 2030. The European Parliament and the Council informally agreed in March 2023 to raise the share of renewables in the EU's final energy consumption to 42.5 % by 2030.
- › The revision of the **Energy Efficiency Directive (EED)**: The proposed rules put forward several provisions to accelerate energy efficiency efforts by member states and to reduce the final energy consumption at EU level by 11.7 % in 2030. A provisional agreement was reached between the European Parliament and the Council on 9 March 2023.
- › The **Alternative Fuel Infrastructure Regulation (AFIR)**: The main objective of this Regulation is to promote the creation of an adequate infrastructure network for recharging or refuelling road vehicles or ships with alternative fuels. The Council and the Parliament reached a provisional deal on the proposal in March 2023.
- › The **Hydrogen and Decarbonised Gas Market Package**: This initiative aims to establish a regulatory framework enabling the integration of low-carbon and renewable gases. It contains provisions for dedicated hydrogen infrastructure, markets and integrated network planning. The Council approved its general approach in March 2023, while negotiations with the European Parliament should start later in 2023.





## Green Deal Industrial Plan

The European Commission launched an initiative for ensuring access to key technologies for the energy transition.

This proposal is a response to the shortage in critical materials and manufacturing capacity in Europe. The Net-Zero Industry Act published in March 2023 lists grid technologies as strategic for the clean energy transition.

As such, grid technologies will benefit from permitting facilitation, new public procurement rules and schemes to encourage skilled workforces to enter the sector.

## Future of our Grids: Accelerating Europe's energy transition

The 'Future of Our Grids: Accelerating the Energy Transition' Forum – organised by ENTSO-E under the patronage of the EU Commission – took place on 7 September 2023, in Brussels. In this occasion, more than 200 leaders from European policymakers, grid operators to industry leaders met to exchange on the opportunities and the challenges for accelerating the electricity grids which are needed for Europe's energy transition.

**The themes for the discussions were:**

- › secure and mobilise the necessary financial capabilities;
- › how policy and regulation can facilitate and speed-up the grid investments;
- › the challenges of manufacturing capacities and skills to supply all the necessary grid components;
- › how to better include local communities and the public at large to increase support of grid infrastructure.

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

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

———— **REGULATION (EU) 2022/869 on guidelines for trans-European energy infrastructure**

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

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

# 1. System Operation

## System Operation Guideline

Regulation (EU) 2017/1485 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 ENTSO-E and TSOs at the pan-European, synchronous area and regional levels. Work at pan-European level is facilitated by ENTSO-E, whereas synchronous areas' activities are organised by TSOs in respective regional groups. To fulfil the obligation from Art. 14(2) SOGI, ENTSO-E will continue the work in collaboration with TSOs and Regional Coordination Centres (RCCs) to deliver the expected data to the Agency for the Cooperation of Energy Regulators (ACER). According to Art. 65(4) SOGI, ENTSO-E will publish the common list of year-ahead scenarios by 15 July as it has done since 2018.

ENTSO-E will fulfil the obligation from Art. 45(1) of the Methodology for coordinating operational security analysis (CSAM) which requires the publication on the website of the common hours (T0 to T5) that define the key milestones of the daily Coordinated Security Analysis (CSA) process, which are jointly defined by TSOs and RCCs. New common hours will be published if there is a need for amending the current ones (default hours) as the process is further implemented. ENTSO-E will continue the work pursuant to Art. 44 of the CSAM on the development of a probabilistic risk assessment methodology. The progress made in this methodology is described in the next biennial report, due in December 2023. The work in 2024 will continue according to the progress achieved. Regarding the Common Grid Model (CGM) Methodologies, ENTSO-E will proceed with the public consultation of the merged CGM Methodologies, aiming to unify the three current existing versions.

## Network Code Emergency & Restoration

In 2024, ENTSO-E will continue to coordinate, where necessary, the implementation of the Network Code Emergency & Restoration (NC ER) by the TSOs and address potential issues that require cross-border alignment. ENTSO-E will maintain engagement with ACER regarding the monitoring of the implementation of the NC ER; in particular following the

in-depth analysis of national frameworks for market activities suspension, including views on the potential for harmonisation, performed in 2022. The developments at Member State level will be communicated regularly through the [NC ER Active Library](#) and the [Market](#) and [System Operations Stakeholders Committees](#).

## Synchronous Areas & Regional Groups

Depending on the specific arrangements with each Regional Group corresponding to a synchronous area, ENTSO-E supports on an ad-hoc basis or provides administrative and technical support for the Region on a continuous basis. ENTSO-E will continue its work to develop mutual coordination and support between synchronous areas, using the functionality of high-voltage direct current (HVDC) links to implement new services.

The work aims to coordinate 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 also continues to support the project of synchronisation between the Baltic TSOs and the synchronous area of Continental Europe. In 2024, work on the elaboration of the relevant procedures and essential system checks for the synchronous operation will continue.

## Coordination with 3<sup>rd</sup> country TSOs

Following the request by the European Commission and the Energy Community (EnC) Secretariat, the TSOs and ENTSO-E's experts have provided feedback on the adapted legislation to be implemented by the Contracting Parties of the EnC. The dedicated experts will continue to provide useful feedback related to the implementation challenges of the adapted legislation to the European Commission and the EnC Secretariat.

The Trade Cooperation Agreement (TCA) signed on December 2020 between the United Kingdom (UK) and the EU foresees that EU and UK TSOs shall prepare technical procedures once requested by the Specialised Committee on Energy.

Further work on the preparation of a Day-Ahead Target model based on the concept of "Multi-region loose volume coupling" (MRLVC) as foreseen in Articles ENER.14, ENER.19 and Annex ENER-4 of the TCA will continue in 2023. On 10 February 2023, the EC addressed a letter to ENTSO-E, requesting additional information with a view to preparing this technical procedure. EU and UK TSOs are cooperating with the aim of delivering these answers by July 2023. The work in 2024 will continue in this and other technical procedures if requested by the Specialised Committee. The dedicated experts will continue to provide useful feedback related to the implementation challenges of the adapted legislation to the European Commission and the EnC Secretariat, as well as supporting the member TSOs from the Contracting Parties.

## European Awareness System

ENTSO-E oversees the European Awareness System (EAS) development and upgrades in collaboration with hosting entities and the software supplier. In line with the recommendations from the 8 January 2021 Continental Europe system split, ENTSO-E will pursue the implementation of Wide Area Metering System (WAMS) data into EAS. Through Phasor Measurement data integration into EAS, TSO operators will be provided with enhanced frequency maps, voltage maps and angle difference visualisation in the European grid.

An analysis of the technology upgrade on Siemens Power Spectrum 4 will be performed to anticipate end-of-life support of the software. A pilot project and feasibility study on data streaming technology will be realised to assess this solution as an alternative for a Supervisory Control and Data Acquisition (SCADA) or Energy Management Systems (EMS) software for the upgrade of EAS. The replacement of hardware and the virtualisation of the hosting environment will also be investigated.

The Connection of EAS to the ENTSO-E central security information and event management (SIEM) will provide enhanced IT security to the EAS system. The provision of an accessible EAS training system will ensure that TSO operators are better trained on the use of the EAS system and get the most out of the available information, enabling them to take better decisions on the European grid.

Access to EAS by RCCs will be enabled to provide them with better information to perform their tasks. The overview and the information shared in EAS becomes even more important, both as an overview of the situation in the region of the RCC and in the neighboring region(s). The integration into EAS of the relevant data from the Balancing Platforms MARI, PICASSO and TERRE will help to concentrate the information in one place (EAS imbalance map), providing the operator with a global overview.



## Risk Preparedness Regulation

Pursuant to Art. 6 of the Regulation (EU) 2019/941 on risk-preparedness in the electricity sector (Risk Preparedness Regulation), ENTSO-E initiated the update process of the Risk Preparedness Methodology in late 2022 which will conclude with its approval by ACER in 2024. This update included the RCCs established in 2022 more profoundly in the regional

electricity crisis scenario identification process. With this Risk Preparedness Methodology update, the second cycle of identifying regional electricity crisis scenarios has commenced in 2023 and will be concluded in September 2024 with a report submitted to the EC and ACER.

## Common Grid Model (CGM)

The CGM and the Operational Planning Data Environment (OPDE) are critical enablers of the operational coordination and the security of supply on the European level. Ensuring greater visibility and insight into pan-European interconnection flows is a critical step in the broader effort to strengthen grid security, ensure cost-efficient operation, and increase cooperation and collaboration among the European TSOs and RCCs. The CGM and OPDE development and implementation are led by the Steering Group Regional Coordination at ENTSO-E level.

The legal basis for the CGM and OPDE is found in three of the Network Codes: The SOGL (Art. 64), the Capacity Allocation & Congestion Management (CACM) Regulation (Art. 17) and the Forward Capacity Allocation (FCA) Regulation (Art. 18).

The CGM is a prerequisite for several services harmonised in the Network Codes, including coordinated capacity calculation (CCC), operational security analysis, outage planning coordination (OPC) and adequacy analysis.

A CGM compiles the Individual Grid Models (IGMs) of each TSO, covering timeframes from one year before real time to one hour before real time. TSOs' IGMs, after following a quality assessment and pan-European alignment process, are picked up by RCCs, who merge them into a pan-European CGM and feed the merged CGM back into the system. In 2024, further work will be done to increase the number of services (OPC, Short-Term Adequacy [STA], Coordinated Security Analysis [CSA] and CCC) using CGMs.

## Regional Coordination Centres

RCCs are entities owned and appointed by TSOs to fulfil six tasks: CSA, CCC, OPC, STA, Emergency and Restoration planning, and CGM creation. The SOGL formalised the role of the RCCs and made it legally binding for TSOs to procure at least the five core tasks from one of the RCCs. Through their recommendations to TSOs, RCCs contribute to increasing the efficiency in system operation; minimising the risks of wide-area events such as brownouts or blackouts, and lowering

costs by ensuring the maximised availability of transmission capacity to market participants. The Clean Energy Package establishes an enhanced framework for regional cooperation through the establishment of RCCs. TSOs of the System Operation Regions (SORs) established RCCs by July 2022 and work is ongoing to complete implementation of the RCC tasks in Art. 37.1 of the Electricity Regulation.





## 6 RCCs

- Coreso (2008)
- TSCNET (2008)
- SCC (2015)
- Nordic RCC (2016)
- Baltic RCC (2016)
- SEleNe CC (2020)

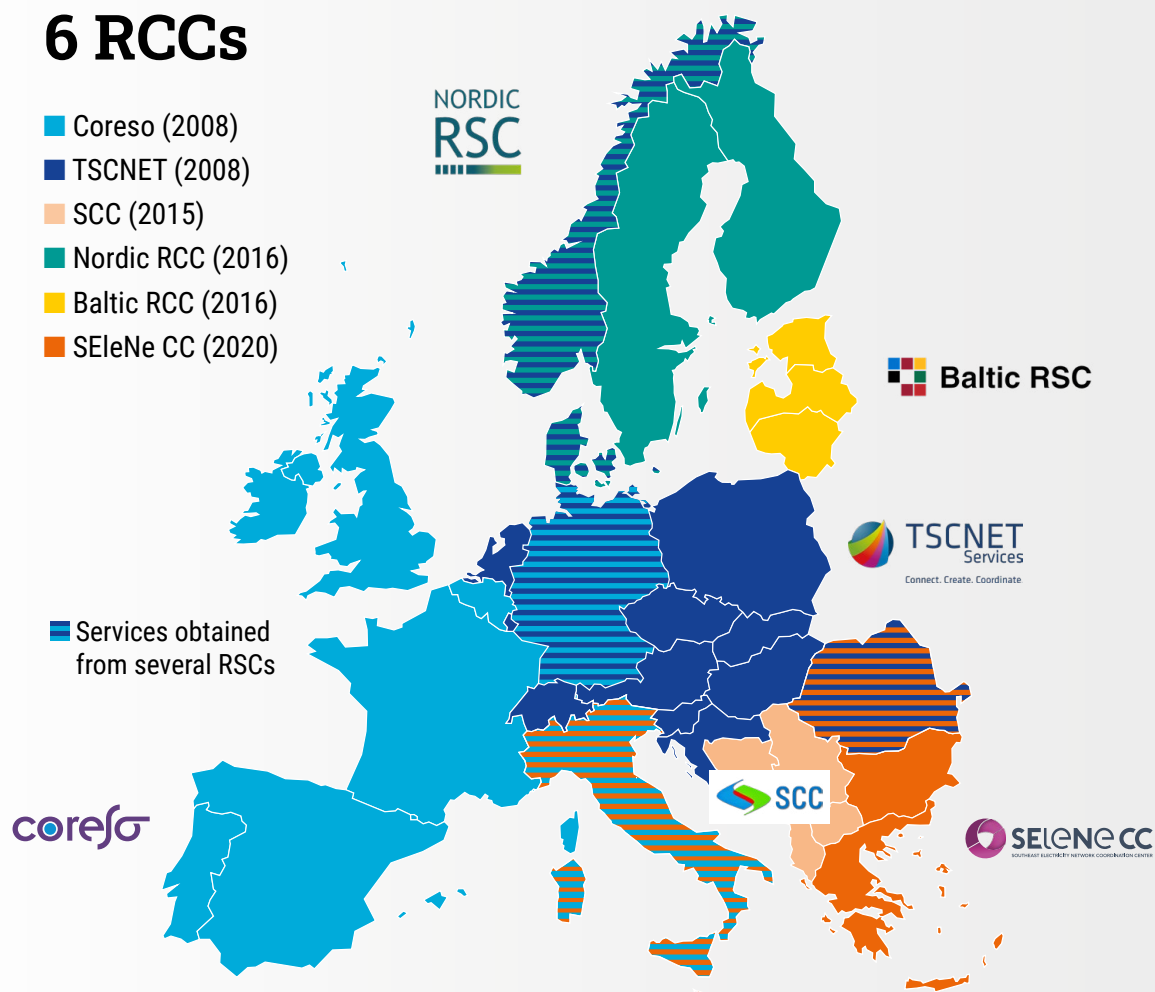


Figure 1: Map showing the Member State geographical area for the RCC service provision\*

\* RCC map. Norway and Denmark are serviced by both NRCC and TSCNET; Countries belonging to Central SOR receive services from both TSCNET and Coreso; Italy is serviced by both Coreso and Selene-CC; Romania is serviced by both Selene-CC and TSCNET. (Kosovo borders are indicated in the RCC services map as KOSTT signed the Connection Agreement with ENTSO-E in 2020. This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo Declaration of Independence. Kosovo is as yet not serviced by an RCC.)

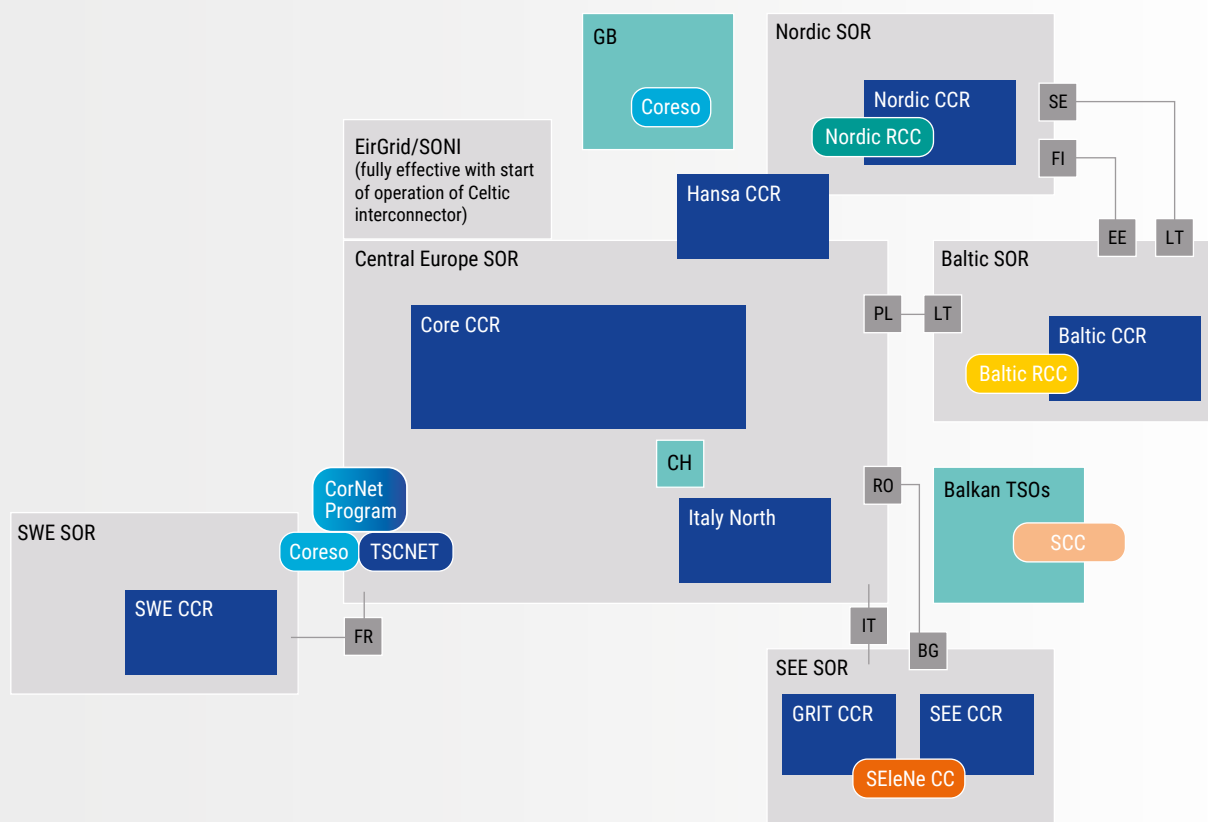


Figure 2: Map of CCR, SOR and RCCs established by that SOR

ENTSO-E supports the proposals for the development and implementation of new RCC tasks according to Art. 37 of the Electricity Regulation and as consulted with stakeholders in the Steering Group Regional Coordination, which is established as per Art 30.1 e) of the Electricity Regulation since end of 2021. The main purpose of the Steering Group Regional Coordination (StG ReC) is to facilitate, coordinate and develop regional coordination, most notably among RCCs and TSOs. The StG ReC framework is used to ensure a platform for efficient, transparent and smooth collaboration between RCCs, TSOs, the regions (CCRs/SORs) and ENTSO-E, as well as external stakeholders.

For the RCC tasks, where a pan-European or cross-regional approach is legally required or requested by TSOs, the StG ReC shall steer the business requirements, business development, implementation, rollout and operation of the tasks to the extent legally required or requested by TSOs. For the RCC tasks at regional level, the StG ReC shall facilitate cooperation and coordination among the regions and RCCs and monitor the performance of those tasks.

#### The implementation of the RCC services from SOGL is still ongoing:

- › STA and OPC are in operation but will continue to be updated;
- › CGM is live, and IGMs are provided by TSOs over OPDE into pan-European CGMs;
- › The implementation of CSA and CCC in the regions according to regional methodologies will be pursued; and
- › Consistency assessment of system defence plans and restoration plans (Art.6 of NC ER) is already established.

ENTSO-E is actively involved in various aspects of the STA (Art.81 SO GL), OPC (Art.80 SO GL) and CGM services, while the CC (Art.25 CACM Regulation) and CSA (Art.75 SO GL) services are mainly implemented in the regions. The Electricity Regulation (Recital 59, Art.30(1)(e) and Art.30(2)) stipulates that ENTSO-E will have a more active role in monitoring and coordinating the implementation of regional tasks.



In addition to the original tasks defined in the Network Codes and guidelines, new RCC tasks are defined in Art. 37(1) of Electricity Regulation. ENTSO-E shall prepare proposals for the new tasks not already covered in the Network Codes or Guidelines.

Specifically, on the implementation of the new RCC tasks, ENTSO-E needs to work across Committees as the RCC tasks are wider in nature than the original Regional Security Coordinator (RSC) ones. The RCC framework will ensure this collaboration with the other Committees on finalisation of the proposals, and StG ReC will lead or monitor the implementation where relevant:

- › **Art. 37(1)(g):** Training and Certification: the proposal has been submitted to ACER; the implementation phase has begun and is expected to last until 2024, after which the execution phase is expected to last until 2026.
- › **Art. 37(1)(h):** Supporting restoration: a proposal is expected to be submitted by Q3 2023, with implementation to start in Q4 2023 or Q1 2024.
- › **Art. 37(1)(j) and Art.37(1)(k):** Sizing and procurement of balancing capacities: implementation by RCCs is expected in the coming years.
- › **Art. 37(1)(l):** Inter-TSO settlement: implementation will be done where applicable, if requested by TSOs.
- › **Art. 37(1)(o):** Maximum Entry Capacity: the European Resource Adequacy Assessment (ERAA) methodology has been approved by ACER; the industrialised tool will be developed in 2023 and shall be finalised by Q2 2024. Provided there is ERAA approval and the availability of the industrial tool, the go-live of the first MEC calculation will take place mid-2024.
- › **Art. 37(1)(p):** The need for new infrastructures, which is related to system development: a proposal is expected to be submitted to ACER in Q4 2023; implementation is expected to begin for the TYNDP 2026 release.

The RSCs were established as voluntary initiatives in 2008, and their roles were formalised in the Network Codes. In the Electricity Regulation, the RSCs are replaced by RCCs as of 1 July 2022. The Electricity Regulation further specifies more detailed regulations for the establishment, implementation and performance of the RCCs.



## 2. Market

### Capacity Allocation and Congestion Management Guideline

CACM Regulation sets out the methods for calculating how much cross-zonal capacity can be offered to Single Day-Ahead Coupling and Single Intraday Coupling without endangering system security, and harmonises how day-ahead and intraday timeframes are operated in Europe to facilitate market integration and increase competitiveness. The implementation of CACM Regulation is almost complete at the pan-European level. Nevertheless, implementation of the methodologies is still ongoing and regular amendment of the methodologies is performed to ensure the consistency of the full regulatory framework. Furthermore, the Market design reform initiated in 2022 could impact some methodologies, which will have

to be adapted to comply with the Electricity market design reform. The following paragraphs describe the ENTSO-E and All TSOs tasks to be undertaken in 2024, according to the existing CACM Regulation.

The implementation of the CACM and the methodologies stemming from it entails several tasks for ENTSO-E and TSOs at the pan-European and regional levels. Work at the pan-European level is facilitated by ENTSO-E, whereas the regional activities are organised by TSOs in respective regional groups and facilitated by ENTSO-E on ad-hoc bases.

#### All TSOs (supported by ENTSO-E) will perform the following tasks:

- › **Algorithm (Art. 37 CACM Regulation):** In accordance with ACER Decision No 04/2020 of 30 January 2020 on the proposal of the nominated electricity market operators (NEMOs) 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 Regulation) and the deadlines set in the Electricity Regulation – the work on the adaptations needed for the implementation of 15-minute products in Day Ahead will continue in 2024. The delivery is planned for 2025. ENTSO-E will coordinate the updates of the methodologies to allow for the 15-minute products go-live. This is the case, for example, for the scheduled exchanges methodology (Art. 43 CACM Regulation) where adaptation might be introduced to optimise the time for computation. This could also be the case for the fallback procedures (Article 44 CACM Regulation) to introduce an alternative to the shadow auction that takes time in the overall process in the context of Intraday Auctions implementation. An assessment will identify how this time can be given back to the Day Ahead algorithm computation.
  - › **Intraday Auctions (Art. 55 CACM Regulation):** All TSOs together with the NEMOs will enter in 2023 the testing phase of the Intraday Auctions according to the decision from ACER on the pricing of intraday. The go-live is planned for Q2 2024, more than 1 year beyond the legal deadline.
  - › **Capacity Calculation Regions (Art. 15 CACM Regulation):** The work on CCR assessment and definition, in accordance with ACER Decision No 04/2021 of 7 May 2021 on the determination of CCRs. TSOs have developed the first part of the framework, which is part of the Capacity Calculation report from 2023. The application of this framework will be due by three months after the implementation of the first version of the regional operational security coordination, in accordance with Article 76(1) of the SOGL in the Core CCR.
  - › **The definition of the capacity calculation region** is to be revised to consider:
    - \_ the upcoming interconnector between France and Ireland expected to go-live in the coming years; and
    - \_ ITN – Core merger for the day ahead timeframe according to the request from ACER on 17 July 2023.
- Regarding the CCRs of the EnC countries, the default CCR configurations have been outlined to be transposed in the EnC contracting parties by 31 December 2023. The outlined configurations can be amended at any time by the proposal of all TSOs, developed in consultation with the EnC TSOs, and approved by ACER. A proposal of all TSOs is only required in case of the adjustments/amendments to the default CCR configurations.



## Internal Energy Market Regulation Bidding Zone Review (Art. 14(6) Electricity Regulation)

Following ACER Decision No 29/2020 of 24 November 2020 on the methodology and assumptions to be used in the Bidding Zone Review (BZR) process in accordance with Art. 14(5) Electricity Regulation, all BZR Regions (except the Baltic region) delivered the locational marginal prices (LMP) by 31 March 2022. These have been used as input for ACER to propose alternative configurations for the BZR. The delivery of the alternative configurations for the BZR by ACER has triggered the BZR for the Nordic and Central BZR Regions, which began on 8 August 2022.

During the BZR process, the alternative Bidding Zone configurations are assessed based on a wide variety of indicators including overall economic efficiency and social welfare, market liquidity, transition costs and the ability to maintain operational security of the grid.

In this BZR, ENTSO-E will lead the pan-EU studies on transition, liquidity and transaction costs, coordinate the different BZR Regions and deal with the stakeholder's management and the envisaged public consultation.

The Regulation gives 12 months to the TSOs to finalise the BZR. The BZR process is characterised by the unprecedented complexity, scale and effort required. The participating TSOs remain fully dedicated and committed to this effort and are doing their utmost best to finalise it as soon as feasible. An updated estimate regarding the timeline will be communicated separately. Due to the described complexity of the exercise, even though the review was triggered in August 2022, the work on the BZR will continue in 2024.

## Forward Capacity Allocation Guideline

FCA Regulation sets out the rules for cross-zonal capacity calculation and allocation in the long-term timeframe. The implementation of the FCA Regulation is completed at the pan-European level. Nevertheless, implementation of the methodologies remains ongoing, and regular amendments of the methodologies are being performed to ensure the consistency of the full system.

Long-Term Flow-Based Allocation implementation: To allow for a timely implementation of the long-term flow-based in the Core (go-live Q1 2025) and Nordic CCR (go-live Q1 2025), all TSOs will continue to follow up on the implementation of the requirements set out in the single allocation platform (SAP requirements – Art. 49 FCA Regulation); the congestion income distribution methodology (CID – Art. 57 FCA

Regulation) and the methodology for sharing costs incurred to ensure the firmness and remuneration of long-term transmission rights (Art. 61 FCA Regulation).

The harmonised allocation rules pursuant to Art. 51 FCA will be revised until March 2025 according to the biennial rhythm and will also consider the necessary changes to implement the long-term flow-based approach.

FCA amendments: All TSOs and ENTSO-E will prepare to contribute to the amendment proposal of the FCA Regulation following ACER's public consultation on Long Term design (June 2022). The framework of the work is still to be defined as no official request has yet been triggered on the amendment of this Regulation.

## Electricity Balancing Guideline

Regulation (EU) 2017/2195 establishing a guideline on electricity balancing (EB Regulation) lays down a detailed guideline on electricity balancing. The implementation of EB Regulation and the methodologies that stem from it

entails several tasks for TSOs at the pan-European and regional levels. Work at the pan-European level is facilitated by ENTSO-E. During 2024, ENTSO-E will continue to advance the implementation of EB Regulation.

## Harmonisation of Cross-Zonal Capacity allocation processes

In accordance with ACER Decision No 11/2023 of 19 July 2023 on the TSOs' proposal for the harmonised cross-zonal capacity allocation methodology, as a first step All TSOs will need to submit additional amendments to this methodology by 31 July 2024; further amendments are expected after gaining some operational data. In addition, All TSOs will

continue the work on the implementation of the Harmonised Cross-Zonal Capacity allocation processes for the exchange of balancing capacity or sharing of reserves pursuant to Art. 38(3) EB Regulation and in accordance with the requirements of ACER Decision.

## European Balancing Platforms

In addition to drafting the All TSOs and ENTSO-E methodologies and supporting the regional ones where requested, ENTSO-E will continue to support the implementation and operation of the European balancing platforms. On 1 June 2022 the automatic Frequency Restoration Reserve Platform (PICASSO) went live and on 5 October 2022 the manual Frequency Restoration Reserve Platform (MARI) went live, completing the implementation of the four European balancing platforms. During 2024, TSOs with derogations will continue their accessions to the respective balancing platforms in accordance with the accession roadmaps.

In addition, in 2024 All TSOs will continue working on the capacity management IT solution – a common solution to all balancing platforms proposed by All TSOs – to increase the efficiency and robustness of the operation of the platforms.

Following regular practice, ENTSO-E will organise at least one public workshop on the European balancing platforms.

## Amendment proposals a) of the European methodology for balancing energy pricing and b) the Implementation Framework for aFRR Platform.

In the period between June and September 2023, all TSOs aimed to assess potential mitigation measures for high balancing energy prices. Based on that assessment, they propose amendments in both the IF for the European platform for the exchange of balancing energy from frequency restoration reserves with automatic activation (Art. 21 EB Regulation) and the Methodology for pricing balancing energy and cross-zonal capacity used for the exchange of balancing energy or operating the imbalance netting process (Art. 30(1) EB Regulation).

Following regular practice, All TSOs will organise a public consultation and at least one public webinar to facilitate this consultation. Potential proposals for amendments are expected to be submitted in January 2024.



## 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 in addition to KOSTT and National Grid ESO. It offers a single frame for compensating European TSOs for costs associated with hosting transit flows. The ITC mechanism is governed by Art. 49 Electricity Regulation. It is further specified by Regulation (EU) No 838/2010 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 for scheduled energy exchanges with ITC Parties.

Two TSOs are the Data Administrators 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 Data Administrator covers a specific geographical area.

In 2024, as 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 Regulation. 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.

## Future Improvements and Changes to the ITC Mechanism

Given the incidence of the high electricity market prices on ITC Losses costs in 2022 and 2023, ENTSO-E and ITC TSOs will follow up on its review of the ITC Mechanism in cooperation with ACER and the EC. The aim in 2024 will be to implement the agreed changes based on a thorough review of today's ITC mechanism.

In addition, ENTSO-E and ITC TSOs aim to finalise their review of Ukraine and Moldova's accession requests to the ITC mechanism in cooperation with the EC and EnC Secretariat. If favourable, the focus shall be placed in 2024 on ensuring a smooth enlargement to those countries.

# 3. System Development

## Europe's Ten-Year Network Development Plan

The TYNDP (Art. 30(1)(b) and Art. 48 Electricity Regulation and Regulation (EU) 2022/869 on guidelines for trans-European energy infrastructure (TEN-E Regulation)) is the pan-European ten-year network development plan which provides a long-term vision of the power system, embedded in a multi-sector energy view. It is the foundation of European grid planning and the basis for transmission projects eligible to be labelled as 'Projects of Common/Mutual Interest'. It is published every two years by ENTSO-E.

The 2024 edition is planned to be released for public consultation in the third quarter of 2024 and to be submitted in the fourth quarter of 2024. TYNDP 2024 is the first edition subject to the newly revised TEN-E Regulation. This implies several novelties, mainly the development of a new Cost-Benefit Analysis (CBA) methodology submitted to Member

States, the European Commission and ACER in April 2023 and that will be implemented for the first time in TYNDP 2024. Another important new requirement in TYNDP 2024 is the development of Offshore Network Development Plans (further information is provided below). The revised TEN-E also foresees the release of an 'Infrastructure Gaps Report' already present in previous TYNDP editions as the System Needs study.

The TYNDP provides a benchmark for transmission network development (scenarios, system needs, development solutions and project assessment). The pan-European system development is coordinated and linked with national planning needs, identifying synergies, when relevant, between European, regional and national studies, and utilising the expertise of the regional and local context of TSOs.

### Scenarios

The first step in the preparation of the TYNDP is the building of long-term European full energy scenarios. The work on the 2024 scenarios jointly by ENTSO-E and ENTSG began in 2022 and continues until early 2024, with strong stakeholder engagement. TYNDP 2024 scenarios already partly implement the recommendations expressed in ACER's Framework Guidelines, released in January 2023, in particular in

engaging with external technical experts with the set-up of the Scenarios External Technical Advisory Group. The Group begins its activities in Q4 2023 and will provide feedback on the 2024 scenarios process feeding into the 2026 process. Development of the TYNDP 2026 scenarios, which will begin in early 2024, will consider the full ACER Framework Guidelines.

### Offshore network development plans

ENTSO-E has a new mandate to develop strategic Offshore Network Development Plans for each European Sea basin as part of the TYNDP. Those strategic plans "shall provide a high-level outlook on offshore generation capacities potential and resulting offshore grid needs, including potential needs for interconnectors, hybrid projects, radial connections, reinforcements and hydrogen infrastructure" (revised TEN-E, Art. 14.2). Another part, to be delivered 1.5 years later, will "present the results of the application of the cost benefit and cost-sharing to the priority offshore grid corridors." (TEN-E, Art. 15.2). The

responsibility of developing guidance on the respective methodology lies with the European Commission, whereas the responsibility related to offshore generation capacities and respective locations lies with the Member States organised in the offshore priority corridors under the TEN-E Regulation.

The first edition of the Offshore Network Development Plans will be delivered in January 2024.



# The European Resource Adequacy Assessment

Under Art. 23 Electricity Regulation, ENTSO-E is mandated to perform a yearly ERAA. 'Resource adequacy' can be defined as the continuous balance between net available resource on the one hand and net demand levels on the other hand. ERAA is based upon a state-of-the-art probabilistic analysis, aiming to model and analyse possible events with potentially adverse consequences for the supply of electric power.

ERAA 2024 will be the fourth edition of the ERAA based on the ERAA methodology approved by ACER decision No 24/2020 of 2 October 2020, building on the first editions ERAA 2021 – 2022 and 2023. ERAA brings significant

methodological improvements compared to previous publications. The implementation of the ERAA builds on ENTSO-E's advancing experience as well as ACER's and feedback received from other stakeholders.

The ERAA 2024 package will be released and provided for consultation in November 2024. It will contain the findings of the study and provide a description of the process, input data, main assumptions and methodological advancements. The delivery also builds on regular consultations and workshops with stakeholders throughout the full project timeline.

## Seasonal outlooks

ENTSO-E's Winter and Summer Outlooks (Article 9 (2), Regulation (EU) 2019/941) 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 in addition to 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 the ERAA, including the Climate Database, Pan-European Market Modelling Data base and demand forecast tool.

In 2022, the Winter Outlook was a particular focus to address the energy crisis, with a strong priority regarding resource and anticipation and additional sensitivity studies. This can also be expected in winter 2023 – 2024 and possibly also 2024 – 2025 depending on the evolution of the European energy market.



## Connection Network Codes

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

Based on ENTSO-E's implementation monitoring reports, new tasks from the Electricity Regulation, TSOs' experiences from national implementations and issues discussed in the European Stakeholder Committees or their Expert Groups (EGs), ENTSO-E has prepared detailed high priority proposals for amending the CNCs. In 2024, the process on the CNCs (NC RfG and NC DC only) amendment, initiated by ACER in 2022 according to Art. 60 of Electricity Regulation – including the submission of ENTSO-E's proposals and with an expected milestone of ACER's recommendation to the European Commission by the end of the year 2023 – will imply ENTSE's collaboration with the European Commission in 2024 towards the finalisation of the process. In addition, ENTSO-E will, in an analogue manner, participate in the amendment process of the Network Code HVDC. The amendment process on the NC HVDC is expected to be initiated in

late 2023 by ACER and follows a similar roadmap to that of the NC RfG and NC DC, during 2024.

ENTSO-E is planning to continue assessing the list of the Implementation Guidance Documents (IGDs) over 2024, according to Art. 58 NC RfG, Art. 56 NC DC and Art. 75 NC HVDC. 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. Revisions or the creation of new IGDs is likely to support the amendment proposals for upcoming national implementations.

Furthermore, ENTSO-E will continue monitoring and providing recommendations where relevant on both existing and new European standards as mandated by Art. 7.3.f NC RfG, Art. 6.3.f NC DC and Art. 5.3.f NC HVDC. A continuous gap analysis will continue to support the overall CNC assessment, trigger the revision of some standards, and achieve better alignment between standards and Network Codes.

In addition, ENTSO-E will perform the yearly process mandated by Art. 59.2 NC RfG and Art. 76.2 NC HVDC and requested by ACER in their letters from 14 March 2017 on NC RfG and on NC HVDC, regarding the collection and submission to ACER of information from TSOs and DSOs about the compliance (and still non-compliance) of the installed generation capacities and HVDC systems.

## 4. Transparency Regulation

Regulation (EU) No 543/2013 on the submission and publication of data in electricity markets (Transparency Regulation) sets out the criteria for data submission and its publication on a centralised platform, namely the ENTSO-E Transparency Platform (TP).

In line with the requirements set out in Art. 5 of the Transparency Regulation, to facilitate the harmonised data submissions to the platform, ENTSO-E developed a Manual of Procedures (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 Single Intraday Coupling, the SAP and European Balancing Platforms.

### TP implementation to comply with the updated Manual of Procedures (MoP v3r4)

As required by Regulation (EU) No 543 / 2013, the MoP of the TP was revised and updated in 2023. The new release includes amendments to the continuous allocation and Nordic flow-based publications. Flow-based allocation is to be implemented in the long-term explicit allocations in at least Nordic and Core CCRs by the end of 2024, following the amendment of the regional Long-Term Capacity Calculation methodologies. The switch from Net Transfer capacities (NTC) to a Flow-based approach in the long-term timeframe in these

two regions has different implications, from methodology amendments to new IT developments or to new processes. These amendments will impact the current data publications and will generate new data publication requirements on the ENTSO-E TP, from which the users will benefit. Therefore, the TP needs to become able to process and publish flow-based parameters accordingly by the project go-live. The implementation of these amendments on the TP is foreseen by the end of Q1 2024.

### Finalisation of the TP architecture implementation

Following the improvements of the Graphical User Interface (GUI) and of the back-end architecture to handle ever increasing data publications, the complete set of data items stored in the TP will be migrated to the renovated platform through several major releases.

The last implementation will bring increased robustness through enhanced functionalities and hosting capabilities, without any technical impact on data providers or on the end users.

### Development of CACM 2.0 requirements

The CACM Guideline draft revision indicates new publication requirements for the ENTSO-E TP. It is foreseen that a methodology for the new publications shall be developed in collaboration with all TSOs and NEMOs.

Although the process was on hold due to the energy crisis, it is foreseen that in 2024 the new publication requirements will lead to new implementations on the TP.

## Data quality improvements

The update of the Memorandum of Understanding (MoU) was finalised in 2023, including upgrades to the existing quality requirements and the addition of new quality requirements for data items stemming from balancing IFs and

amendments due to BREXIT. According to the updated MoU, ENTSO-E will continue monitoring the quality and completeness of the data submitted by the data providers of the TP.

## Implementation of new data items for statistical purposes

The data items in the Statistical Data Portal will be implemented on the TP. This change will replace the existing reports containing aggregated operational data, and it will

enable the submission and publications of data primarily intended for statistical purposes.

## TP Strategy

The ever-increasing publication requirements on the TP and increasing number of TP users calls for a development of TP vision and strategy to further contribute to net zero and better qualify TP as an advisor for specialists, politics and the broader public. The work done on this during 2023 is foreseen to be implemented in 2024.

As per the TP Vision & Strategy 2030 agreed within ENTSO-E after the Transparency Platform external survey, a new project will begin in 2024 to re-invent the current TP mobile application. The scope of the project is to identify

the requirements/scope for the new TP mobile application (Phase 1: Discovery) and implement the requirements (Phase 2: Implementation). To enlist the requirements/scope, relevant stakeholders need to be involved, and their suggestion need to be gathered and evaluated by the project team in 2024. TSO experts and relevant parties from the ENTSO-E Transparency User Group shall be consulted to gather requirements. IT development of the application is planned for the year 2025. The TP mobile application project is contingent upon the priorities and availability of resources.

## ACER Data Exchange

Pursuant to Articles 30(1), 30(2) and 32 Regulation (EU) 2019/943 (previously Articles 8(8), 8(9) and 9(1) of Regulation (EC) No 714/2009), as well as Article 82(4)(5) of CACM and Article 63(3) of the FCA, ENTSO-E shall make available to ACER data included in the CACM and FCA lists of information, as agreed between ACER and ENTSO-E. TSOs shall submit these data items to ENTSO-E once the capacity calculation methodologies in their respective CCR become compliant with CACM and with the FCA. ENTSO-E will provide the data to ACER to complete its monitoring activities.

The TP is already set up to accommodate the submission of data which is part of the CACM list of information by the different CCRs. With more capacity calculation methodologies going live in the different CCRs, more data will become available on the TP and to ACER from the respective TSOs.

To facilitate the provision of data from the FCA list of information on the TP, the functionality of the TP will be extended. With the completion of the IT development on the TP, TSOs will be able to submit the data required under the FCA list of information on the TP. In a similar manner to the data becoming available from the CACM list of information, increasing amounts of data from the FCA list of information will become available and provided on the TP as increasing numbers of long-term capacity calculation methodologies go live in the different CCRs.

Data submitted on the TP for the purpose of fulfilling the requirements of data provision as part of the CACM and FCA lists of information are shared with ACER only for its monitoring activities and are not publicly available.



# 5. Research & Development

## Digitalisation, Electrification & Cooperation

ENTSO-E's Research, Development, and Innovation (RDI) activities, as legally mandated by Art. 30(1)(i) Electricity Regulation, involve the coordination of research, development and innovation planning of TSOs and the deployment of those plans through efficient research programmes. In 2024, ENTSO-E will publish the new version of its RDI Roadmap for the period 2024–2034. This long-term planning document designates the milestones to be reached by the TSOs to support the EU's energy and climate objectives in 2030 and climate neutrality by 2050. The RDI Roadmap 2024–2034 is a direct continuation of the previous version (RDI Roadmap 2020–2030). However, the new edition will be aligned with the 2030 Energy and Climate Policy Framework regarding priorities, technological advancements and the emerging needs of the TSOs identified during the previous four years. This evolution ensures that the RDI efforts of the TSOs address the commonly developed priority goals in ensuring a sustainable, affordable and secure electricity system.

The RDI Roadmap 2024–2034 will focus on those topics related to digitalisation, the deep electrification of the energy system and the integration of state-of-the-art technologies. While still based on the 6 RDI Flagships 1 identified in 2020, the new RDI Roadmap will investigate further in its programmes the flexibility needs on a system level, the challenges and opportunities of the smart integration of sectors

(such as transport, heating or hydrogen), the new approaches required for the stability management, and the solutions which digitalisation can bring to the electricity system.

The latter supports the implementation of the EU Action Plan for Digitalizing the Energy System which, among other objectives, tackles the promotion of investments in digital energy infrastructure and the strengthening of cybersecurity and resilience of the energy system. As such, ENTSO-E and the EU DSO Entity will work in 2024 on the development of a common framework for digital developments and solutions: a digital twin of sophisticated virtual models for the European electricity grid to enhance the efficiency and smartness of the grid. In addition, ENTSO-E will also maintain strong cooperation with policymakers, regulators and stakeholders across the European research and innovation sphere for enhanced stakeholder engagement. ENTSO-E participates in the EU-endorsed European Technology & Innovation Platforms on Smart Networks for Energy Transition Platform (ETIP SNET) and other activities under the umbrella of the European Commission's Strategic Energy Technology (SET) plan.

In 2024, ENTSO-E will continue facilitating proposals for the Horizon Europe calls and foster TSO participation in European RDI projects, SET Plan for HVDC and DC Technologies and ETIP SNET, together with strategic stakeholders.

### ENTSO-E will be involved in 2024 in the following EU-funded projects:

- 1. OneNet (2020–2024)**, the largest project of its kind with 72 partners, of which 14 are TSOs, has as a main objective to develop an open and flexible architecture to make the European electricity system smarter and more efficient. The project aims to investigate how the local flexibility markets could be most efficiently connected to the wholesale markets, with a strong focus on TSO–DSO coordination. OneNet continues the work done in the INTERRFACE and CoordiNet projects, bringing closer the flexibility platforms' deployment into the business environment.
- 2. IntNET (2022–2025)** consists of 12 partners (among those ENTSO-E stakeholders E.DSO and Florence School of Regulation) and aims to create a common knowledge base for interoperability activities on energy services in Europe and to develop a comprehensive and accepted Interoperability Maturity Mode.
- 3. TwinEU project (2024–2026)** is a new project involving 77 partners across 15 EU countries, with 12 TSOs directly involved in the project and 2 more as associated entities. The TwinEU project aims to create an adaptable federated Pan-European digital twin ecosystem to enable a reliable, resilient and safe operation of the infrastructure while facilitating new business models that will accelerate the deployment of renewable energy sources in Europe.

# 6. New Network Codes, Guidelines and Regulations

## Network Code Demand Response

On 9 March 2023, in accordance with Article 59(9) of Regulation (EU) 2019/943, the European Commission requested that the EU DSO Entity, in cooperation with ENTSO-E, submit a proposal for a Network Code on Demand Response in line with the ACER Framework Guideline on Demand Response. Both Associations shall run a public consultation prior to submission of the final proposal to ACER in March 2024,

following which it will be reviewed by the European Commission. ENTSO-E and the EU DSO Entity will also collaborate to establish the framework for the implementation of this new Network Code, which will include new tasks for both Associations e. g. monitoring duties and the potential further harmonisation of methodologies.

## Network Code Cybersecurity

On 23 July 2021, the European Commission requested that ENTSO-E, in close collaboration with the EU DSO entity and in accordance with Article 59(9) of Electricity Regulation, submit a proposal for a Network Code on Cybersecurity (NCCS) aspects of cross-border electricity flows, including rules on risk assessments, common minimum requirements, planning, monitoring, reporting and crisis management, by 14 January 2022 to ACER. ACER submitted the revised NCCS, in consultation with ENTSO-E and the EU DSO Entity, on 6 July 2022, followed by the review procedure of the Commission regarding the adoption of the Delegated Act.

During 2024, all the entities falling under the scope of this Network Code shall perform activities to comply with the legal obligations.

**For ENTSO-E, in close collaboration with the EU DSO entity, this would mainly, but not exclusively, mean the activities on:**

- › co-chairing the Cybersecurity Risk Working Group;
- › supporting ACER in issuing non-binding performance indicators;
- › developing the cybersecurity risk assessment methodologies;
- › developing the cybersecurity incidents classification scale methodology;
- › supporting entities in developing capabilities to handle detected cybersecurity incidents;
- › performing a feasibility study to develop a common tool to share incidents; and
- › preparing a template to perform cybersecurity exercises.

## Implementing Acts Data Interoperability

ENTSO-E is part of the Editorial Team of Smart Grids Task Force Expert Group 1, which is developing the implementing acts on interoperability requirements and procedures for access to data, to be adopted by the European Commission as required by Article 24(2) of Directive (EU) 2019/944. The first implementing act deals with general interoperability requirements and metering and consumption data. It was drafted in 2022, and its entry into force is expected in Q2 2023. The second implementing act deals with customer switching master data and demand response master data. This act is currently being developed by the Editorial Team led

by the European Commission, in which ENTSO-E participates. Its entry into force is expected in 2024.

In particular, the draft of the first implementing act foresees the establishment of a Joint Working Group between ENTSO-E and the EU DSO entity. This Joint Working Group will have to cooperate with all relevant stakeholders, including representatives of national regulatory authorities, consumer associations, electricity retailers, European standardisation organisations, service and technology providers, and equipment and component manufacturers.



## Tasks of the Joint Working Group

**The main tasks of the Joint Working Group shall include:**

1. developing guidance to assist Member States in the reporting of national practices;
2. collecting the reports of national practices provided by Member States regarding the implementation of the reference model;
3. publishing the reports of national practices in a publicly available repository which shall be kept up to date;
4. assisting the European Commission in the monitoring of the implementation of the reference model included in the first implementing act and its further development as a result of regulatory, market or technology changes; and
5. support the European Commission, upon its request, in developing, as part of future implementing acts, interoperability requirements and non-discriminatory and transparent procedures for access to data required for customer switching, demand response, and other services<sup>1</sup>.

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<sup>1</sup> ENTSO-E currently participates in the Editorial Team led by the European Commission in charge of developing the second implementing act dealing with master data, customer switching, demand response and other services. Once the first implementing act is in force and the Joint Working Group established, ENTSO-E as such will no longer participate in the Editorial Team; the Joint Working Group will take over this drafting support instead.

# 7. Cooperation on the Transmission & Distribution Interface

Regulation (EU) 2019/943 requires ENTSO-E to cooperate with the EU DSO Entity and Distribution System Operators (DSOs). In this vein, in January 2022, ENTSO-E and the EU DSO Entity signed an MoU which further specifies the principles of this cooperation. This MoU covers the following areas described in this chapter and is complemented by a specific common work plan updated every year.

## Network Codes and Guidelines

ENTSO-E will pursue the ongoing cooperation with the EU DSO Entity on the development of an European framework for demand-side flexibility (see chapter 6). ENTSO-E also strives to align positions with the EU DSO Entity on amendments of

existing Network Codes and guidelines. Cooperation will also continue regarding the implementation of the Cybersecurity Network Code (see chapter 6).

## Cooperation on applying best practices on operation and planning of the transmission and the distribution systems

Based on Article 55(2) of Regulation (EU) 2019/943, ENTSO-E will strengthen its cooperation with the EU DSO Entity in various areas pertaining to the planning and operation of the transmission and distribution systems. Related to system planning, ENTSO-E will further involve DSOs in the TYNDP 2024 and 2026 besides common scenarios building. It aims to exchange and promote best practices on TSO – DSO cooperation for network development at the national level. Both Associations will also work together in the development of new implementing acts and maintenance of reference model for data interoperability and access (see chapter 6).

Related to research and development, ENTSO-E will continue to work together with the EU DSO Entity in 2024 on the implementation of the EU Action Plan Digitalizing the Energy Sector, including the development of a framework for the digital twin of the electricity grid. In addition, ENTSO-E and the EU DSO Entity might also organise, on an ad hoc basis, a series of thematic workshops focusing on planning and operational issues as well as more forward-looking discussions on topics such as the realisation of an ENTSO-E Vision of a power system for a carbon-neutral Europe.



## 8. Interoperability and Data

ENTSO-E develops and maintains the Electronic Data Interchange (EDI) library and the Common Grid Model Exchange Standard (CGMES) library. These gather documents and definitions for the harmonisation and implementation of standardised electronic data interchanges to enable interoperability between actors in the European electrical industry.

ENTSO-E also maintains and develops the tooling necessary for data exchange harmonisation. In accordance with Art. 30(1)(k) of the Electricity Regulation, ENTSO-E should contribute to the establishment of interoperability requirements and non-discriminatory and transparent procedures for accessing data.

Main activities in 2024 will include the development of the Common Information Model (CIM) and implementation guides to support data exchanges required from the Network Codes

and Clean Energy Package; work on international standards; updating the CGMES; maintaining the harmonised role model, participating in the Joint Working Group and contributing to the development, implementation and monitoring of data interoperability implementing acts and access; contributing to Common Energy Data Space and Digital Twin discussions as foreseen in DESAP; implementing Art. 55(2)(a, b, c) of the Electricity Regulation and Art. 24 of the Electricity Directive; and training activities for the TSO–RCC community.



# 9. Monitoring and Reporting activities

## Related to the Market activities

All relevant NEMOs and TSOs will provide a yearly report to the regulatory authorities explaining the costs of establishing, amending and operating single day-ahead and intraday coupling in accordance with Art. 80 of the CACM Regulation. Furthermore, a yearly report pursuant to Art. 23 of the EB Regulation will be prepared and will focus on the costs of establishing, amending and operating the European balancing energy platforms.

In addition, ENTSO-E will publish a yearly Market Report to outline the work achieved by European TSOs, in cooperation with their stakeholders, in implementing the CACM Regulation, the FCA Regulation and the EB Regulation. These Regulations are aimed at integrating the European electricity wholesale and balancing markets.

Furthermore, a detailed biennial Balancing Report in accordance with Art. 59(2) (a) of the EB Regulation will be published. The Balancing Report describes the design and implementation of balancing markets at pan-European, regional and national levels. It also emphasises cross-border balancing capacity procurement, the development and harmonisation of methodologies, balancing energy platforms and the imbalance settlement harmonisation process.

## Related to the System Operation,

ENTSO-E continues to fulfil the reporting obligations according to Art. 15 of the Commission Regulation (EU) 2017/1485 (SOGL) for the incident classification scale and Art. 16 SOGL for the load frequency control annual reports.

## For the monitoring and reporting of Regional Coordination activities:

ENTSO-E will provide the Annual Regional Coordination Assessment report pursuant to Art 17. in SO GL. Under Article 17 of SO GL, ENTSO-E has the obligation to publish an annual report on regional coordination assessment. The report aims to document the implementation and operational monitoring of the RCC services. It contains Key Performance Indicators (KPIs) for the services provided by the RCCs. As long as a service is not fully implemented, RCCs can use this report to show whether a legacy service is in place, what this consists of and the progress for implementing the service based on the regulatory framework. In addition, each RCC will publish a report on the RCC activities pursuant to Art. 46 of the Electricity Regulation. This report covers the RCC operational performance, cost and shortcomings.

# Annexes



# Annex 1: List of Abbreviations

<b>ACER</b>	Agency for the Cooperation of Energy Regulators	<b>EB GL</b>	Regulation (EU) 2017/2195 establishing a guideline on electricity balancing
<b>AFIR</b>	Alternative Fuel Infrastructure Regulation	<b>ECCo SP</b>	ENTSO-E's Communication and Connectivity Service Platform
<b>aFRR</b>	automatic Frequency Restoration Reserves	<b>EDI</b>	Electronic Data Interchange
<b>AWP</b>	Annual Work Programme	<b>EED</b>	Energy Efficiency Directive
<b>BZ</b>	Bidding Zone	<b>EG</b>	Expert Group
<b>BZR</b>	Bidding Zone Review	<b>EMS</b>	Energy Management Systems
<b>CACM</b>	Capacity allocation and congestion management	<b>EnC</b>	Energy Community
<b>CBA</b>	Cost Benefit Analysis	<b>ENTSO-E</b>	European Network of Transmission System Operators
<b>CC</b>	Capacity Calculation	<b>ENTSOG</b>	European Network of Transmission System Operators for Gas
<b>CCC</b>	Coordinated Capacity Calculation	<b>ERAA</b>	European Resource Adequacy Assessment
<b>CCR</b>	Capacity Calculation Region	<b>ETIP SNET</b>	European Technology & Innovation Platforms on Smart Networks for Energy Transition Platform
<b>CfD</b>	Contracts for Difference	<b>EU</b>	European Union
<b>CGM</b>	Common Grid Model	<b>FCA Regulation</b>	Regulation (EU) 2016/1719 establishing a guideline on forward capacity allocation
<b>CGMES</b>	Common Grid Model Exchange Standard	<b>FSKar</b>	Financial Settlement of KΔf, ACE and ramping period
<b>CID</b>	Congestion Income Distribution	<b>GUI</b>	Graphical User Interface
<b>CIM</b>	Common Information Model	<b>HVDC</b>	Regulation (EU) 2016/1447 establishing a Network Code on requirements for the grid connection of high voltage direct current systems and direct current-connected power park modules
<b>CM</b>	Capacity Mechanism	<b>IEM Directive</b>	Directive (EU) 2019/944 on the internal market for electricity
<b>CMM</b>	Capacity Management module	<b>IEM Regulation</b>	Regulation (EU) 2019/943 on the internal market for electricity
<b>CNC</b>	Connection Network Code	<b>IGD</b>	Implementation Guidance Document
<b>CSA</b>	Coordinated Security Analysis		
<b>CSAM</b>	Coordinated Security Analysis Methodology		
<b>CZC</b>	Cross-zonal Capacity		
<b>DSF</b>	Demand Side Flexibility		
<b>DSO</b>	Distribution System Operator		
<b>EAS</b>	European Awareness System		












<b>IGM</b>	Individual Grid Model	<b>RfG</b>	Regulation (EU) 2016/631 establishing a Network Code on requirements for grid connection of generators
<b>IFs</b>	Implementation Frameworks		
<b>IGDs</b>	Implementation Guidance Documents	<b>RG CE</b>	Regional Group Continental Europe
<b>IN</b>	Imbalance Netting		
<b>ITC</b>	Inter Transmission System Operator Compensation	<b>Risk Preparedness Regulation</b>	Regulation (EU) 2019/941 on risk-preparedness in the electricity sector
<b>KPI</b>	Key Performance Indicator	<b>RPP</b>	Risk Preparedness Plan
<b>LMP</b>	Local Marginal Pricing	<b>RSC</b>	Regional Security Coordinator
<b>mFRR</b>	manual Frequency Restoration Reserves	<b>SAFA</b>	Synchronous Area Framework Agreement
<b>MoP</b>	Manual of Procedures	<b>SAP</b>	Single Allocation Platform
<b>MoU</b>	Memorandum of Understanding	<b>SCADA</b>	Supervisory Control and Data Acquisition
<b>NC DSR</b>	Network Code on Demand Side Response	<b>SET</b>	Strategic Energy Technology
<b>NC ER</b>	Regulation (EU) 2017/2196 establishing a Network Code on electricity emergency and restoration	<b>SOGL</b>	Regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation
<b>NCCS</b>	Network Code on Cybersecurity	<b>SOR</b>	System Operation Region
<b>NEMO</b>	Nominated Electricity Market Operators	<b>STA</b>	Short-term Adequacy
<b>NRA</b>	National Regulatory Authority	<b>StG ReC</b>	Steering Group Regional Coordination
<b>NTC</b>	Net Transfer capacities	<b>TEN-E Regulation</b>	Regulation (EU) 2022/869 on guidelines for trans-European energy infrastructure
<b>OPC</b>	Outage Planning Coordination		
<b>OPDE</b>	Operational Planning Data Environment	<b>TP</b>	Transparency Platform
<b>PCN</b>	Physical Communication Network	<b>Transparency Regulation</b>	Regulation (EU) No 543/2013 on the submission and publication of data in electricity markets
<b>PPAs</b>	Power Purchase Agreements	<b>TSOs</b>	Transmission System Operators
<b>RCC</b>	Regional Coordination Centre	<b>TYNDP</b>	Ten-Year Network Development Plan
<b>RDI</b>	Research, Development and Innovation		
<b>RED III</b>	Renewable Energy Sources Directive	<b>WAMS</b>	Wide Area Monitoring System

# Annex 2: List of Deliverables

Topic	Regulation	Article	Level 1   Article   content/activity	J	F	M	A	M	J	J	A	S	O	N	D
<b>MARKETS</b>															
BZ	Reg 2019/943	A. 14.6	Bidding Zone Review												
BZ	Reg 2019/943	A. 14.2	Bidding Zone technical report												
CACM	Reg 2015/1222	A. 10	Day-to-day management of the single day-ahead and intraday coupling												
CACM	Reg 2019/943	A. 8.4	Implementation of 15 minute products in ID and DA												
CACM	Reg 2019/943	A. 15	CCR determination – possible relevant amendments												
CACM	Reg 2015/1222	A. 49, A. 56	Review of the Scheduled Exchanges methodologies												
CACM	Reg 2019/943	A. 44	Review of the regional fallback procedures												
CACM	Reg 2015/1222 ACER decision No 04/2021	A. 15	CCR determination – future assessment of Hansa, Nordic and Core												
CACM	Reg 2015/1222	A. 15	CCR determination – Celtic cable/Core – IT North												
CACM	Reg 2015/1222	A. 37.6	NEMOs review of the algorithm methodology in cooperation with TSOs												
FCA	Reg. 2016/1719	A. 49, A. 57 and A. 61	Implementation of Long Term Flow based in accordance with A. 49, A. 57 and A. 61												
FCA	Reg. 2016/1719	A. 51	Harmonised allocation Rules (FCA A. 51)												
EB	Reg 2017/2195	A. 20.6	Implementation of mFRR Platform												
EB	Reg 2017/2195	A. 21.6	Implementation of aFRR-Platform												
EB	Reg 2017/2195	A. 22.5	Implementation of IN-Platform												
EB	Reg 2017/2195	A. 21	Proposal for amendment of the implementation framework of aFRR-Platform.												
EB	Reg 2017/2195	A. 30(1)	Proposal for amendments of the Methodology for pricing balancing energy and cross-zonal capacity used for the exchange of balancing energy or operating the IN process.												
Monitoring CACM	Reg 1222/2015	A. 80.2	Annual CACM cost report												
Monitoring CACM	Reg 1222/2015	A. 82.2	Monitor the implementation of single day-ahead and intraday coupling including progress and potential problems with the implementation												
Monitoring CACM	Reg 1222/2015	A. 82.4 & A. 82.5	Collect data from TSOs/CCRs based on the list of information agreed between ACER and ENTSO-E. Data is to be submitted following the go live of the methodologies in each CCR and on a six month basis following that. The data will be made available to ACER in order to complete its monitoring activities. <sup>2</sup>												
Monitoring CACM	Reg 1222/2015	A. 31.2	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 including the progress and potential problems with the implementation												
Monitoring FCA	Reg 2016/1719	A. 63.3 & A. 63.4	Collect data from TSOs/CCRs based on the list of information agreed between ACER and ENTSO-E. Data is to be submitted following the go live of the methodologies in each CCR and on a six month basis following that. The data will be made available to ACER to complete its monitoring activities.												
Monitoring FCA	Reg 2016/1719	A. 26.2	Capacity Calculation and allocation report												
Monitoring EB	Reg 2017/2195	A. 23.1	Report on costs of establishing, amending and operating European balancing platforms												
Monitoring EB	Reg 2017/2195	A. 63.1	Monitoring of the implementation of the EB												

2 The deadline applies to CCRs whose methodologies are compliant with CACM. For the rest of the CCRs, the submission deadline will depend on their go-live date.

 TSO process for developing methodology	 TSO deadline for submitting proposal	 Public Consultation	 Workshop
 Implementation	 Implementation Deadline	 ACER Decision preparation	 ACER Decision publication
 European Commission approval			

Topic	Regulation	Article	Level 1   Article   content/activity	J	F	M	A	M	J	J	A	S	O	N	D
NC DSR	Reg. 2019/943	A. 59.1.e (NC DSR)	Rules implementing A. 57 of this Regulation and A. 17, 31, 32, 36, 40 and 54 of Directive (EU) 2019/944 in relation to demand response, including rules on aggregation, energy storage and demand curtailment rules												
Capacity Mechanisms	Regulation 2019/943	A. 26.11	Annual Report on Cross-Border Participation to Capacity Mechanisms. (Technical specifications for cross-border participation in capacity mechanisms A. 25 <sup>3</sup> )												
TP	Reg 2013/543		Continuation of TP back-end architecture and front-end implementation												
TP	Reg 2013/543		TP app development												
TEN-E	TEN-E		Preparatory work towards application of the cost-benefit and cost-sharing to the priority offshore grid corridors												
ITC	Reg 2010/838	Annex A A. 7.3	Collection of annual data, audit and publication of the perimeter fee												
ITC	Reg 2010/838	Annex A A. 4.3	Transit Losses Data Report												
Annual Work Programme	Reg 2019/943	A. 30.1.j	Adopt an Annual Work Programme												










\* Electricity Market Design reform implementation (Policymakers expect our involvement even if no legal mandate is given yet)

SYSTEM OPERATION				J	F	M	A	M	J	J	A	S	O	N	D
SOGL	Reg. 2017/1485	A. 114	Operate an ENTSOE operational planning data environment (OPDE) for the storage, exchange and management of all relevant information for the CGM Business Process.												
RCC	Reg 2019/943	A. 30.2	Report to ACER on shortcomings identified regarding the establishment and performance of RCCs.												
RCC	Reg 2019/943	A. 37.1.d	ENTSO-E shall develop proposals for RCC tasks – Consistency defense and restoration plans												
RCC	Reg 2019/943	A. 37.1.e	ENTSO-E shall develop proposals for RCC tasks – Short term adequacy												
RCC	Reg 2019/943	A. 37.1.f	ENTSO-E shall develop proposals for RCC tasks – Outage Planning Coordination												
RCC	Reg 2019/943	A. 41.2	ENTSO-E and RCCs shall operate transparently and Publish documents on websites, full transparency towards stakeholders												
RCC	Reg 2019/943	A. 46.3	ENTSO-E to receive from RCCs the RCC Annual Report												
RCC	Reg 2019/943	A. 37.1.h	ENTSO-E shall develop proposals for RCC tasks – supporting regional restoration												
RPP	Reg. 2019/941	A. 6	RPP crisis scenarios identification (update every 4 years)												
SOGL	Reg. 2017/1485	A. 65	Common list of year-ahead scenarios against which TSOs assess the operation of the interconnected transmission system for the following year												
SOGL	Reg. 2017/1485	A. 15	Annual incident classification scale report												
SOGL	Reg. 2017/1485	A. 16	Annual report on load-frequency control												
SOGL	Reg. 2017/1485	A. 17	Annual report on regional coordination assessment												
SOGL Regional	Reg. 2017/1485 Reg. 2017/2196	SOGL A. 13/A. 118 E & R A. 10	Agreements for Future Synchronous Operation between Continental Europe TSOs and Ukrenergo/Moldelectrica												
SOGL Regional	Reg. 2017/1485 Reg. 2017/2196	SOGL A. 13/A. 118 E & R A. 10	Agreement for Synchronous Operation between Continental Europe TSOs and KOSTT												
SOGL Regional	Reg. 2017/1485 Reg. 2017/2195 Reg. 2017/2196	SOGL A. 13/A. 118 EBGL A. 50, 51 E & R A. 10	RG CE: Implementation of SAFA methodologies (including FSKar)												
SOGL/CSAM	Reg. 2017/1485	A. 75.1/A. 44.1	Report on status on probabilistic risk management approaches and maturity												

### 3 Technical specifications for cross-border participation in capacity mechanisms

TSO process for developing methodology	TSO deadline for submitting proposal	Public Consultation	Workshop
Implementation	Implementation Deadline	ACER Decision preparation	ACER Decision publication
European Commission approval			

Topic	Regulation	Article	Level 1   Article   content/activity	J	F	M	A	M	J	J	A	S	O	N	D
SOGL	Reg. 2017/1485	A.14.2	Comprehensive, standardised format, digital data archive of the information required by ACER												
RGCE Operations	Reg. 2017/1485	A.156	RG CE: Implementation A.156 SO GL – TminLER for FCR (frequency containment reserves) by LER (low energy reservoirs)												
SOGL Regional	Reg. 2017/1485	SOGL A.118	CFI agreements of BS TSOs before synchronisation and adherence to SAFA after their synchronisation with SA CE												
RESEARCH, DEVELOPMENT & INNOVATION															
RDI			IntNET project work												
RDI	Reg 2019/943	A.30.1.i	RDI Roadmap 2024 – 2034												
RDI	Reg 2019/943	A.30.1.i	Initiation of projects based on the ongoing programmes												
RDI	Reg 2019/943	A.30.1.i	Development of new programmes												
RDI			OneNet project work												
RDI			ETIP SNET support (project work)												
RDI			Digitalisation of Energy Action Plan (DoESAP)												
RDI			Digital Twin of the European Electricity Grid (Dol implementation)												
RDI			TwinEU (project)												
RDI			ENTSO-E Vision Implementation												
EMDR			Methodology to assess flexibility needs (ENTSO-e and EU DSO)												
SYSTEM DEVELOPMENT															
Adequacy	Reg 2019/943	A.23	ERAA (European Resource Adequacy Assessment)												
Adequacy	Reg 2019/943	A.30.1.m	Summer Outlook												
Adequacy	Reg 2019/943	A.30.1.m	Winter Outlook												
DC	Reg. 2016/1388	A.56	Non-binding guidance on implementation of NC DC, explaining technical issues, conditions and interdependencies												
HVDC	Reg. 2016/1447	A.75	Non-binding guidance on implementation of NC HVDC, explaining technical issues, conditions and interdependencies												
HVDC	Reg. 2016/1447	A.76.2	NC HVDC List of information to ACER												
RfG	Reg. 2016/631	A.58	Non-binding guidance on implementation of NC RfG, explaining technical issues, conditions and interdependencies												
RfG	Reg. 2016/631	A.59.2	NC RfG List of information to ACER												
RfG, DC, HVDC	Reg. 2016/631, 2016/1388, 2016/1447	A.59.1, A.57.1, A.76.1	Monitoring (analysis and preparation of report) – joint CNCs report												
RfG, DC, HVDC	Reg. 2016/631, 2016/1388, 2016/1447	A.7.3.f & preamble 27, A.6.3.f & preamble 17, A.5.3.f & preamble 13	Monitoring of existing and under development standards												
TYNDP	TEN-E	A.11	CBA methodology												
TYNDP	TEN-E	A.12	TYNDP scenarios												
TYNDP	TEN-E	A.13	TYNDP gap analysis/system needs												
TYNDP	TEN-E	Annex III, 2, 1	TYNDP CBA												
TYNDP	TEN-E	A.15.2	Offshore Network Development Plans												
TYNDP	TEN-E	A.11, para 10 & 11	Interlinked model												
TEN-E	Reg. 2022/869	A.15	Application of the cost-benefit and cost-sharing to the priority offshore grid corridors												

 TSO process for developing methodology	 TSO deadline for submitting proposal	 Public Consultation	 Workshop
 Implementation	 Implementation Deadline	 ACER Decision preparation	 ACER Decision publication
 European Commission approval			



Topic	Regulation	Article	Level 1   Article   content/activity	J	F	M	A	M	J	J	A	S	O	N	D
ICTC															
Interoperability	Reg. 2019/944	A. 23 & 24	Draft Implementing acts on data access and data interoperability												
Interoperability	Reg. 2019/944	A. 23 & 24	Mandate from the implementing act on interoperability requirements (Joint Working Group with EU DSO)												
Cybersecurity	NCCS	A. 11.5	Support ACER in the issuing of non-binding performance indicators for the assessment of operational reliability related to the cyber-security aspects of cross-border electricity flows.												
Cybersecurity	NCCS	A. 14.2	Establish Cybersecurity Risk Working Group												
Cybersecurity	NCCS	A. 16	Develop proposals for the cybersecurity risk assessment methodologies												
Cybersecurity	NCCS	A. 34	Develop sets of cybersecurity procurement recommendations												
Cybersecurity	NCCS	A. 37.8.9	Perform feasibility study to develop a common tool												
Cybersecurity	NCCS	A. 38.3.6	Develop a cybersecurity incidents classification scale methodology												
Cybersecurity	NCCS	A. 48.1	Develop a transitional list of Union-wide high-impact and critical-impact processes												
Cybersecurity	NCCS	A. 48.6	Develop a transitional list of European and international standards and controls												
Cybersecurity	NCCS	A. 48.1.2.3	Develop transitional ECII												

- TSO process for developing methodology

Implementation

European Commission approval
- TSO deadline for submitting proposal

Implementation Deadline
- Public Consultation

ACER Decision preparation
- Workshop

ACER Decision publication

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## **Design**

DreiDreizehn GmbH, Berlin  
[www.313.de](http://www.313.de)

## **Images**

[istockphoto.com](https://www.istockphoto.com)

## **Publishing date**

May 2023