ENTSO-E Annual Report

2020 Edition

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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 42 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 use 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.

Foreword

We are honoured, as President and Chair of the Board, to present you the ENTSO-E Annual Report 2020. This report is listing all the achievements of the European TSO community during last year.

As regulated entities, acting under a clear legal mandate, the European TSOs share the common mission of ensuring the security of the European interconnected electricity system. They also are responsible for enabling the optimal functioning and development of interconnected markets and are cornerstone in the integration of renewable energy sources and emerging technologies.

This year's report shows again the commitment of TSOs in being key enablers of the climate neutrality objective by 2050 in line with the European Commission Green Deal's initiative.

Throughout 2020, despite exceptional circumstances brought by the Covid-19 pandemic, ENTSO-E has continued to pool TSO expertise at European level to put climate and energy policy objectives into practice.

The Annual Report is aimed at informing our stakeholders about the many solutions which TSOs develop together to complete the Internal Energy Market (IEM), foster the needed onshore/offshore grid developments, increase cooperation with DSOs and customer participation, and accelerate innovation in European energy systems.

ENTSO-E will continue facilitating cooperation among TSOs and with stakeholders in moving towards one system of interconnected systems – able to deliver on the 2050 objectives while maintaining system security, competitiveness and move the customer to centre stage.

President

Hervé Laffaye
ENTSO-E

Chair of the Board

Joachim Vanzetta
ENTSO-E

Introduction

ENTSO-E in 2020

This Annual Report covers the period from January to December 2020. It focuses on the legal mandates given to ENTSO-E. The activities covered in this report were performed thanks to the 42 members of ENTSO-E who provide its financial resources and whose staff provides expertise to the Association. The successful implementation of these activities also relies on the input provided by stakeholders via ENTSO-E's Independent Advisory Council, the Network Codes European Stakeholder Committees and other stakeholders groups, and via the public consultation processes.

This Annual Report will be submitted for stakeholders' views in a public consultation from 16 July to 12 August 2021. The consultation results and responses will be considered and the Annual Report will be subsequently submitted to ACER for opinion.

While ENTSO-E and TSOs are still implementing the Third Package, 2020 also saw the implementation of several legal mandates stemming from the Clean Energy Package (CEP).

In addition, while delivering legally mandated tasks, ENTSO-E also aims to support policy objectives, in particular the Green Deal, on a pan-European level. This ambition concerns all aspects of ENTSO-E's work as the increase of variable renewable generation and the electrification of several sectors, among others, impact all TSOs' activities. Concretely, this evolution has led, for example, TSOs to enhance the forecast, planning and regional coordination of real time operations. It has also pushed the introduction of new products to the energy markets as well as enhanced coordination with Distribution System Operators (DSOs) to develop new flexibility services. With both the planning and the research and development sides, ENTSO-E and TSOs are anticipating the impact of achieving a carbon-neutral European energy system by 2050. Examples of ENTSO-E and TSOs' contribution towards this objective are highlighted in green boxes throughout this document.

Report structure

- **Chapter 1** describes the implementation of System Operation legal mandates tasks, aimed at improving operations and securing electricity supply with increasing volumes of variable renewable energy sources (RES). Many deliverables under the System Operation Guideline have been submitted, and activities stemming from the Emergency and Restoration Code were carried out in 2020. The chapter also outlines activities carried out in the field of regional development – especially the Outage Planning Coordination (OPC) and Short-Term Adequacy (STA) – as well as the Common Grid Model (CGM) and ENTSO-E Awareness System (EAS).

- **Chapter 2** covers the Market legal mandates tasks. TSOs are instrumental in the progressive harmonisation of electricity market rules, which enables the entry of increasing numbers of RES producers and thus contributes to a more sustainable energy system. In 2020, ENTSO-E and TSOs developed and submitted several methodologies for regional capacity calculation, bidding zones, capacity mechanisms and balancing.

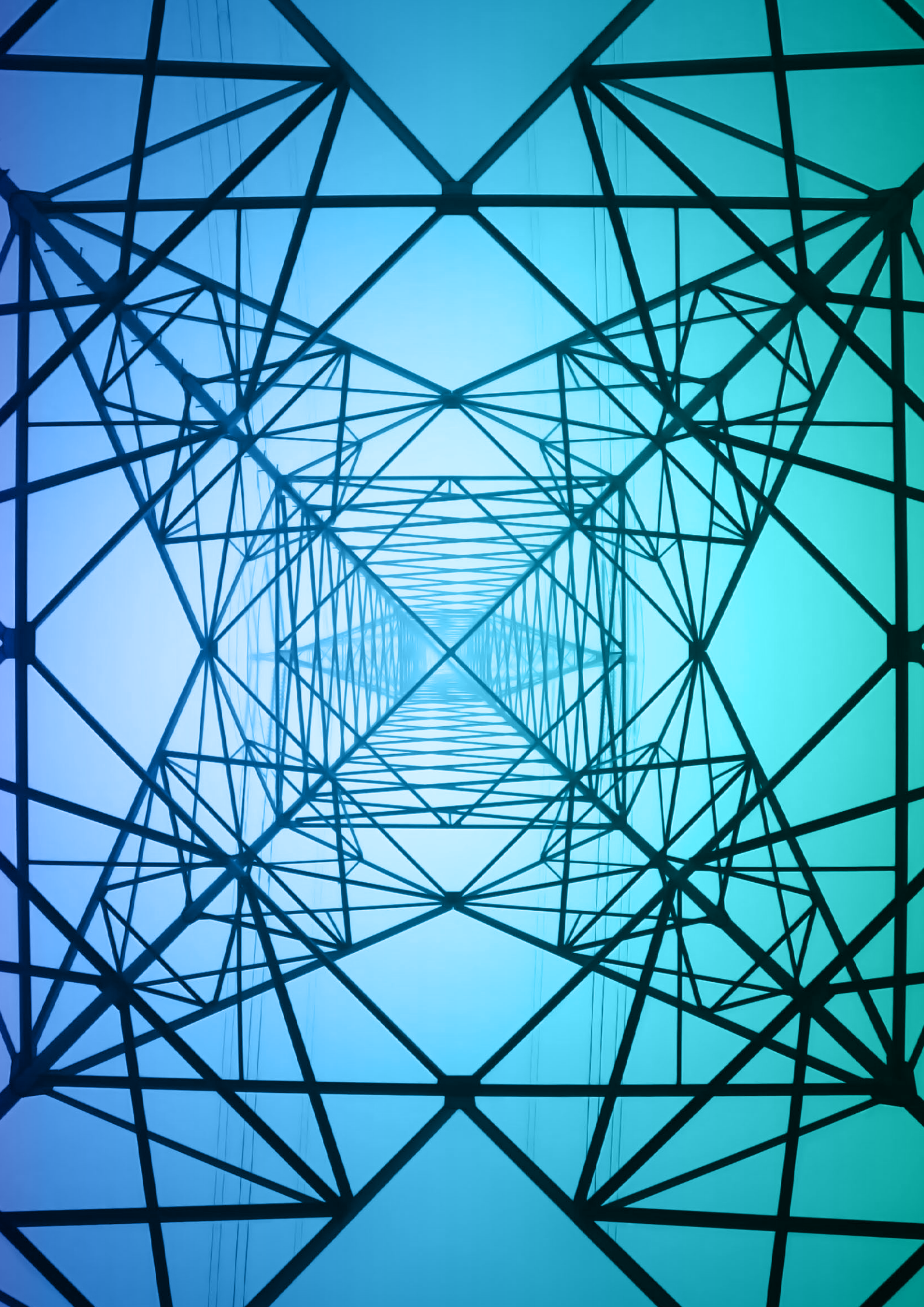
- **Chapter 3** provides an overview of all system development activities related to future scenarios, long-term planning and adequacy assessments. These deliverables aim to support investment decisions by various actors of the electricity market with a view to achieving a carbon-neutral European energy system by 2050. In 2020, ENTSO-E and ENTSOG published their final joint TYNDP 2020 Scenario Report as well as joint TYNDP 2022 Scenario Storylines. The TYNDP 2020 assessed 154 transmission projects, of which were 97 cross-border projects, representing close to 90 GW of additional cross-border transmission capacity, and 26 storage projects, representing 485 GWh of storage capacity. Moreover, 2020 saw the approval of new methodologies related to the implementation of CEP provisions on resource adequacy.

- **Chapter 4** describes the development of the Transparency Platform (TP) for the ACER data purposes and for the purposes of data exchanges for the Financial Settlement of the frequency control error, the area control error and ramping (FSkar), and the implementation of the changes stemming from the Manual of Procedures (MoP). Publicly and freely available data allows the share of generation technologies of the different geographical areas to be transparently followed.

- **Chapter 5** outlines the ENTSO-E Research, Development and Innovation (RDI) activities in 2020 such as the publication of its new RDI Roadmap 2020 – 2030, the publication of two position papers on offshore, the position paper on the reduction of SF6 emissions and introduction of alternative technologies, the position paper on the Standardized control interface for HVDC SIL/HIL conformity tests and of the ENTSO-E Technopedia, and its participation in European Technology and Innovation Platform Smart on Networks for Energy Transition (ETIP SNET). The main driver is to identify the necessary innovation milestones for TSOs to reach the EU Green Deal policy objectives, thus achieving the green transition.

- **Chapter 6** details cybersecurity and data exchange & the interoperability activities carried out in 2020. Whereas cybersecurity activities have been carried out under the Connecting Europe Facility (CEF) project, ENTSO-E participated in the informal drafting team of the Network Code on Cybersecurity. The chapter also describes data exchange and interoperability activities to support network code implementation, the development of the Electronic Data Interchange library, and the publication of the version of the Harmonised Electricity Market Role Model. The transition towards a more sustainable society implies the electrification and digitalisation of sectors such as transport or heating. To work efficiently, this evolution will require more data protection and more interoperability standards to facilitate cross-border exchange.

- **Chapter 7** describes the activities carried out in the framework of the TSO-DSO cooperation, key areas of cooperation report on Active System Management developed in 2020 by ENTSO-E and the DSOs associations, and a report on Demand Side Flexibility. With the constant increase of renewable generation, DSOs and TSOs must strengthen their coordination to facilitate the deployment of distributed flexibilities and operate their networks securely.



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1 System Operation

The System Operation Guideline

The Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (SOGL) sets out harmonised rules on how to ensure security of supply through efficient grid operation in a variable renewables paradigm. The implementation of the SOGL and the related methodologies entails several challenging 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 decided by TSOs in the respective regional groups.

Further SOGL deliverables in 2020	Key documents and dates
Art. 75.1: Methodology for coordinating operational security analysis	**18 Dec 2020:** amendment submitted to ACER **13 Aug – 23 Sep 2020:** public consultation
Art. 76.1: Core TSOs' common provisions for regional operational security coordination	**4 Dec 2020:** ACER approval (ACER approved the Proposal subject to the amendments set out in Annex I to Decision 33/2020.)
Art. 76.1: Hansa TSOs' common provisions for regional operational security coordination	**18 Oct 2020:** amendment submitted to relevant NRAs (As per the Hansa NRAs request of 20 July 2020. The initial Proposal was submitted on 20 December 2019.)
Art. 76.1: SEE TSOs' common provisions for regional operational security coordination	**4 Dec 2020:** ACER approval (ACER approved the Proposal subject to the amendments set out in Annex I to Decision 34/2020.)
Art. 156.11: CBA for suggesting the required minimum activation time for FCR in the Continental Europe and Nordic synchronous areas	**29 May 2020:** Submission to relevant NRAs (The submission date refers to Nordic NRAs. Submission to Continental Europe NRAs is due for October 2021.) **27 Feb – 30 Apr 2020:** public consultation
Art. 137.3-4: Nordic TSOs' proposal for ramping restrictions for active power output	**3 Aug – 4 Sep 2020:** public consultation (Nordic TSOs submitted the proposal to the relevant NRAs in March 2021, which will in turn make a decision by October 2021. These developments are outside the scope of this Report and will be covered in the Annual Report 2021, to be drafted next year.)

Table 1 – SO GL implementation activities in 2020

Implementation monitoring

Between July and September 2020, ENTSO-E released three important yearly implementation monitoring reports: the Incident Classification Scale annual report (Art. 15 SOGL), the annual report on Load-Frequency Control (Art. 16 SOGL) and the all TSOs' scenario definition and scenario description for the year 2020 (Art. 65 SOGL).

In December 2020, ENTSO-E organised a workshop to discuss the current implementation status of the Key Organisational Requirements, Roles and Responsibilities (KORRR) with its stakeholders. The proposal was developed in 2018 in accordance with SOGL Article 40(6).

KEY DATES & DOCUMENTS

15 July 2020: Publication of the All TSOs' scenario definition and scenario description for the year 2021

30 Sep 2020: Publication of the Incident Classification Scale 2019 annual report

30 Sep 2020: Publication of the Load-Frequency Control annual report

11 Dec 2020: Stakeholder Workshop on the National Implementation of KORRR

The Emergency and Restoration Code

The Emergency and Restoration Network Code (NC ER) sets out harmonised rules on how to deal with emergency situations and restore the system as efficiently and as quickly as possible. It entered into force on 18 December 2017 and is primarily subject to implementation at a national or TSO level. Implementation should be finished by December 2022 (Art. 55 NC ER).

ENTSO-E has monitored the national implementation of the network code (Art. 52.1 NC ER). In December 2020, it also delivered an assessment of the level of harmonisation of the rules for the suspension and restoration of market activities established by TSOs (Art. 36.7 and 52.1 NC ER).

The implementation of the NC ER was discussed with stakeholders during meetings of the System Operation European Stakeholder Committee that took place in 2020.

KEY DATES & DOCUMENTS

25 March 2020: Public webinar discussing the Report for assessing the level of harmonisation of the rules for suspension and restoration of the market activities

18 December 2020: Submission to ACER of the Report Assessing the Level of Harmonisation of the Rules for Suspension and Restoration of Market Activities

Common Grid Models

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

A CGM compiles the Individual Grid Model (IGM) 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 Regional Security Coordinators (RSCs), who merge them into a pan-European CGM and feed the merged CGM back into the system.

Achievements and Challenges

The CGM Programme is mandated to establish the CGM Build Process among ENTSO-E, TSOs and RSCs based on the Physical Communication Network (PCN) and the OPDE. During 2020, the CGM Programme delivered several critical milestones including:

- The connection of 67% of TSOs to the PCN. PCN is a pan-European physical network for inter-TSO/RSC communications, designed for real-time and non-real-time data exchange. The PCN network is intended to be a single physical network for OPDE and associated services (e.g. CGM Build Process, balancing platforms).
- Two upgrades of the ENTSO-E's Connectivity and Communication Service Platform (ECCoSP), a software component that enables standardised, secure and reliable data exchange among different parties (e.g. TSOs, RSCs).
- Testing of the CGM Build Process with ENTSO-E, TSOs and RSCs
- Drafting of a set of requirements that will enable smooth processing by a third party, allowing interoperability between tools on a pan-European scale.

Operational Planning Data Environment

The OPDE, specified in the SOGL (Art. 114), is the information platform that will support the data exchange and business processes associated with the CGM Build Process. It is also the foundation of the data exchange platform for fulfilling the five core tasks of RSCs.

In 2020, two releases of the OPDE Platform, including the connection of new applications and the evolution of existing applications, were published. Moreover, the already existing part of the OPDE was operated and maintained throughout 2020.

ENTSO-E Awareness System

The EAS provides a real-time pan-European view of the state of transmission systems. All operators input a number of measurements including frequency and cross-border exchange. These measurements are then merged to provide an overall European view of each TSO on the platform. ENTSO-E has been monitoring the maintenance of the EAS to ensure its continuous operations within TSO business Service-Level Agreements (SLAs).

The following evolutions were introduced during 2020: automatic TSO online data quality check and improvement in the generation map. Moreover, technical upgrade and sandbox management were also performed.

Regional development

Cooperation at the regional level is a building block for ensuring security of supply and implementing the internal energy market. The development of variable generation and increased interconnections render regional coordination among TSOs more important than ever.

ENTSO-E supports regional tasks where it is beneficial for the TSOs of the region. In this respect, 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.

Regional Coordination

RSCs are entities owned and appointed by TSOs to fulfil five tasks: security analysis, capacity calculation, outage coordination, adequacy forecast, and the CGM creation. The System Operation Guideline formalised the role of the RSCs and made it legally binding for TSOs to procure at least the five core tasks from one of the RSCs. Through their recommendations to TSOs, RSCs contribute to increasing efficiency in system operation; minimising the risks of wide-area events such as brownouts or blackouts; and lowering costs through ensuring the maximised availability of transmission capacity to market participants.

In May 2020, the four TSOs – ESO-EAD (Bulgaria), IPTO (Greece), Transelectrica (Romania) and Terna (Italy) – of the South-East Europe (SEE) and Greece–Italy (GRIT) capacity calculation regions (CCRs) established the Southeast Electricity Network Coordination Centre (SEleNe CC), located in Thessaloniki.

KEY DATES & DOCUMENTS

22 May 2020: Establishment of SEleNe CC

In October 2020, ENTSO-E submitted on behalf of all TSOs the Capacity Calculation Regions Assessment Report. This report addresses the ACER Decision 04/2019 on the Amendment of the determination of CCRs of 1 April 2019. According to the amendment, the TSOs shall analyse the optimal determination of CCRs with regard to Hansa and Channel CCRs. This report concludes that the current structure of the CCR Hansa and CCR Channel are the most optimal structure for ensuring progress in the current implementation of the flow-based methodologies and other regional methodologies in CCR Core and CCR Nordic in the short-term.

KEY DATES & DOCUMENTS

1 Oct 2020: Submission to ACER of the Capacity Calculation Regions Assessment Report

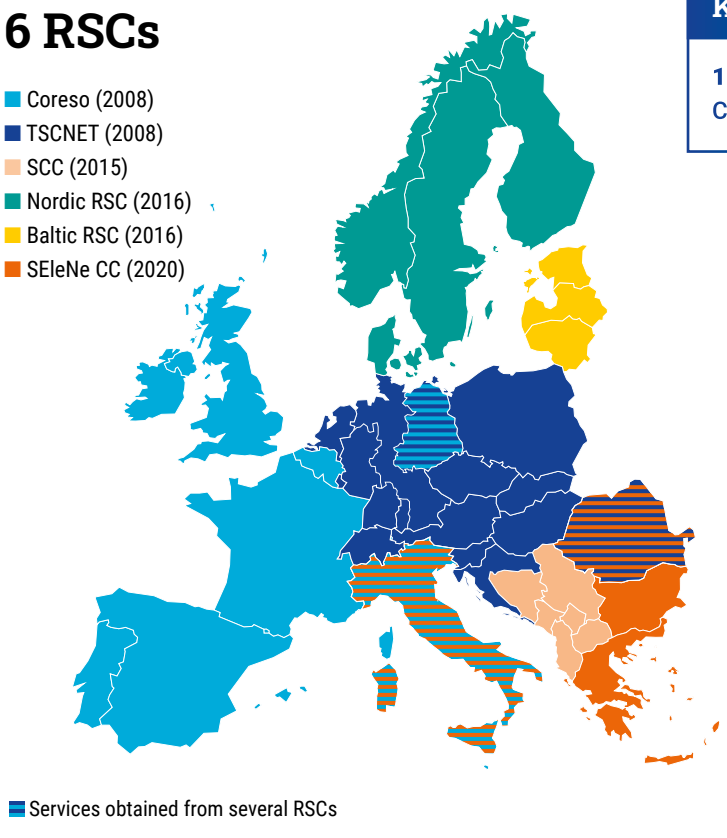

Figure 1 – RSC map

Regional Security Coordinators and the Clean Energy Package

The CEP establishes an enhanced framework for regional cooperation through the establishment of Regional Coordination Centres (RCCs). Art. 35 of Regulation (EU) 2019/943 (the "Electricity Regulation") requires that TSOs of System Operation Regions (SORs) develop a proposal for the establishment of the RCCs of their region. These should be operational by 1 July 2022 and will replace existing RSCs, adding new tasks for the RCCs.[1]

ENTSO-E developed and submitted in January 2020 a proposal defining SORs in compliance with Art. 36 of the Electricity Regulation. The SOR Proposal specifies that some of the new tasks shall be carried out through a SOR configuration, and others through CCR or other configurations. ACER amended the proposal in April 2020, and it was appealed by ENTSO-E in June 2020. In October 2020, the ACER Board of Appeal asked the Agency to issue a new decision.

KEY DATES & DOCUMENTS

6 Apr 2020: ACER approval of the SOR definition proposal (subject to the amendments as set out in Annex I to Decision 10/2020)

4 Jun 2020: ENTSO-E appeal against ACER Decision No 10/2020

24 Sep 2020: ACER Board of Appeal Decision asking the Agency to issue a new decision

Other regional developments

ENTSO-E launched the pan-European IT tools for OPC and STA, aimed at increasing the operational security of Europe's power system. The OPC, live since end of March 2020, allows RSCs and 38 TSOs to coordinate outage planning on a weekly basis. Based on generation and demand forecast provided by all ENTSO-E Member TSOs, the STA, launched in May 2020, enables RSCs and TSOs to perform daily calculations which identify any possible lack of adequacy for the week ahead. ENTSO-E and the Baltic RSC co-organised the RSC Conference held in a digital format in November 2020. The event took stock of the latest trends and discussed how innovation, data and digitalisation, regulatory framework, TSO cooperation, and offshore support regional development in the power sector.

KEY DATES & DOCUMENTS

24 November 2020: RSC Conference 2020

Future synchronisation of Baltic countries to the Continental Europe synchronous area

In 2020, the Baltic TSOs continued work on the implementation of technical measures specified in the "Agreement on the Conditions for a Future Synchronous Interconnection of the power system of the Baltic States and the power system of Continental Europe", which entered into force on 27 May 2019. They focused on creating the infrastructure and tools to enable frequency and dynamic stability as foreseen in the studies performed in 2018 and further detailed in 2019 and 2020 in related projects.

The Baltic synchronisation with Continental Europe is part of the EU Energy Union strategy and will enable the Baltic TSOs to operate their systems under the EU rules.

The vast majority of the System Operation tasks aim to improve operations and secure electricity supply by enhancing forecast, planning and regional coordination to cope with higher and higher volumes of variable RES and with the gradual phase out of conventional power plant in the system. This is key to achieving a carbon-neutral European energy system by 2050.

1 Article 37 of the Electricity Regulation mentions 10 new tasks in addition to the ones provided for by SOGL and the NC ER as adopted on the basis of Regulation 714/2009.

2 Market

The Capacity Allocation and Congestion Management Regulation

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

Single day-ahead and intraday coupling

According to Art. 10 CACM, TSOs cooperate with Nominated Electricity Market Operators (NEMOs) to organise the day-to-day management of the single day-ahead and intraday coupling. ENTSO-E facilitates the discussion. This work helps jointly organise the further development of the market coupling by defining the responsible bodies and classifying the decisions to be taken by each body, as well as helping to define the criteria for prioritising the functionalities to be developed. In this spirit, in January 2020 ACER approved the NEMO's joint proposal on the Products that can be taken into account in Single Intraday Coupling (SIDC), and also approved in December 2020 the NEMO's joint proposal on the Products that can be taken into account in Single Day-Ahead Coupling (SDAC). ACER also approved in January 2020 the TSO's and NEMO's proposal for the price coupling algorithm and for the continuous trading matching algorithm. Moreover, the market coupling operations of the Greek bidding zone in SDAC were successfully launched on 15 December 2020.

KEY DATES & DOCUMENTS

30 Jan 2020: ACER approval of the TSO's and NEMO's proposal for the price coupling algorithm and for the continuous trading matching algorithm

30 Jan 2020: ACER approval of the NEMO's joint proposal on Products that can be taken into account in SIDC (subject to the amendments as set out in Annex I to Decision 05/2020)

22 Dec 2020: ACER approval of the NEMO's joint proposal on Products that can be taken into account in SDAC (subject to the amendments as set out in Annex I to Decision 37/2020)

Capacity Calculation Regions

In accordance with Art. 15.1 CACM, in November 2020 all TSOs submitted to ACER the common proposal for the determination of CCRs.

Moreover, in 2020 CCRs delivered, in accordance with the CACM Regulation, robust and timely fallback procedures (Art. 44), day-ahead and intraday capacity calculation methodologies (Art. 20.2), methodologies for coordinated redispatching and countertrading (Art. 35.1), and redispatching and countertrading cost sharing methodology (Art. 74.1).

KEY DATES & DOCUMENTS

19 Aug–19 Sep 2020: Public consultation on the all-TSOs proposal for the determination of CCRs

6 Nov 2020: Submission of the all-TSOs proposal for the determination of CCRs

6 Nov 2020: ENTSO-E's response to the public consultation of the all-TSOs proposal for the determination of CCRs

	DA and ID CapCalc (Art. 20.2)	RD and CT (Art. 35.1)	Robust and timely fallback procedures (Art. 44)	RD and CT cost sharing (Art. 74.1)
Italy North	DA and ID submitted 24 Jul 2020	Already approved	Submission 1st amendment 30 Sep 2020* Public consultation 24 Jul – 24 Aug 2020	Already approved
Greece/Italy	Public consultation 26 May – 27 Jun 2020	Already approved	Submission 1st amendment 3 Dec 2020 Public consultation 24 Jul – 24 Aug 2020	Already approved
Core	Submission 1st amendment 16 Nov 2020 Public consultation 25 Jun – 31 Jul 2020	ACER approval 4 Dec 2020 (subject to the amendments as set out in Annex I to Decision 35/2020)	NRAs of the Core CCR requested ACER Decision 4 Dec 2020** Public consultation 24 Jul – 24 Aug 2020	ACER approval 30 Nov 2020 (subject to the amendments as set out in Annex I to Decision 30/2020)
SWE	Already approved	Already approved	Submission 2nd amendment 29 Sep 2020 Public consultation 24 Jul – 24 Aug 2020	Already approved
SEE	Already approved	Already approved	Submission 1st amendment 1 Sep 2020 Public consultation 28 Jul – 28 Aug 2020	ACER approval 30 Nov 2020 (subject to the amendments as set out in Annex I to Decision 31/2020)
Hansa	Request for amendment 4 Sep 2020 Public consultation 3 Dec 2020 – 10 Jan 2021	Submission 2nd amendment 03 Dec 2020 Public consultation 3 Dec 2020 – 10 Jan 2021	Already approved	Submission 2nd amendment 29 Dec 2020
Nordic	Submission 2nd amendment 14 Oct 2020 Public consultation 15 Jan – 17 Feb 2020	Already approved	Already approved	Already approved
Channel	Already approved	Already approved	Public consultation 24 Jul – 24 Aug 2020	Already approved

* Relevant NRAs approved the amendment in March 2021. These developments are out of the scope of this Report and will be covered in the Annual Report 2021, to be drafted next year.)

** ACER approved the Proposal in March 2021 subject to the amendments set out in Annex I to Decision 02/2021. These developments are out of the scope of this Report and will be covered in the Annual Report 2021, to be drafted next year.

Table 2 – CACM Capacity Calculation methodologies in 2020

Implementation monitoring

The CACM Cost Report 2019 submitted to all NRAs in July 2020 in accordance with Art. 80(1) of the CACM Regulation includes the costs of the coordinated activities of all NEMOs and/or all TSOs, and the costs incurred for activities performed by NEMOs or by TSOs and NEMOs in a certain region, in relation to single day-ahead and intraday market coupling.

In June 2020, ENTSO-E issued the 6th edition of the annual report on the progress and potential problems with the implementation of FCA, single day-ahead coupling and single intraday coupling (a "Market Report") in pursuance of Art. 82(2)(a) CACM and Art. 63(1)(a) FCA.

KEY DATES & DOCUMENTS

30 Jul 2020: Submission to all NRAs of the CACM Cost Report 2019

29 Jun 2020: Submission to ACER of the ENTSO-E Market Report

In 2020, ENTSO-E has also enhanced the Transparency Platform for ACER data provision purposes in accordance with Art. 82.4 CACM and 63.3 FCA.

The Forward Capacity Allocation Regulation

The FCA Regulation, which entered into force on 17 October 2016, sets out rules regarding the type of long-term transmission rights (LTTRs) that can be allocated via explicit auction, and the means by which holders of transmission rights are compensated in the event their right is curtailed.

The overarching goal is to promote the development of liquid and competitive forward markets in a coordinated manner across Europe and provide market participants with the ability to hedge their risk associated with cross-border electricity trading.

FCA Methodologies

Regarding the implementation tasks at the regional level, some CCRs delivered common capacity calculation methodologies for long-term time frames (Art. 10.1 FCA), methodologies for splitting long-term cross-zonal capacity (Art. 16.1 FCA) and the regional design of LTTRs (Art. 31.3 FCA).

	LT timeframes (Art. 10.1)	Splitting LT cross-zonal capacity (Art. 16.1)
Hansa	Amendment submitted 3 Oct 2020	Approved 4 May 2020
Core	Submitted 30 Nov 2020 Public consultation 16 Sep – 16 Oct 2020	Approved 14 Jul 2020
SWE	Approved 28 Feb 2020	Approved 28 Feb 2020
Baltic	Request for amendment 17 Nov 2020	
Channel	Request for amendment 29 Jul 2020 Public consultation 13 Dec 2019 – 13 Jan 2020	Request for amendment 29 Jul 2020
Greece/Italy	Approved 27 Jan 2020	Approved 27 Jan 2020
Italy North	Approved 15 Dec 2020 Public consultation 10 Feb – 13 Mar 2020	Approved 15 Dec 2020 Public consultation 10 Feb – 13 Mar 2020
SEE	Amendment submitted 1 Sep 2020	Approved 2 Dec 2020 (subject to the amendments as set out in Annex I to Decision 32/2020)

Table 3 – FCA Capacity Calculation Methodologies in 2020

In accordance with Art. 31.3 of the FCA Regulation, in June 2020 the relevant NRAs approved the third amendment to the Core TSOs' regional design of LTTRs that introduces the switch from physical transmission rights with the use-it-or-sell-it principle to financial transmission rights on specific bidding zone borders. Moreover, this third amendment does not change the impact of the previously approved amendment on the objectives of the FCA Regulation.

Finally, ENTSO-E has coordinated the preparation of the All TSOs' proposal for the methodology for sharing costs incurred to ensure firmness and remuneration of long- term transmission rights pursuant to Art. 61 (FCA). The methodology was approved by ACER in October 2020.

KEY DATES & DOCUMENTS

9 Jun 2020: Approval of the 3rd amendment to the Core TSOs' regional design of LTTRs

18 Dec 2019 –28 Jan 2020: Public consultation on the 3rd amendment to the Core TSOs' regional design of LTTRs

KEY DATES & DOCUMENTS

23 Oct 2020: Approval of the all TSOs' proposal for the methodology for sharing costs incurred to ensure firmness and remuneration of LTTRs

The Electricity Balancing Regulation

Efficient balancing markets, in which all resources are empowered to participate on a level playing field, shall ensure security of supply at the lowest cost and can deliver environmental benefits by reducing the need for back-up generation. The Electricity Balancing Regulation (EB Reg.) sets a framework for common European rules and European platforms for cross-border balancing markets. The balancing processes are organised in the following steps:

1. Frequency containment reserves (FCR)[2], which stabilise the frequency after a disturbance at a steady-state value by a joint action of FCR within the whole synchronous area;
2. Frequency restoration reserves with automatic activation (aFRR) and frequency restoration reserves with manual activation (mFRR): these are activated to control the frequency toward its set point value and replace FCR;
3. Replacement reserves (RR), which replace and/or complement FRR via the activation of RR;
4. Imbalance netting (IN), which reduces the amount of simultaneous and counteracting aFRR activations via imbalance netting power interchange.

Ongoing or planned implementation activities include the development of several methodologies by all TSOs, with ENTSO-E acting as facilitator, as well as the implementation of the European balancing platforms.

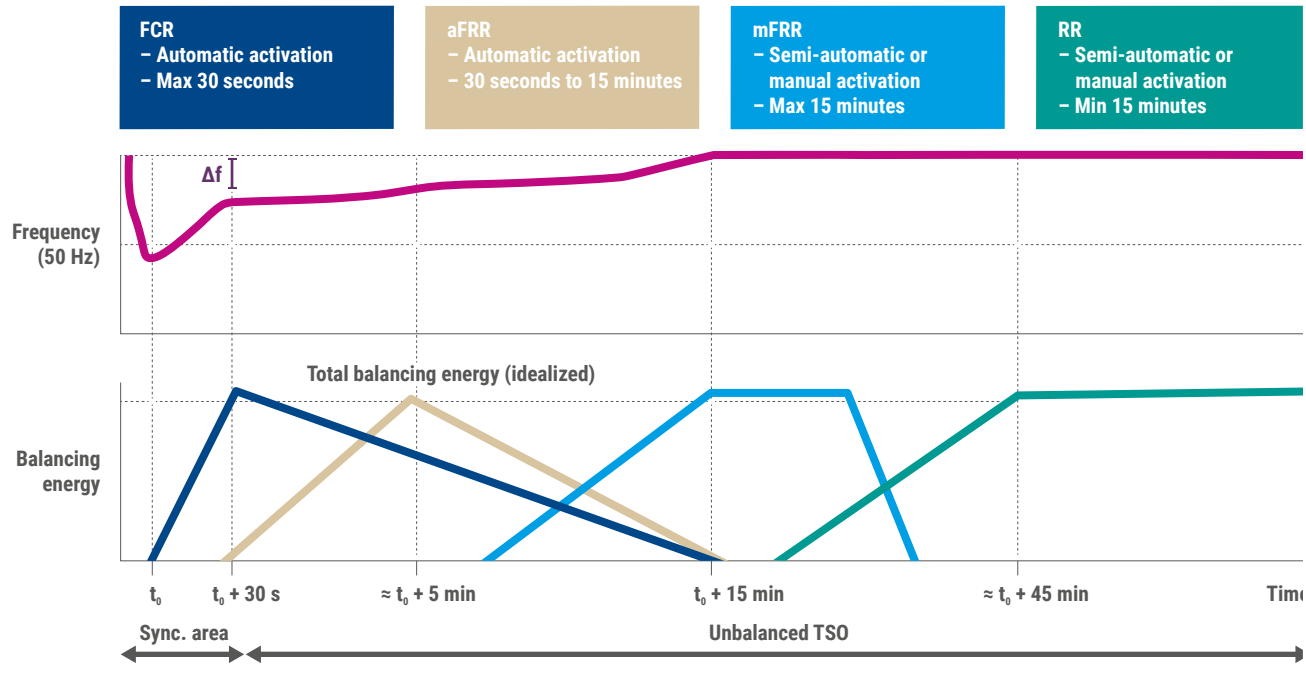

Figure 2 – Frequency restoration process

2 The Guideline includes FCR in the balancing process but does not provide for an associated common platform.

The European balancing platforms

The European platform for replacement reserves – Trans-European Replacement Reserves Exchange (TERRE) – was made operational in January 2020 and five[3] TSOs became Members throughout the same year (Art. 19.5 EB Reg.).

The European platform for imbalance netting – International Grid Control Cooperation (IGCC): in 2020, there were nineteen [4]operational members that continued the implementation of the platform (Art. 22.5 EB Reg.); among these, six[5] member TSOs became operational throughout 2020. In June 2020, ACER adopted the implementation framework of the European platform for the imbalance netting process (Art. 22.1 EB Reg.).

European platform for the exchange of mFRR and aFRR energy – Manually Activated Reserves Initiative (MARI) and Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation (PICASSO): In accordance with the submission by all TSOs of the methodology proposals for implementation frameworks, pricing and activation purposes of balancing energy bids and TSO–TSO settlement of exchanges of balancing energy and the IN process, the implementation of the platforms continued throughout 2020 (Art. 20.6 and 21.6 EB Reg.). In January 2020, ACER adopted the implementation framework of the European platform for the exchange of mFRR (Art. 20.1 EB Reg.)[6] and of the European platform for the exchange of aFRR (Art. 21.1 EB Reg.)[7]. Moreover, in August 2020, all TSOs designated their proposed balancing entities entrusted with operating the MARI and PICASSO platforms (Art. 20.4 and 21.4 EB Reg.).

KEY DATES & DOCUMENTS

24 Jun 2020: ACER Decision on the implementation framework of the European platform for the imbalance netting process (subject to the amendments as set out in Annex I to Decision 13/2020)

KEY DATES & DOCUMENTS

24 Jan 2020: ACER Decisions on the implementation frameworks of the European platform for the exchange of mFRR and on the European platform for the exchange of aFRR

13 Jul 2020: Public Workshop on the MARI implementation

18 Dec 2020: Public Workshop on the MARI implementation

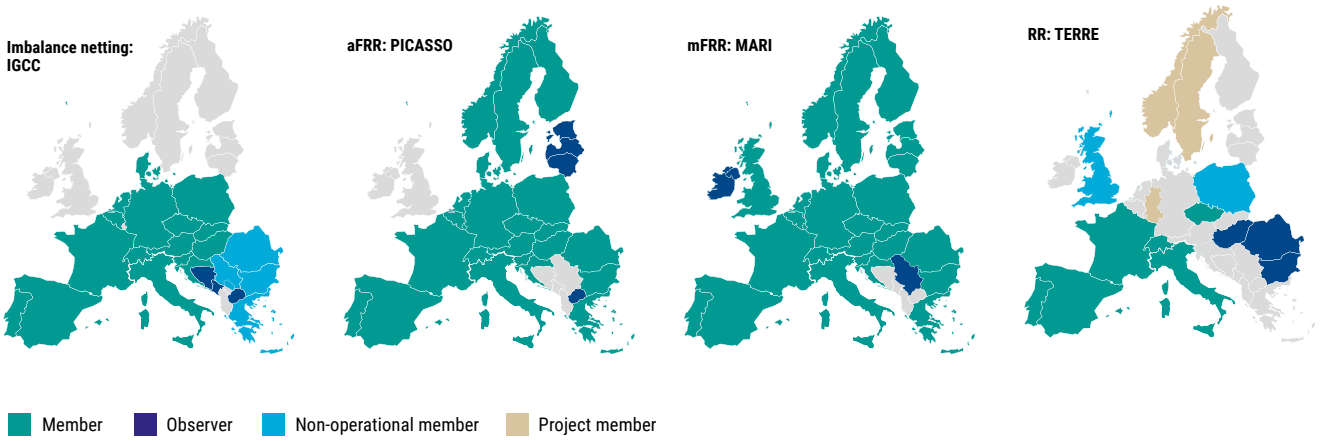

Figure 3 – Balancing Implementation Projects Status. It is worth clarifying that this figure represents the status of projects as of today.

3 ČEPS (Czech Republic), REE (Spain), REN (Portugal), RTE (France), and Swissgrid (Switzerland).

4 50Hertz (Germany), Amprion (Germany), APG (Austria), ČEPS (Czech Republic), HOPS (Croatia), Elia (Belgium), Energinet (Denmark), ELES (Slovenia), MAVIR (Hungary), PSE (Poland), REE (Spain), REN (Portugal), RTE (France), SEPS (Slovak Republic), Swissgrid (Switzerland), TenneT NL (the Netherlands), TransnetBW (Germany), TenneT DE (Germany) and Terna (Italy).

5 Terna (Italy), PSE (Poland), MAVIR (Hungary), SEPS (Slovak Republic), REE (Spain) and REN (Portugal).

6 ACER approved the Proposal subject to the amendments set out in Annex I to Decision 03/2020.

7 ACER approved the Proposal subject to the amendments set out in Annex I to Decision 02/2020.

CCR Methodologies

Regarding the implementation tasks at the regional level, some CCRs delivered on a voluntary basis methodologies for market-based cross-zonal capacity (CZC) allocation (Art. 41.1 EB Reg.) and for the allocation of CZC based on an economic efficiency analysis (Art. 42.1 EB Reg.).

	CZC for the exchange of balancing capacity or sharing of reserves (Art. 41.1)	Allocation of CZC based on an economic efficiency analysis (Art. 42.1)
Hansa	1st amended proposal submitted 13 Oct 2020 (Hansa TSOs have withdrawn the proposal pursuant to Article 41(1) of EB Regulation from the regulatory approval process on 12 May 2021. These developments are outside the scope of this Report and will be covered in the Annual Report 2021, to be drafted next year.)	
Core	1st amended proposal submitted 4 Dec 2020	1st amended proposal submitted 4 Dec 2020 (Core TSOs have withdrawn the proposal pursuant to Article 42(1) of EB Regulation from the regulatory approval process on 12 May 2021. These developments are outside the scope of this Report and will be covered in the Annual Report 2021, to be drafted next year.)
Baltic	2nd amended proposal submitted 30 Oct 2020	
Greece/Italy	2nd request for amendment 2 Dec 2020 (2nd amended proposal submitted 1 Apr 2021. These developments are outside the scope of this Report and will be covered in the Annual Report 2021, to be drafted next year.)	2nd request for amendment 2 Dec 2020 (2nd amended proposal submitted 9 Apr 2021. These developments are outside the scope of this Report and will be covered in the Annual Report 2021, to be drafted next year.)
Italy North	2nd request for amendment 15 Dec 2020 (2nd amended proposal submitted 26 Mar 2021. These developments are outside the scope of this Report and will be covered in the Annual Report 2021, to be drafted next year.)	2nd request for amendment 15 Dec 2020 (2nd amended proposal submitted 26 Mar 2021. These developments are outside the scope of this Report and will be covered in the Annual Report 2021, to be drafted next year.)
Nordic	ACER approval 5 Aug 2020 (ACER approved the Proposal subject to the amendments set out in Annex I to Decision 22/2020.)	

Table 4 – EB GL Capacity Calculation Methodologies in 2020

Further EB Reg. deliverables in 2020

Further EB Reg. deliverables in 2020	Key documents and dates
Art. 25.2: Proposal for a list of standard products for balancing capacity for frequency restoration reserves and replacement reserves	**17 Jun 2020:** ACER approval (ACER approved the Proposal subject to the amendments set out in Annex I to Decision 11/2020.)
Art. 29.3: Proposal for a methodology for classifying the activation purposes of balancing energy bids	**15 Jul 2020:** ACER approval (ACER approved the Proposal subject to the amendments set out in Annex I to Decision 16/2020.)
Art. 30.1: Proposal for pricing of balancing energy and CZC used for the exchange of balancing energy (RR, FRR, IN)	**24 Jan 2020:** ACER approval (ACER approved the Proposal subject to the amendments set out in Annex I to Decision 01/2020.)
Art. 40.1: All TSOs' Proposal for a methodology for a co-optimised allocation process of CZC for the exchange of balancing capacity or sharing of reserves	**17 Jun 2020:** ACER approval (ACER approved the Proposal subject to the amendments set out in Annex I to Decision 12/2020.)
Art. 50.1: Proposal for TSO–TSO settlement of intended exchanges of energy as a result of the RR, mFRR, aFRR and/or RR processes	**15 Jul 2020:** ACER approval (ACER approved the Proposal subject to the amendments set out in Annex I to Decision 17/2020.)
Art. 52.2: Proposal for imbalance settlement harmonisation	**15 Jul 2020:** ACER approval (ACER approved the Proposal subject to the amendments set out in Annex I to Decision 18/2020.)

Table 5 – Further EB Reg. deliverables in 2020

Implementation monitoring

In accordance with Art. 63.2 EB Reg., ENTSO-E submitted to ACER the Balancing Report 2020. This publication focuses on the technical aspects of the implementation at the European, regional and national levels of the Electricity Balancing Regulation and is the first of its kind. It summarises the developments that have occurred since the EB regulation entered into force (i. e. 18 December 2017) until 18 December 2019.

KEY DATES & DOCUMENTS

29 June 2020: Submission to ACER of the Balancing Report 2020

Transparency of capacity calculation by TSOs

The CEP introduces a new regulatory framework for cross-zonal capacity calculation. Specifically, Article 16.8 of the EU Electricity Regulation demands that at least 70 % of the interconnection capacity shall be made available for cross-zonal electricity trading (respecting operational security limits of internal and cross-zonal critical network elements and considering contingencies). The remaining 30 % of the total capacity of each critical network element can be used for the reliability margins, loop flows and internal flows.

In response to the "ACER Report on the Result of Monitoring the Margin Available for Cross-Zonal Electricity Trade in the EU in the First Semester of 2020", ENTSO-E published in December 2020 its technical comments highlighting a series of aspects related to the implementation of the 70 % rule.

KEY DATES & DOCUMENTS

22 December 2020: Publication of ENTSO-E's technical comments on ACER's "Report on the result of monitoring the margin available for cross-zonal electricity trade in the EU in the first semester of 2020"

Bidding zone review

In accordance with Art. 14.5 of the EU Electricity Regulation (2019/943), all TSOs submitted in February 2020 an updated[8] proposal for the methodology and assumptions to be used in the bidding zone review process and for the alternative bidding zone configurations to be considered. The updated proposal contains the same alternative bidding zone configurations as initially submitted, with the exception of the Nordic bidding zone review region, which is proposing an additional alternative configuration.

Following the all-NRAs' request for decision of July 2020, ACER approved the proposal in November 2020.

KEY DATES & DOCUMENTS

24 Nov 2020: ACER approval of the proposal for the methodology and assumptions to be used in the bidding zone review process and for the alternative bidding zone configurations to be considered (subject to the amendments set out in Annex I to Decision 29/2020)

8 The initial proposal was submitted in October 2019, and all NRAs requested its re-submission in December 2019.

Capacity Mechanisms

As required by Art. 26.11 of the Electricity Regulation, ENTSO-E submitted to ACER in July 2020 technical specifications for cross-border participation in capacity mechanisms. ACER approved these in December 2020.

Use of Congestion Income

In accordance with art. 19.4 of the Electricity Regulation, ACER approved in December 2020 the methodology for the use of congestion income.

KEY DATES & DOCUMENTS

22 Dec 2020: ACER approval of the technical specifications for cross-border participation in capacity mechanisms.

31 Jan –13 Mar 2020: Public consultation on the technical specifications for cross-border participation in capacity mechanisms.

23 Dec 2020: ACER approval of the methodology for the use of congestion income

20 Mar –1 May 2020: Public consultation on the methodology on the use of congestion income

Inter Transmission System Operator Compensation

The Inter Transmission System Operator Compensation (ITC) Agreement is a multiparty agreement concluded between ENTSO-E, on the one hand, and ENTSO-E members and TSOs that comply with the Union law in the field of electricity or with the previous agreement on ITC, also referred to in this context as "ITC Parties" on the other. It offers a single framework wherein European TSOs compensate each other for costs associated with hosting transit flows (i. e. facilitating the transfer of electricity between two countries). This mechanism aims to incentivise the hosting of cross-border flows and thereby facilitate an effectively competitive pan-European electricity market.

The ITC mechanism is governed by Art. 49 of Reg. (EU) 943/2019. The ITC mechanism is further specified by Reg. (EU) 838/2010 on laying down guidelines relating to the inter-transmission system operator compensation mechanism and a common regulatory approach to transmission charging.

The ITC Agreement provides for an annual process in which the parties are required to provide and check the values for the calculation of the annual perimeter fee. Based on the preliminary data, the transit flows, also including the perimeter flows, are calculated (i. e. imports and exports of electricity to and from third countries).

According to Reg. (EU) 838/2010, ENTSO-E is mandated to determine the amount of losses incurred on national transmission systems by calculating the difference between: (1) the amount of losses actually incurred on the transmission system during the relevant period; and (2) the estimated amount of losses on the transmission system which would have been incurred on the system during the relevant period if no transit of electricity had occurred. In October 2020, ENTSO-E published the ITC Transit Losses Data Report 2019.

KEY DATES & DOCUMENTS

2 Oct 2020: Publication of the "ITC Transit Losses Data Report 2019"

ACER publishes an annual monitoring report on ITC. To this end, ENTSO-E provides ACER with information on both quantitative data (preliminary and final data) and descriptive information (e. g. explanations for capacities not allocated according to Guidelines).

TSOs are instrumental in the progressive harmonisation of electricity market rules, which leads to a vast increase of electricity exchanges across countries, stimulates competition and increases liquidity in wholesale markets. This delivers benefits to society and enables the entry of an increasing number of market participants, including producers of renewable energy, thus contributing to a more sustainable energy system.

3 System Development

The Ten-Year Network Development Plan: Building Europe's future power system

The TYNDP is the outcome of a two-year process, starting with the development of scenarios outlining how the European energy system might look in 2030 and 2040.

Imagine and model future electricity and gas systems scenarios

Scenarios are a crucial element of the TYNDP process and a deliverable that can be used for other studies on future aspects of the energy system.

ENTSO-E and ENTSOG published the final Joint Scenario Report for TYNDP 2020 in June 2020. The Report was presented in a public workshop held in July 2020. In November 2020, ENTSO-E and ENTSOG published their draft TYNDP 2022 scenario building storylines[9]. The draft report consists of the storyline development for two future Paris agreement compliant (COP 21) scenarios ("Global Ambition" and "Distributed Energy"), together with the outline of the upcoming national policy scenario. The proposed COP 21 storylines are defined along a pan-energy approach, relying on a wide range of energy technologies, sources and carriers, and representing a step towards more system integration in the planning phase.

The previous storyline report for TYNDP 2020 was limited to descriptive (qualitative) information only. Due to a lack of quantitative figures, some stakeholders found it challenging to comment on the proposed storylines. Based on this feedback, the draft storyline report for TYNDP 2022 now incorporates quantitative ranges for some of the key storyline parameters, to improve transparency. The proposed high-level drivers outlining the storylines aim to sufficiently differentiate energy systems for the purpose of infrastructure assessment within TYNDP 2022. Table 6 on the following page provides an overview of storyline differentiation based on the high-level drivers.

KEY DATES & DOCUMENTS

29 Jun 2020: Publication of the final Joint Scenario Report for TYNDP 2020

3 Jul 2020: Public webinar to present the Joint Scenario Report for TYNDP 2020

3 Nov 2020 –15 Dec 2020: Public consultation on the draft TYNDP 2022 storylines

TYNDP 2022 – TWO TOP-DOWN SCENARIOS

Global Ambition pictures a pathway to achieving carbon neutrality by 2050 and at least a 55 % emission reduction in 2030, driven by a fast and global move towards the Paris Agreement targets. This translates into the development of a very wide range of technologies (many being centralised) and the use of global energy trade as a tool to accelerate decarbonisation.

Distributed Energy pictures a pathway to achieving EU-27 carbon neutrality by 2050 and at least a 55 % emission reduction in 2030. The scenario is driven by the willingness of society to achieve energy autonomy based on widely available indigenous RES. It translates into both a way-of-life evolution and a strong decentralised drive towards decarbonisation through local initiatives by citizens, communities and businesses, supported by authorities.

9 The final TYNDP 2022 storylines were published in April 2021.

	Distributed Energy Higher European autonomy with renewable and decentralised focus	Global Ambition Global economy with centralised low carbon and RES options
Green Transition	At least −55 %10 reduction in 2030, climate neutral in 2050	
Driving force of the energy transition	Transition initiated on local / national level (prosumers)	Transition initiated on a European / international level
	Aims for EU energy autonomy through maximisation of RES and smart sector integration (P2G/L)	High EU RES development supplemented with low carbon energy and imports
Energy intentsity	Reduced energy demand through circularity and better energy consumption behaviour	Energy demand also declines, but priority is given to decarbonisation of energy supply
	Digitalisation driven by prosumer and variable RES management	Digitalisation and automation reinforce competitiveness of EU business.
Technologies	Focus of decentralised technologies (PV, batteries, etc) and smart charging	Focus on large scale technologies (offshore wind, large storage)
	Focus on electric heat pumps and district heating	Focus on hybrid heating technology
	Higher share of EV, with e-liquids and biofuels supplementing for heavy transport	Wide range of technologies across mobility sectors (electricity, hydrogen and biofuels)
	Minimal CCS and nuclear	Integration of nuclear and CCS

Table 6 – Storylines differentiation based on high-level drivers

The Ten-Year Network Development Plan

The TYNDP is a pan-European network development plan, providing a long-term vision of the power system. A legal mandate deliverable (Article 30(1), Regulation 943/2019), published by ENTSO-E every two years, it is the foundation of European grid planning and the basis on which transmission projects may apply for "Projects of Common Interest" (PCI) status. The elaboration of each TYNDP is a two-year process, as described in Figure 4.

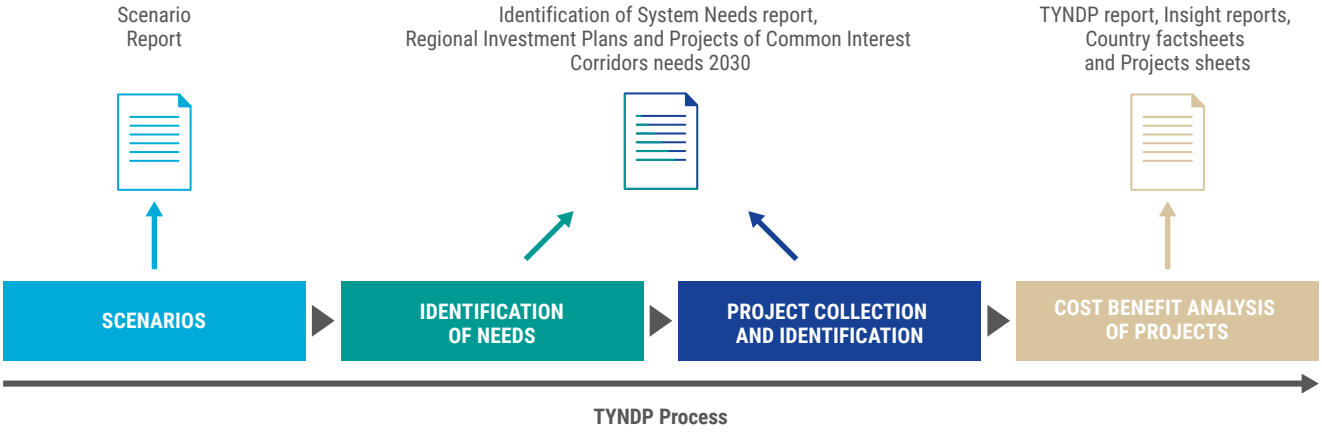

Figure 4 – TYNDP two-year process

Each scenario's impacts on energy markets and networks are analysed with the help of tailored modelling tools. Thanks to the models, ENTSO-E can explore various system needs and the options which address these needs. We can therefore understand, make transparent and better explain which parts of the network infrastructure are fit for purpose and which need to be reinforced or supported by alternative solutions or technologies. The main role of TYNDP is thus to identify where investment in the electricity system would help to release the expected system constraints, and by doing so provide

a fit-for-purpose infrastructure. This is done in two stages: performing a system needs analysis that identifies a high level overview of constraint relief options to allow the decarbonisation of the EU power system at the lowest cost, followed by a call for transmission and storage projects (under different stages of development) across Europe, complemented by an analysis of their impacts under different scenarios.

ENTSO-E released the TYNDP 2020 for stakeholder consultation in November 2020[11], which was held from November 2020 to January 2021. A public webinar took place in December 2020.

The TYNDP 2020 assessed 154 transmission projects, of which were 97 cross-border projects, representing close to 90 GW of additional cross-border transmission capacity and 26 storage projects, representing 485 GWh of storage capacity. System needs amount to a total of 50GW on close to 40 borders in 2030 and 43 additional GW on more than 55 borders in 2040. Addressing system needs is in line with the Green Deal policy objectives, with 110 TWh of curtailed energy and 53 Mtons of CO_2 emissions avoided every year until 2040.

KEY DATES & DOCUMENTS

6 Nov 2020: Release of the TYNDP 2020 for consultation

6 Nov 2020 – 4 Jan 2021: Public consultation on the TYNDP 2020

4 Dec 2020: Public webinar on the TYNDP 2020

A pilot study assessed the projects' impact in terms of job creation and GDP. Collectively, TYNDP 2020 projects generate an increase in European socioeconomic welfare of 7.3 to 13.2 billion euro per year depending on the future considered, by reducing CO_2 emissions and supporting the integration of RES. Investing in the TYNDP project portfolio would represent 1.7 million jobs in the EU, contributing to the post-pandemic European economic recovery.

KEY DATES & DOCUMENTS

16 Jul 2020: Publication of the ENTSO-E Roadmap for a Multi-Sectorial Planning Support

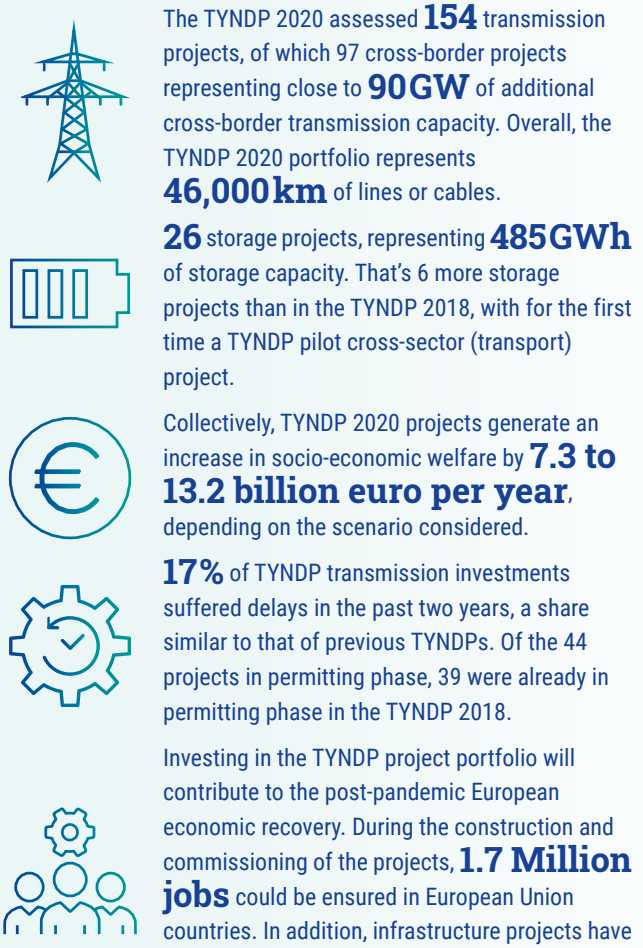

Figure 5 – TYNDP 2020 facts and figures

A common element of all future energy scenarios is that electricity will become the leading energy carrier (up to 65 %) and that the European electricity grid will be the backbone of the decarbonisation of all energy sectors. That is why infrastructure planning for the future power system will require a multi-sectorial approach. In line with the new "Multi-Sectorial Planning Support" concept, TYNDP 2020 highlighted the need for the energy system to be more integrated and dynamic between all the value chains, linking the specific energy resources to the end-sectors. The various energy carriers (electricity, heat & cooling, solid, liquid and gas fuels) will be linked and converted to provide the most efficient and carbon neutral services. This will facilitate the full decarbonisation while ensuring security of supply and limiting the costs of the energy transition.[12]

11 The draft TYNDP 2020 was submitted to ACER for opinion in February 2021.

12 In October 2020, ENTSO-E conveyed its key messages on infrastructure development and sector integration at the Energy Infrastructure Forum ("Copenhagen Forum") and at the European Gas Regulatory Forum ("Madrid Forum").

The cost–benefit analysis methodology

KEY DATES & DOCUMENTS

11 Feb 2020: Submission to ACER of the draft 3rd CBA methodology

The assessment of infrastructure and storage projects performed in the TYNDP uses a cost-benefit analysis (CBA) methodology drafted by ENTSO-E, in consultation with stakeholders. The methodology is proposed to ACER and the European Commission for, respectively, an opinion as well as further recommendations and a final decision. The CBA results are also used as the basis of the PCI selection process by policy makers. The main objective of the CBA methodology is to provide a common basis for the assessment of projects with regard to their value for European society, in line with Europe's energy goals.

ENTSO-E developed a third version of the CBA methodology, which improves on the previous versions in its consideration of security of supply, socioeconomic welfare and storage. The draft CBA 3.0 was submitted to ACER for opinion in February 2020[13].

Ensuring resource adequacy

"Resource adequacy" can be defined as the continuous balance, including storage and demand side response, between supply on the one hand and demand levels on the other.

Due to the increasing level of variable RES in the European power system and the associated challenges for system development and operation, a pan-European analysis of resource adequacy has become ever more important. Cooperation across Europe is necessary to accelerate the development of common methodological standards, i. e. a common "language" is required to perform these studies. Resource adequacy requires advanced methodologies to capture and analyse rare events with adverse consequences for the supply of electric power.

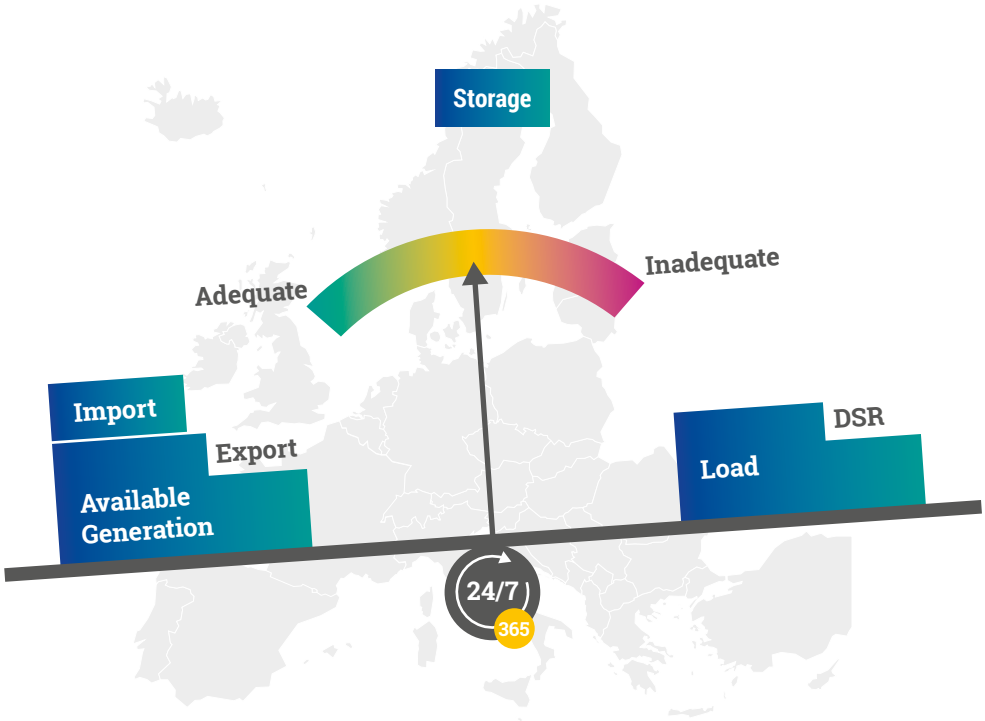

Figure 6 – Resource Adequacy

13 The draft CBA 3.0 was submitted to EC for approval in March 2021. These developments are outside the scope of this Report and will be covered in the Annual Report 2021, to be drafted next year.

The Mid-term Adequacy Forecast

KEY DATES & DOCUMENTS

30 Nov 2020: Publication of the MAF 2020

To account for a growing number of disruption risks related to the evolution of the energy mix – the growing development of RES, reduction of conventional power plants – Europe requires a regular assessment of the adequacy situation, at time horizons of up to ten years ahead. The "Mid-term Adequacy Forecast" (MAF) aims to provide a pan-European adequacy assessment of the risks to security of supply and the need for flexibility for the coming decade. The MAF is based upon state-of-the-art probabilistic analysis, conducted using sophisticated market modelling tools. It contributes to the harmonisation of resource adequacy methodologies across Europe by being a reference study for European TSOs. The MAF aims to provide stakeholders with the data necessary to make informed, quality decisions and promote the development of the European power system in a reliable, sustainable and connected manner.

In the MAF 2020, published in November 2020, the assessment was carried out for two target years (TY): 2025 and 2030. TY 2025 represents a pivotal year for evaluating adequacy due to expected reductions in coal and nuclear capacity in Europe and enables a comparison with the MAF 2019. TY 2030 was chosen to allow for the evaluation of the adequacy situation further ahead, at the end of the 10-year time horizon. The results indicate mostly low risks of inadequacy in the system for both target years, with a positive evolution in some zones from TY 2025 to TY 2030. However, some countries do show high risks of inadequacy. The zones with the largest risks of inadequacy in TY 2025 are Malta, Sardinia, Turkey and Ireland.

Resource adequacy and the Clean Energy Package

The CEP places resource adequacy in a central position in the European energy policy context. It extends the scope of the ENTSO-E MAF and develops it further into a new Pan-European Resource Adequacy Assessment. As provided for by Article 23 of the Electricity Regulation, ACER approved in October 2020 a methodology for a European Resource Adequacy Assessment (ERAA) and a methodology for calculating the Value of Lost Load (VoLL), the Cost of New Entry (CONE) and the Reliability Standard. The stepwise implementation of the ERAA will begin in 2021; the MAF 2020 is thus the last MAF report anterior to the ERAA implementation.

KEY DATES & DOCUMENTS

2 Oct 2020: ACER approval of the methodology for a European resource adequacy assessment (subject to the amendments as set out in Annex I to Decision 24/2020)

5 Dec 2019 – 30 Jan 2020: Public consultation on a European resource adequacy assessment

2 Oct 2020: ACER approval of the methodology for calculating the VoLL, the CONE and the Reliability Standard (subject to the amendments as set out in Annex I to Decision 23/2020)

5 Dec 2019 – 30 Jan 2020: Public consultation on the the methodology for calculating the VoLL, the CONE and the Reliability Standard

The Seasonal Outlooks

ENTSO-E's Seasonal Outlooks (Article 30(1)f, Regulation 943/2019) are pan-European, system-wide analyses of risks to electricity security of supply. Analyses are performed twice a year to ensure a good view regarding the summer and winter and to present TSOs' views on the risks to security of supply and the countermeasures they plan for the coming season, either individually or in cooperation. Each outlook is accompanied by a review of what occurred during the previous season.

The outlooks are performed based on the data collected from TSOs and using a common methodology. Moreover, ENTSO-E uses a common database in its assessment, the Pan-European Climate Database (PECD), to determine the levels of solar and wind generation at a specific date and time. ENTSO-E analyses the effect on system adequacy of climate conditions, evolution of demand, demand management, evolution of generation capacities, and planned and forced outages.

KEY DATES & DOCUMENTS

15 June 2020: Publication of the Summer Outlook 2020

17 June 2020: Summer Outlook 2020 Webinar

30 November 2020: Publication of the Winter Outlook 2020

1 December 2020: Winter Outlook 2020 Webinar

ENTSO-E published the Summer Outlook 2020 in June 2020 and the Winter Outlook 2020/2021 in November 2020.

Since 2020, and in line with the CEP, ENTSO-E has applied a probabilistic approach to its seasonal adequacy assessments – using a set of possible scenarios for each variable which enables it to detect more risks. This is in line with the methodology used in the MAF.

Moreover, to improve the coordination with the week-ahead adequacy assessment performed by RSCs, ENTSO-E submitted in January 2020 a proposal for a methodology for assessing seasonal and short-term adequacy, namely monthly, week-ahead to at least day-ahead adequacy (Art. 8 of the Risk Preparedness Regulation 2019/941). ENTSO-E also submitted in January 2020 a proposal for the methodology for identifying regional electricity crisis scenarios (Art. 5 of the Risk Preparedness Regulation). ACER approved both risk preparedness methodologies in March 2020.

KEY DATES & DOCUMENTS

6 March 2020: ACER approval of the methodology for assessing seasonal and short-term adequacy and of the methodology for identifying regional electricity crisis scenarios

Connection codes: Integrating renewables

The objectives of the three Connection Network Codes (CNCs) – Demand Connection Code (DCC), Requirements for Generators (RfG), and High Voltage Direct Current Connections (HVDC) – are to ensure the integration of decentralised RES and the increased demand response into the power system while simultaneously maintaining security of supply and resilience at all times, and to facilitate the internal electricity market by levelling the playing field of grid users in different member states.

The implementation of connection codes is the responsibility of each EU member state. In this context, ENTSO-E acts as a platform to maintain and eventually amend CNCs; share information, guidance and best practices for national implementation processes; and monitor their progress, especially through the development and delivery of non-binding written guidance – Implementation Guidance Documents (IGDs) – to its members and other system operators. The development of IGDs is fuelled by discussions with stakeholders from the drafting phase onward, via dedicated expert groups and the Grid Connection Stakeholder Committee. In December 2020, ENTSO-E launched a consultation on the revision of several IGDs[14].

KEY DATES & DOCUMENTS

2 Dec 2020 –31 Jan 2021: Public consultation on several revised IGDs

Implementation monitoring

ENTSO-E monitors the implementation activities in each country via its Active library, looking in particular at divergences in national implementation. The "Monitoring report on Connection Network Codes Implementation" was published in December 2020.

In accordance with Art. 59(2) RfG and 76(2) HVDC, ENTSO-E shall provide ACER with the information required to monitor the implementation of these two network codes. In response to ACER's requests, ENTSO-E maintains summary tables for each Member State, clarifying the type of information that need to be collected by the TSOs and DSOs. The information will then be aggregated and submitted to ACER by 30 June each year.

KEY DATES & DOCUMENTS

1 Dec 2020: Publication of the Monitoring report on connection network codes implementation

Long term planning and resource adequacy assessments provide mid-term monitoring as well as long term visions to achieve a carbon-neutral European energy system by 2050. This aims to support strategic orientations by authorities and investment decisions by various actors of the electricity market.

14 These IGDs were revised and published in June 2021. These developments are outside the scope of this Report and will be covered in the Annual Report 2021, to be drafted next year.

4 Transparency Regulation

ENTSO-E's Transparency Platform (Art. 3, Regulation 543/2013) centralises data relating to the generation, transportation and consumption of electricity at the European level. The data are collected from data providers, including TSOs and other qualified third parties.

Depending on the users' needs, these data can serve various purposes, such as market analysis, research or trading. The Platform is also instrumental for the monitoring and regulation of power markets. Start-ups and new players increasingly use the Platform's wealth of data for delivering more value to customers, for example through shedding light on life-CO_2 emissions by country, wind generation and more.

In 2020, ENTSO-E developed the TP for FSkar[15] purposes, implementation of the changes stemming from the MoP revision 3.2 and TP architectural study in order to respond to the publication requirements of Art. 50.3 and 51.1 EB GL.

In the context of the amendments to the MoP revision 3.2, a snapshot of the most recent values of the offered capacity for explicit and implicit allocations have been published every 15 minutes on the TP. The full evolution of the offered capacity has also been made available. In 2020, ENTSO-E followed up on the outcomes of the public consultation conducted by ACER on inside information platform and inside information related thresholds.

The Terms and Conditions of the TP include the list of data provided by TSOs but also by Transmission Capacity Allocators, such as the Joint Allocation Office (JAO), which can be re-used by TP users without any restriction. The list was updated in October 2020.

Publicly and freely available data play an important role in bringing transparency into the market. The datasets provide an easy opportunity to transparently follow the share of generation technologies of the different geographical areas.

15 As explained in the Introduction, FSkar stands for "Financial Settlement of frequency control error (KΔf), area control error (ACE) and ramping period". The area control error is the sum of the power control error ('ΔP') – that is the real-time difference between the measured actual real time power interchange value ('P') and the control program ('P0') of a specific LFC area or LFC block – and the frequency control error ('K×Δf') – that is the product of the K-factor and the frequency deviation of that specific LFC area or LFC block, where the area control error equals ΔP+K×Δf.

5 Research, Development and Innovation

The European grid must be adapted to the emerging energy transition power system, characterised by high and increasing variable RES shares, flexibility, and decentralised co-existing with centralised in one system. Innovative solutions on the physical side and the increasing use of digital technologies for the optimisation of the grid are to be applied. The power system will see new players emerge, such as aggregators, and also see the customers moving centre stage.

ENTSO-E promotes and supports TSOs' innovation activities to transform the European energy system into an integrated one, with an emphasis on flexibility (including demand-side response, storage, etc.) and end-to-end digitisation to integrate different technologies and market services. The sections below describe ENTSO-E activities in the field of RDI that occurred in 2020.

Research, Development and Innovation Roadmap 2020–2030

In October 2020, ENTSO-E published the RDI Roadmap 2020–2030. The new RDI Roadmap identified three priority areas (One System of Integrated Systems, Power Grid for Energy System, Cyber-Physical System), addressed in six flagship projects:

KEY DATES & DOCUMENTS

2 Jul 2020: Public webinar on the RDI Roadmap 2020–2030

29 Jun–20 Aug 2020: Public consultation on the RDI Roadmap 2020–2030

14 Oct 2020: Publication of the Research, Development and Innovation Roadmap 2020–2030

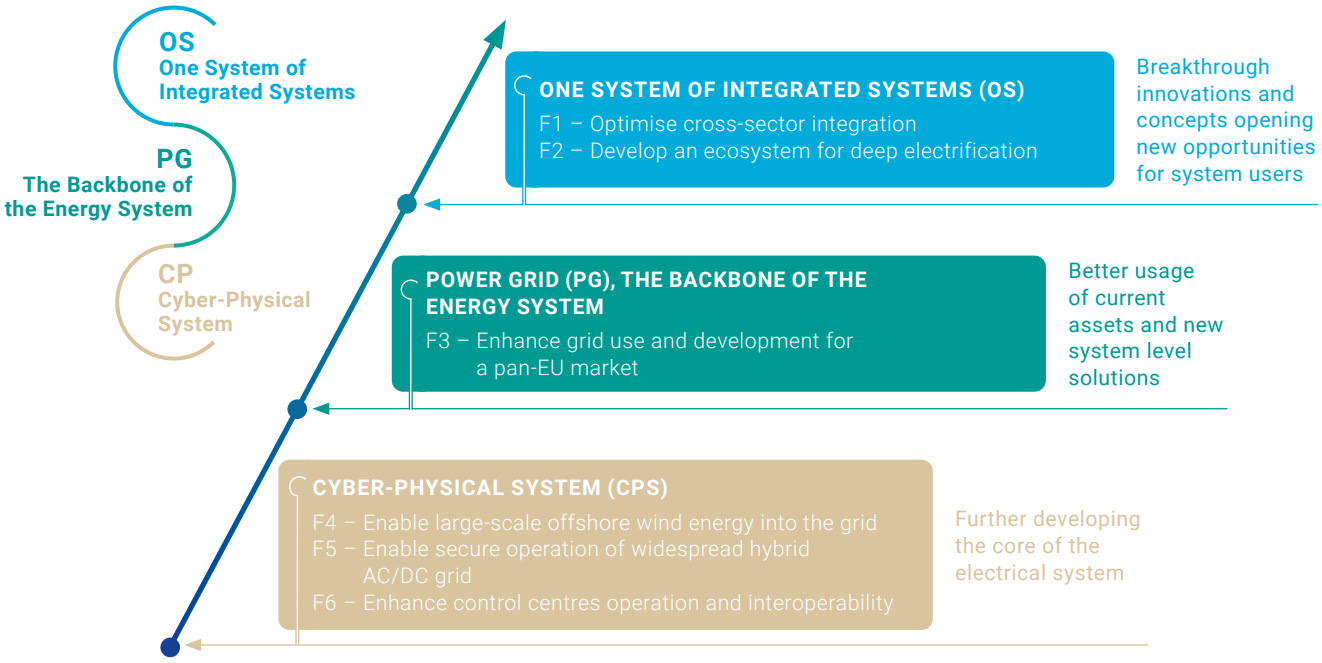

Figure 7 – RDI Roadmap Key Areas and Flagships

Other RDI publications and activities

In April 2020, ENTSO-E published its "Position Paper on the reduction of SF_6 emissions and introduction of alternative technologies", in which the TSO community confirmed its commitment to the development of SF_6 alternative technologies and substitutive gases for the various TSO applications. ENTSO-E also published a position paper on the "Standardized control interface for HVDC SIL/HIL conformity tests" to support interoperability.

ENTSO-E published, respectively, in May and October 2020 the "Position Paper on Offshore Development", and the "Position Paper on Offshore Development: Market and Regulatory Issues". The former identified five pillars for a successful offshore development, whereas the latter calls for an electricity market design that ensures the efficient utilisation of resources by providing efficient price signals (incentives) to generators, consumers, storage and infrastructure operators, both for short-term operations and for long-term investments.

The ENTSO-E Technopedia went live in November 2020. It includes factsheets on different innovative and state-of-the-art technologies in relation to power transmission assets, system operation, and digitalisation and flexibility solutions. These factsheets enable a better understanding of these technologies, their advantages for TSOs and their readiness level, including the ongoing research areas. With Technopedia, ENTSO-E hopes to continue contributing to sharing knowledge and best practice on TSO innovation.

ENTSO-E strengthened its role in the European Technology Innovation Platform on Smart Networks Energy Transition (ETIP SNET), through active participation in its working groups and the Governing Board, of which ENTSO-E holds the chairmanship. ENTSO-E is also engaged in the integrated ETIP SNET 2050 vision of the energy system and will contribute to its 2020–2030 Roadmap and the further development of RDI building blocks.

The ETIP SNET Platform falls under the umbrella of the European Commission's Strategic Energy Technology (SET), as well as the Horizon2020 calls, in which ENTSO-E participates. In 2020, ENTSO-E continued to facilitate proposals for the Horizon2020 call and to foster TSO participation. ENTSO-E is involved in the following projects:

KEY DATES & DOCUMENTS

24 April 2020: Publication of the Position Paper on the reduction of SF_6 emissions and introduction of alternative technologies

24 April 2020: Publication of the Position Paper on the Standardized control interface for HVDC SIL/HIL conformity tests

25 May 2020: Publication of the Position Paper on Offshore Development

15 Oct 2020: Publication of the Position Paper on Offshore Development: Market and Regulatory Issues

20 Nov 2020: Go-live of the ENTSO-E Technopedia

- **INTENSYS4EU**, jointly developed with the ETIP SNET, aims to support the further integration of innovative solutions and extend the existing RDI Roadmaps, through permanent and direct interactions with the impacted stakeholders and EU member states. Though the project ended in September 2020, a similar consortium with the same purpose continued the work under the name "SPRING".

- **TDX-Assist**, which aims to design and develop novel ICT tools and techniques that facilitate scalable and secure information systems and data exchange between TSOs and DSOs. Participating TSOs include Eles (Slovenia) and REN (Portugal). The project ended in September 2020.

- **INTERRFACE**, which groups TSOs, DSOs, aggregators and IT providers together to conceive a digital solution to support new flexibility markets and develop an interoperable architecture for data exchange between TSOs, DSOs and prosumers. In addition to ENTSO-E, its members Fingrid (Finland), Elering (Estonia), ELES (Slovenia), AST (Latvia), Transelectrica (Romania), and REN (Portugal) are participating in the project.

- **OneNet**, which is building on the results of INTERRFACE, developing further the coordination among TSOs, DSOs and consumers and the integration of the European energy system with 72 partners in the consortium, including 12 TSOs (with e.g. ELES, Fingrid, Elering, REN or Mavir) and ENTSO-E.

In addition, ENTSO-E organised on 18 and 30 June 2020, jointly with E.DSO, the InnoGrid virtual sessions. The conference brought together participants from the industry, associations, EU institutions, regulators, academic world and Member States, who discussed how EU funded projects can contribute in making the Green Deal a reality through enabling renewables' integration, flexibility and opening-up new market opportunities via electrification.

The main driver for the development of the ENTSO-E research plan (RDI Roadmap 2020 – 2030) was to identify the necessary innovation milestones for TSOs to reach the EU Green Deal policy objectives, thus achieving the green transition. Without neglecting the need for grid expansion, the innovation building blocks to achieve this are: deep electrification; smart sector coupling; and the integration of a massive deployment of RES, including offshore, through a reliable and secure cyber-physical system. Moreover, existing assets, markets and services should ensure both horizontal and vertical integration of energy resources with an eye towards optimisation as new types of services to customers emerge. All the activities stemming from this legally mandated document underline this purpose, as do the Horizon2020 projects.

6 Cybersecurity, Interoperability and Data

The current frame for digital activities in ENTSO-E is provided by its IT Strategy, which was approved in 2017. The ENTSO-E IT Strategy has clearly identified interoperability and cybersecurity as two of the founding capabilities for ENTSO-E's information systems. This has led to the development of an ENTSO-E Cyber Security Strategy that was approved in the first quarter of 2019. In this context, relevant activities are steered as detailed in the following paragraphs.

Cyber-security

Protecting TSOs' systems and network operation tools against cyber-attacks is obviously of paramount importance for the security of electricity supply. For several years now, ENTSO-E has been acting as a platform for the sharing of best practice between TSOs. The entry into force of the CEP tasked ENTSO-E with the mandate to promote cyber security and data protection in cooperation with relevant authorities and regulated entities (Art. 30.1.n Reg. 943/2019).

Under the framework of the Connecting Europe Facility (CEF) project, ENTSO-E carried out the following cybersecurity activities:

- **Activity 1:** Cybersecurity design
  - ISO 27001 TSO Scope & Secure Software Development Lifecycle (SSDLC)
  - Risk Impact Matrix & Data Classification
  - Supply Chain security & procurement
  - Tech. & operation cybersecurity standards
- **Activity 2:** Identify requirements for a cybersecurity testing facility
- **Activity 3:** Identify requirements for a cybersecurity operations centre

Moreover, ENTSO-E performed cyber risk assessments on the main ENTSO-E legally mandated IT platforms: CGM, EAS, Transparency Platform and Outage Planning Coordination/ Short Term Adequacy Assessment Process (OPC/STA). Regarding the latter, ENTSO-E performed external penetration testing to confirm effective overall security.

In October 2020, ENTSO-E, together with E.DSO and ENCS, hosted the 3rd edition of their cybersecurity event "Cybersecurity: Data Sharing". Leading cybersecurity experts from the grid operator community, public organisations and industry discussed current and emerging threats, the main challenges connected to data sharing, the Cybersecurity Act and the Network Code on Cybersecurity.

ENTSO-E also participated in the informal drafting team of the Network Code on Cybersecurity (composed of TSOs and DSOs under the EC leadership)[16]. The working group proposed recommendations on cross-border cyber risk assessment and management, ISO/IEC 27001 certification or proof of equivalence, common functional and non-functional security controls and requirements, Product Assurance Scheme, and information sharing.

Finally, due to the cybersecurity incident that took place in 2019, in 2020 ENTSO-E redesigned and rebuilt its IT-infrastructure, which were subjected to two external penetration tests and which are now considered highly secure. ENTSO-E also invested in new security tools to continuously monitor for breaches in security.

16 Discussions culminated with the publication of the final report in February 2021.

Data exchange standards: Ensuring pan-European interoperability

Standards facilitate cross-border exchange and allow for the efficient and reliable identification of different objects and parties relating to the internal energy market and its operations. Standards also support the implementation of network codes in various ways, and several of ENTSO-E's IT tools and data environment, such as the OPDE, rely on standards. In accordance with Art. 30.1.k of the Electricity Regulation (943/2019), ENTSO-E should contribute to the establishment of interoperability requirements and non-discriminatory and transparent procedures for accessing data.

ENTSO-E develops and maintains an Electronic Data Interchange library to enable interoperability between actors in the electrical industry in Europe.

The main standardisation activities in 2020 included the following:

1. **Development** of the Common Information Model (CIM) and implementation guides to support data exchanges required from the Network Codes. This will include support for the CGM (SOGL, CACM, FCA), coordinating operational security analysis (SOGL), balancing platforms (EBGL), and capacity calculation (SOGL, CACM).

2. **Development** of the CIM and implementation guides to support the data exchange required for the TYNDP and for the Pan-European Market Model process.

3. **Continuing** the ongoing work on the international standards IEC (International Electrotechnical Commission) 62325 series (CIM for Market), including developing the Unified Modelling Language (UML) model for the European market profile, defining the core components required, and generating the relevant documentation for IEC standards, including the balancing data exchange standard, standard of the communication tool (proposed Technical Specification IEC 62325-505), HVDC scheduling, capacity calculation, and outage planning standards.

4. **Updating** the Common Grid Model Exchange Standard (CGMES) and conformity assessment scheme to meet the latest requirements from the CGM Programme and RSC services and proposing an evolution to the CIM to the IEC to cover European needs in terms of grid model standardisation.

5. **Maintaining** the harmonised role model for the European electricity market to ensure a common vocabulary and views on the different roles and extract a European electricity market role model based on the Network Codes and Guidelines.

6. **Supporting** future data exchange requirements between TSOs and DSOs and the new tasks from the CEP including those related to the capacity mechanism registry. An assessment of the CEP in terms of the standardisation required from ENTSO-E should also be performed.

7. **Continuing** training activity in data exchange standardisation to the TSO–RSC community.

The transition towards a more sustainable society implies the electrification of sectors such as transport (e.g. electric vehicles) or heating. To work efficiently, this evolution will require more data to be collected, e.g. about individual behaviours and preferences. Cybersecurity will be the key to build the required trust for all stakeholders to embrace this evolution.

7 TSO–DSO partnership and demand side flexibility

The energy transition corresponds to a change from a centralised system to a more complex integrated electricity system, with decentralised and centralised co-existing. The new system also sees new actors, such as aggregators, active customers, demand side response and distributed flexibility.

This chapter describes ENTSO-E's activities concerning the TSO–DSO partnership and demand side flexibility, as well as the key messages of the ENTSO-E Vision 2030 for the future power system.

Integration of distributed flexibilities

A key area for cooperation is active system management and the coordinated use of distributed flexibility. Storage, distributed generation and customer participation through demand-side response have the potential to generate new services for the grid and the system. These are known as distributed flexibilities, and they will be key to efficiently managing the electrical system of the future and developing new market products.

ENTSO-E pursued its activities with the DSOs' associations based on the Memorandum of Understanding signed in 2018 and with the support of a new Steering Group dedicated to the Transmission and Distribution Interface.

A key area for cooperation is to follow up on the report on Active System Management developed in 2019 by ENTSO-E and the DSOs' associations as well as the report on Demand Side Flexibility developed by the Expert Group 3 of the Task Force Smart Grids. These reports describe the high-level principles for the implementation of market mechanisms aimed at procuring flexibility services from distributed energy resources while taking due account of each nation's specific needs. The impact on the Harmonised Role Model and existing Network Codes/Guidelines has been assessed. Concepts have been tested "on the field" in the frame of Horizon 2020 projects such as Interrface or Coordinet, and findings have been discussed and compared with similar sandboxes in dedicated workshops.

Vision 2030 Webinar Series

From 12–14 October ENTSO-E organised six webinars presenting the ENTSO-E Vision 2030. More than 40 speakers (and 800 participants) contributed to discussions on the upcoming challenges and opportunities for Europe's power system towards 2030, how to best prepare for climate neutrality by 2050, and how to move the customer to the centre stage and increase flexibility. Panel discussions touched upon market design, flexibility, offshore, system integration and research, development and innovation, among others.

KEY DATES & DOCUMENTS

12–14 Oct 2020:
ENTSO-E Vision 2030 Webinar Series

With the constant increase of renewable generation, storage and active customers largely connected to the distribution grid, DSOs and TSOs need to strengthen their coordination and exchange the necessary information for operating their networks securely while ensuring distributed flexibilities are used when and where they provide the most value to the whole electricity system.

Annexes

Annex 1 – Network Codes and Clean Energy Package: Focus on implementation

The Network Codes and Guidelines and the CEP represent a large part of the legislative framework under which ENTSO-E operates. The implementation of the Network Codes/Guidelines and of the CEP represent a substantial effort, which ENTSO-E as an association is prioritising.

All codes & guidelines have entered into force, and ENTSO-E is now focused on their implementation and the monitoring thereof.

What is ENTSO-E's role in the implementation?

The implementation of European legislation is done on national, regional, and pan-European levels, often in combination. TSOs, as well as DSOs, market participants and regulators at the EU, regional and national levels are involved in various ways. In some cases, Network Codes or primary legislation define clear and detailed roles for specific bodies/entities; in others, legal provisions are less detailed and require an additional layer of text to define roles and processes.

TASK ATTRIBUTED TO …	RESPONSIBILITY	APPROVAL*
ENTSO-E	ENTSO-E tasks	ACER
Pan-European 'All TSOs'	All TSOs	ACER
Regional 'All TSOs'	TSOs of the region	NRAs of the region. ACER to make the final decision if NRAs cannot agree**
National	Depending on national legislation (TSO, DSO…) (ENTSO-E may provide supporting documents and guidance)	National NRAs

* In accordance with CEP provisions of the Electricity Regulation 2019/943.
** In accordance with art. 5(3) of ACER Regulation 2019/942.

Table 7 – Entities responsible for pan-European, regional and national tasks

'All TSOs' refers to the TSOs of all EU countries (pan-European 'All TSOs'), or to the TSOs of a specific EU region (regional 'All TSOs').

Monitoring the implementation

ENTSO-E is responsible for the monitoring of the implementation of Network and Guidelines, as defined by the legal provisions of the latter. To fulfil this obligation, ENTSO-E elaborates monitoring plans and publishes reports. It also collects data, (termed 'lists of information'), and designs and implements interfaces for data collection. Based on new provisions under Regulation (EU) 2019/943, ENTSO-E will further cooperate with the future EU DSO entity on the monitoring of the implementation of possible new Network Codes and Guidelines. These will be adopted pursuant to this Regulation and are relevant to the operation and planning of distribution grids and the coordinated operation of the transmission and distribution networks.

ENTSO-E and ACER have signed an agreement for data collection and provision to ACER. This agreement is currently being used initially for the monitoring of the CACM and should then be extended to other network codes and guidelines.

Annex 2 – Governance

ENTSO-E is governed by an Assembly representing the 42 Transmission System Operators and by a Board consisting of 12 elected members.

President

Hervé Laffaye
RTE, France

Vice-president

Zbyněk Boldiš
ČEPS a. s.,
Czech Republic

Chair of the Board

Joachim Vanzetta
Amprion GmbH,
Germany

Board members

Dirk Biermann
50Hertz Transmission GmbH, Germany

Damian Cortinas
RTE, France

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EirGrid plc, Ireland

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Market Committee Chair
Statnett SF, Norway

Håkon Borgen
Research, Development & Innovation Committee Chair
Statnett SF, Norway

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Legal and Regulatory Group Chair
TenneT TSO B. V.,
Netherlands

Gerald Kaendler
System Development Committee Chair
Amprion GmbH,
Germany

Tahir Kapetanovic
System Operations Committee Chair
Austrian Power Grid AG,
Austria

Annex 3 – Resources

Budget

ENTSO-E AISBL[17] is a non-for-profit organisation under Belgian law.

ENTSO-E's budget is covered by membership fees as well as other revenues and incomes. For 2020, the budget of ENTSO-E totalled EUR 39.9 million, funded by TSO member fees of EUR 32.7 million, self-financing of EUR 0.6 million via ENTSO-E reserves and by other revenues of EUR 6.6 million (H2020 grants and additional TSO funding).

Staff

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

At the end of 2020, ENTSO-E had 110 employees.

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

List of acronyms

Acronym	Definition
ACER	Agency for the Cooperation of Energy Regulators
aFRR	Automatic Frequency Restoration Reserves
AISBL	Association Internationale Sans But Lucratif (International Not-For-Profit Association)
CACM	Capacity Allocation and Congestion Management
CBA	Cost–Benefit Analysis
CCR	Capacity Calculation Region
CEF	Connecting Europe Facility
CENELEC	European Committee for Electrotechnical Standardisation
CGM	Common Grid Model
CGMES	Common Grid Model Exchange Standard
CIM	Common Information Model
CNC	Connection Network Code
CNEC	Critical Network Element
CoNE	Cost of New Entry
CZC	Cross-Zonal Capacity
DCC	Demand Connection Code
DSO	Distribution System Operator
EAS	ENTSO-E Awareness System
EB Reg.	Electricity Balancing Regulation
ENTSOG	European Network of Transmission System Operators for Gas
ETIP SNET	European Technology and Innovation Platform Smart on Networks for Energy Transition
FCA	Forward Capacity Allocation
FCR	Frequency Containment Reserve
FSKAR	Financial Settlement of KΔf, ACE and ramping
GL	Guideline
GRIT	Greece–Italy
GUI	Graphical User Interface
HAR	Harmonised Allocation Rules
HVDC	High Voltage Direct Current
iAC	Independent Advisory Council
IEC	International Electrotechnical Commission
IGCC	International Grid Control Cooperation
IGDs	Implementation Guidance Documents
IGM	Individual Grid Model
IN	Imbalance Netting
ITC	Inter Transmission System Operator Compensation
JAO	Joint Allocation Office
KORR	Key Organisational Roles and Responsibilities
LTTR	Long-Term Transmission Rights
MAF	Mid-term Adequacy Forecast
MARI	Manually Activated Reserves Initiative
mFRR	Manual Frequency Restoration Reserves
MoP	Manual of Procedures
NC ER	Emergency and Restoration Network Code
NECP	National Energy and Climate Plan
NEMO	Nominated Electricity Market Operator
NRA	National Regulatory Authority

Acronym	Definition
OPC/STA	Outage Planning Coordination/Short Term Adequacy Assessment Process
OPDE	Operational Planning Data Environment
PCI	Project of Common Interest
PCN	Physical Communication Network
PECD	Pan-European Climate Database
PICASSO	Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation
Prosumers	Neologism that designates producers and consumers
RCC	Regional Coordination Centre
RES	Renewable Energy Source
RfG	Requirements for Generators
RGCE	Regional Group Continental Europe
RDI	Research, Development and Innovation
RR	Replacement Reserves
RSC	Regional Security Coordinator
SAT	Site Acceptance Test
SAFA	Synchronous Area Framework Agreement
SDAC	Single Day-Ahead Coupling
SET	Strategic Energy Technology
SEE	South-East Europe
SEleNe CC	South East electricity Network – Coordination Center
SIDC	Single Intraday Coupling
SLA	Service-Level Agreement
SO	System Operation
SOC	System Operation Committee
SOGL	System Operation Guideline
SOR	System Operation Region
SSDLC	Secure Software Development Lifecycle
TERRE	Trans-European Replacement Reserves Exchange
TP	Transparency Platform
TSO	Transmission System Operator
TYNDP	Ten-Year Network Development Plan
VoLL	Value of Lost Load

Publisher

ENTSO-E AISBL
8 Rue de Spa
1000 Brussels
Belgium

Design

DreiDreizehn GmbH, Berlin
www.313.de

Publishing date

August 2021

European Network of
Transmission System Operators
for Electricity