

# ENTSO-E Market Report

2020



# About ENTSO-E

ENTSO-E, the European Network of Transmission System Operators for Electricity, represents 42 electricity transmission system operators (TSOs) from 35 countries across Europe. ENTSO-E was registered in European law in 2009 and given legal mandates since then.

The role of Transmission System Operators has considerably evolved with the Third Energy Package. Due to unbundling and the liberalisation of the energy market TSOs have become the meeting place for the various players to interact on the market place.

ENTSO-E members share the objective of setting up the internal energy market and ensuring its optimal functioning, and of supporting the ambitious European energy and climate agenda. One of the important issues on today's agenda is the integration of a high degree of Renewables in Europe's energy system, the development of consecutive flexibility, and a much more customer centric approach than in the past.

ENTSO-E is committed to develop the most suitable responses to the challenge of a changing power system while maintaining security of supply. Innovation, a market based approach, customer focus, stakeholder focus, security of supply, flexibility, and regional cooperation are key to ENTSO-E's agenda.

ENTSO-E is contributing to build the world's largest electricity market, the benefits of which will not only be felt by all those in the energy sector but also by Europe's overall economy, today and into the future.

Transparency is a key principle for ENTSO-E, and requires a constant listening, learning and improvement, in the interest of society.

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# Executive Summary

This report combines four different market timeframes: balancing markets, single intraday coupling, single day-ahead coupling and forward capacity allocation.

Capacity allocation and congestion management are the cornerstones of a European single market for electricity. They harmonise the way cross-border markets operate in Europe to increase competitiveness and the integration of renewables from real-time to long-term.

## Balancing markets at a glance

- › Four platforms for the exchange of balancing energy from replacement reserves (RR), frequency restoration reserves with manual (mFRR) and automatic (aFRR) activations and for the imbalance netting process (IN).
- › At the time of writing, RR includes 8 countries with 8 TSOs (as full members) and more than 17 active market participants; mFRR includes 25 countries with 28 TSOs (as full members); aFRR includes 22 countries with 25 TSOs (as full members); and IN includes 14 countries with 17 TSOs (as operational members).
- › The balancing platforms are required by law to go live on different dates. The RR platform went live in January 2020, the mFRR platform and aFRR platform are expected to become operational on Q4 2021 – Q1/Q2 2022 and Q2–Q3 2021, respectively; the IN platform will be formally considered as operational in Q2 2020.<sup>1</sup>

## Single intraday coupling at a glance

- › Single intraday coupling (SIDC) uses a common IT system to continuously allocate cross-border capacity implicitly across Europe.
- › The project includes 27 countries<sup>2</sup> with 33 TSOs and 15 NEMOs, thus far including 29 integrated Bidding Zones.
- › In total, more than 36 million trades have been executed since the initial date to go live – June 2018 – and the entry of second-wave parties in November 2019.

## Single day-ahead coupling at a glance

- › Single day-ahead coupling (SDAC) uses a common price coupling algorithm to calculate electricity prices across Europe and to allocate auction-based cross-border zonal capacity implicitly.
- › The project includes 27 countries with 35 TSOs and 17 NEMOs, involving to-date 57 Bidding Zones for two operational projects.
- › In total, more than 2.250 market sessions have been successfully completed since the project went live in February 2014.

## Forward capacity allocation at a glance

- › Forward capacity allocation uses a single pan-European platform to allocate auction-based cross-zonal transmission rights.
- › The project includes 22 countries with 25 TSOs, 71 serviced borders and more than 300 active market participants.
- › In total, more than 2,000 cross-border auctions have been successfully completed since going live in October 2018.

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<sup>1</sup> The specific date and month is pending on the Imbalance Netting Implementation Framework decision by ACER, expected in June 2020.

<sup>2</sup> 22 are operational with at least one border: Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Latvia, Lithuania, Luxembourg, Norway, the Netherlands, Poland, Portugal, Romania, Slovenia, Spain, and Sweden.

# 1 Introduction

ENTSO-E monitors the state-of-play of balancing, intraday, day-ahead and long-term markets in line with the obligations stemming from the Commission Regulation (EU) 2017/2195 of 23 November 2017 (hereafter **EB regulation**), the Commission Regulation (EU) 2015/1222 of 24 July 2015 (hereafter **CACM regulation**) and the Commission Regulation (EU) 2016/1719 of 26 September 2016 (hereafter **FCA regulation**).

In accordance with Article 63(2) of the EB regulation (hereafter **EB monitoring plan**)<sup>3</sup> and the detailed description of the monitoring obligations set out in Article 59(1) of the EB regulation, this report describes and analyses the implementation of the EB regulation, as well as reporting on the progress made with regards to the integration of balancing markets in Europe.

In accordance with Article 82(3) of the CACM regulation (hereafter **CACM monitoring plan**)<sup>4</sup>, the following monitoring obligations are covered in this report: a review of the progress made and potential problems with the implementation of the single day-ahead and intraday coupling in line with

Article 82(2)(a) of the CACM regulation; recommendations for further development of single day-ahead and intraday coupling, including further harmonisation of methodologies, processes and governance arrangements in line with Article 31(3)(h) of the CACM regulation; indicators for assessing and following the efficiency of the single day-ahead and intraday coupling in the longer term in line with Article 31(3)(g) of the CACM regulation; assessment of the effectiveness of the criterion concerning the estimation of the value of lost load with respect to minimum and maximum prices in intraday and day-ahead markets in line with Article 82(2)(e) of CACM regulation.

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3 Prepared and submitted by ENTSO-E to ACER on 29 May 2018 and subsequently amended on 27 September 2019.

4 Prepared and submitted by ENTSO-E to ACER on 2 February 2016 and subsequently amended on 24 April 2018.



In accordance with Article 63(2) of the FCA regulation (hereafter **FCA monitoring plan**)<sup>5</sup>, the following monitoring obligations are covered in this report: an account of the progress and potential problems with the implementation of forward capacity allocation in line with Article 63(1)(a) of the FCA regulation; recommendations for further development of the forward capacity calculation, including further harmonisation of methodologies, processes and governance arrangements in line with Article 26(3)(f) of the FCA regulation and an account of the effectiveness of the operation of the forward capacity allocation and the single allocation platform in line with Article 63(1)(d) of the FCA regulation.

As in its previous editions<sup>6</sup>, this report begins by highlighting the transversal progress of the balancing markets, intraday and day-ahead coupling projects as well as forward capacity allocation. Moreover, overall pan-European expenditures for CACM and FCA-relevant market time horizons are depicted.

To fulfil the requirements above, ENTSO-E has committed to providing an annual joint report (hereafter ENTSO-E Market Report). For this year, in line with the ENTSO-E monitoring plans, this report covers the period from July 2019 to May 2020. The report will be delivered to ACER and published on the ENTSO-E website directly following the reporting period.

## The ENTSO-E Market Report 2020 is organised into the following chapters:

- › **Chapter 2** introduces the transversal progress of the single day-ahead and intraday coupling as well as forward capacity allocation based on all TSOs and all nominated electricity market operators (hereafter NEMOs). Additionally, the development of balancing market methodologies are, for the first time, included.
- › **Chapter 3** provides, for the first time, monitoring details on the implementation of balancing platforms, describing the implementation of EB regulation harmonisation and integration of balancing markets through the application of the EB regulation.
- › **Chapter 4** offers a detailed overview of the 2019/2020 reporting period and a glimpse of the 2020/2021 reporting period in line with the relevant monitoring requirements of the CACM regulation.
- › **Chapter 5** reviews in detail the 2019/2020 reporting period and presents a glimpse of the 2020/2021 reporting period in line with the relevant monitoring requirements of the FCA regulation.
- › A **glossary** is included at the end of this report for convenience.

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5 Prepared and submitted by ENTSO-E to ACER on 14 April 2017 and subsequently amended on 12 April 2018.

6 ENTSO-E has already published four market reports: the **first report** was delivered in August 2016 and specifically covered the period from the date of entry into force of the CACM regulation (14 August 2015) onwards. The **second report** was made available in February 2017, building upon the first report with a special emphasis on the six months following its initial delivery. The **third report** was delivered in August 2017. Following the entry into force of the FCA regulation, the CACM market report was extended by the forward capacity allocation. The **fourth report** was delivered in August 2018. The **fifth report** was delivered in August 2019.

# 2 Transversal progress for balancing market, single intraday and day-ahead coupling, and long-term capacity allocation

## 2.1 Electricity balancing regulation

The EB regulation aims to integrate balancing markets across Europe. It entered into force on 18 December 2017 and it sets out the legal basis for harmonised cross-border balancing markets, standard balancing products and consistent pricing and settlement rules. In addition, the EB regulation sets the rules for the establishment of voluntary balancing

capacity cooperation of neighbouring TSOs. For that, TSOs have endeavoured to agree on rules jointly and subsequently incorporated them in proposals for legally binding methodologies to be approved by the appropriate regulatory authorities, as listed below:

### 2.1.1 Balancing energy

#### Implementation framework for the European RR platform (hereafter RRIF) (Article 19, EB regulation)<sup>7</sup>

On 18 June 2018, all TSOs performing the reserve replacement process ('RR TSOs') submitted a proposal for the RRIF to their relevant regulatory authorities.

The TSOs submitting the proposal include: Czech Republic (ČEPS a.s.), Great Britain (National Grid Electricity System Operator Ltd.), Poland (Polskie Sieci Elektroenergetyczne S.A.), Spain (Red Eléctrica de España S.A.U.), Portugal (REN – Rede Eléctrica Nacional, S.A.), France (Réseau de Transport d'Électricité), Switzerland (Swissgrid AG) and Italy (Terna-Rete Elettrica Nazionale SpA). Each TSO submitted the proposal to the relevant regulatory authority.

On 15 January 2019, all the relevant regulatory authorities approved the RRIF, and RR TSOs have had at least one year to join the RR platform (i. e. by 15 January 2020).

On 6 January 2020, the European platform for the exchange of balancing energy from replacement reserves (hereafter the RR platform) became operational. ČEPS a.s. was the first TSO to connect to the RR platform (6 January 2020), followed by Red Eléctrica de España S.A.U. (3 March 2020), while the other TSOs will connect in respect to the agreed derogation with their respective regulatory authority: in Q3 2020 REN – Rede Eléctrica Nacional, S.A.; in early Q4 2020 Swissgrid AG, Réseau de Transport d'Électricité and National Grid Electricity System Operator Ltd.;<sup>8</sup> in Q4 Terna-Rete Elettrica Nazionale SpA; and finally Polskie Sieci Elektroenergetyczne S.A. in January 2021.

<sup>7</sup> Various public stakeholder workshops (19 March 2018, 20–21 June 2018, 26 June 2019) and consultations have been organised by TERRE and ENTSO-E. For more information please check here.

<sup>8</sup> National Grid Electricity System Operator press release.

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### **Implementation framework for the European mFRR platform (hereafter mFRRIF) (Article 20, EB regulation)<sup>9</sup>**

On 18 December 2018<sup>10</sup>, the proposal was submitted to ACER on behalf of all TSOs. Each TSO submitted, in turn, a proposal in their own language, if required, to the relevant regulatory authority. The final submission was sent on 11 February 2019, and all TSOs submitted a proposal for the mFRRIF to their respective regulatory authorities. As of 24 July 2019, not all regulatory authorities could reach a consensus and instead referred the proposal to ACER.

ACER adopted a decision on 24 January 2020. In comparison with the TSO proposal, ACER included the capacity management function (CMF) in the high-level design of the mFRR platform.

All TSOs will have 30 months following the approval of the mFRRIF (i. e. by 24 July 2022) to implement, make operational and use the mFRR platform. The mFRR platform is expected to become operational between Q4 2021–Q1 2022.

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### **Implementation framework for the European aFRR Platform (hereafter aFRRIF) (Article 21, EB regulation)<sup>11</sup>**

On 18 December 2018<sup>12</sup> the proposal was submitted to ACER. Where necessary, each TSO submitted the proposal in their native language to the relevant regulatory authority. On 11 February 2019, all TSOs submitted a proposal for the aFRRIF to their respective regulatory authorities. 24 July 2019, all regulatory authorities could not reach a consensus and referred the proposal to ACER.

ACER adopted a decision on 24 January 2020. In comparison with the TSO proposal, ACER established that the standard aFRR balancing energy product bid characteristics are defined by the minimum bid size and granularity of 1 MW and the validity period of 15 minutes. The target full activation time ("FAT") of five minutes allowed for the exchange of standard aFRR balancing energy was moved up by one year (end of 2024). In comparison with the TSO proposal, ACER included the CMF in the high-level design of the aFRR platform.

All TSOs performing the automatic frequency restoration process have 30 months (i. e. by 24 July 2022) to implement, make operational and use the aFRR platform, which is expected to become operational between Q2 and Q3 2021.

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### **Implementation framework for the European IN platform (hereafter INIF) (Article 22, EB regulation)<sup>13</sup>**

On 10 July 2018, all TSOs submitted a proposal for the INIF to their respective regulatory authorities. On 9 November 2018, all regulatory authorities requested amendments, upon which each TSO submitted an amended proposal on 19 March 2019. On 19 July 2019, all regulatory authorities submitted a second request for amendments, which all TSOs submitted on 28 October 2019.

On 14 January 2020, all regulatory authorities acknowledged that TSOs had implemented all the requested changes, but some argued that they were no longer competent to issue a decision on the proposal given the entry into force of the ACER regulation. Thus, all regulatory authorities referred the decision to ACER on 28 December 2019. ACER is expected to approve the INIF in June 2020.

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### **List of standard balancing capacity products for FRR and RR (Article 25, EB regulation)<sup>14</sup>**

On 17 December 2019<sup>15</sup>, this all-TSO proposal was submitted to ACER following public consultation<sup>16</sup> from 15 May to 31 July 2019 and a stakeholder workshop on 6 June 2019. ACER has until June 2020 to adopt a decision on this proposal.

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9 **Various public stakeholder workshops and consultations have been organised by MARI and ENTSO-E.**

10 **Major milestone reached towards the integration of European electricity balancing markets**

11 **Various public stakeholder workshops and consultations have been organised by PICASSO and ENTSO-E.**

12 **Major milestone reached towards the integration of European electricity balancing markets**

13 **Various public stakeholder workshops and consultations have been organised by IGCC and ENTSO-E.**

14 ENTSO-E has organised a public stakeholder workshop on 6 June 2019 and consultation from 15 until 31 July 2019.

15 ENTSO-E press release on the submission on the co-optimisation allocation process proposal Article 40 of the **EB regulation and standard balancing capacity products Article 25 of the EB regulation**

16 **All TSOs-Consultation on Article 25 EB regulation**



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### **Classification of the activation purposes of balancing energy bids (hereafter Activation purposes methodology) (Article 29, EB regulation)<sup>17</sup>**

On 18 December 2018<sup>18</sup>, the proposal was submitted to ACER on behalf of all TSOs. When required, each TSO submitted the proposal in their language to the relevant regulatory authority.

On 11 February 2019, all TSOs submitted a proposal for the activation purposes methodology to their respective regulatory authorities. On 24 July 2019, all regulatory authorities requested amendments, which were submitted by TSOs on 14 November 2019.

On 14 January 2020, some regulatory authorities determined that they were no longer competent to issue a decision on the proposal given the entry into force of the ACER regulation and, consequently, all regulatory authorities referred the decision to ACER.

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### **Pricing method for all products (hereafter 'pricing proposal') (Article 30, EB regulation)<sup>19</sup>**

On 18 December 2018<sup>20</sup>, the proposal was submitted to ACER on behalf of all TSOs. When required, each TSO submitted the proposal in their language, to its relevant regulatory authority. On 11 February 2019, all TSOs submitted a proposal for the pricing methodology to their respective regulatory authorities. As of 24 July 2019, regulatory authorities could not reach a consensus and referred the proposal to ACER.

ACER adopted a decision on 24 January 2020. The methodology establishes, from standard balancing energy product bids activated through European platforms, to the pricing rules based on the principles of cross-border marginal pricing.

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### **TSO–TSO settlement of intended exchanges of energy as a result of the RRP, FRP and INP (hereafter TSO–TSO settlement methodology) (Article 50, EB regulation)<sup>21</sup>**

On 18 December 2018,<sup>22</sup> the proposal was submitted to ACER on behalf of all TSOs. On 11 February 2019, all TSOs submitted a proposal for the activation purposes methodology to their respective regulatory authorities.

On 24 July 2019, all regulatory authorities requested amendments, and TSOs submitted an amended proposal on 14 November 2019.

On 14 January 2020, some regulatory authorities considered themselves no longer competent to issue a decision on the proposal given the entry into force of the ACER regulation and, consequently, referred the decision to ACER.

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### **TSO–TSO settlement of intended exchanges of energy due to ramps and FCR within synchronous area continental Europe (hereafter CCFR) and of unintended exchanges of energy within synchronous area continental Europe (hereafter CCU) (Articles 50 and 51, EB regulation)**

The TSOs based in continental Europe have developed methodological proposals for intended energy exchanges as a result of the frequency containment process (FCR) and ramping period and for unintended exchanges of energy. These methodologies are pursuant to EB regulation, which will be binding for EU TSOs in continental Europe ('CE TSOs') following the approval of the relevant regulatory authorities.

The proposals have been submitted to all continental European regulatory authorities on 5 July 2019 and 7 July 2019, respectively. The relevant regulatory authorities reached an agreement on 4 December 2019 to request amendments to both proposals. The TSOs agreed on amended proposals for submission, which were received by the last relevant regulatory authority on 15 April 2020. On 27 May 2020, the relevant regulatory authorities agreed to approve the TSOs' amended proposals and are expected to formalise the decision by 15 June 2020.

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17 ENTSO-E held various public stakeholder workshops (20–21 June 2018 and 16 October 2018). An additional public consultation was opened by ENTSO-E from 12 September to 13 November 2018.

18 Major milestone reached towards the integration of European electricity balancing markets

19 ENTSO-E held various public stakeholder workshops (20–21 June 2018 and 16 October 2018). An additional public consultation was opened by ENTSO-E from 12 September to 13 November 2018.

20 **Major milestone reached towards the integration of European electricity balancing markets**

21 ENTSO-E hold various public stakeholder workshops (20–21 June 2018 and 16 October 2018).

22 **Major milestone reached towards the integration of European electricity balancing markets**

Considering the interconnected nature of EU and non-EU system operations, and the need for working arrangements beyond the EU TSOs' ability to implement the said financial settlement according to Articles 50(3) and 51(1), all TSOs within the CE SA need to be part of the process, including non-EU TSOs. To solve this issue, the RG CE agreed to include their rules in the CE Synchronous Area Framework Agreement (SAFA). This addition should be approved and signed by all CE TSOs. The first version of the SAFA incorporates the compensation programme, which will still be used until the financial settlement rules are in place.

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**TSO–TSO settlement of intended exchanges of energy due to ramping-up restrictions and FCR between synchronous areas**  
(Article 50, EB regulation)

All asynchronously connected TSOs have developed common financial settlement rules for intended exchanges of energy resulting from ramping-up restrictions and FCR. The proposal was submitted to the relevant regulatory authorities on 18 June 2019.<sup>23</sup> A request for amendments was received on 27 January 2020, following which the TSOs submitted an amended proposal on 27 March 2020. The relevant regulatory authorities were expected to adopt a decision by May 2020.

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**TSO–TSO settlement of unintended exchanges between synchronous areas**  
(Article 51, EB regulation)

On 18 June 2019, all asynchronously connected TSOs submitted to their respective regulatory authorities a proposal for a settlement methodology for unintended exchanges of energy between SAs. On 28 January 2020, all relevant regulatory authorities approved the methodology.

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**TSO–TSO settlement of unintended exchanges within Nordic synchronous area TSOs and TSO–TSO settlement of intended exchanges of energy due to ramps and FCR within the Nordic synchronous area**  
(Article 50 and 51, EB regulation)

TSOs within the Nordic synchronous area submitted on 18 June 2019 a common proposal covering both the settlement of intended exchanges of energy due to FCR and ramping-up, as well as unintended exchanges of energy, to the relevant regulatory authorities. On 18 December 2019, the Nordic TSOs received a request for amendments and an amended proposal was submitted on 18 February 2020. On 21 April 2020, the relevant regulatory authorities approved the proposal.

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**Imbalance settlement harmonisation (hereafter ISH methodology)**  
(Article 52, EB regulation)<sup>24</sup>

On 18 December 2018<sup>25</sup>, the proposal was submitted to ACER on behalf of all TSOs. Each TSO submitted, in turn, the proposal in their respective languages, when required, to the relevant regulatory authority. On 24 July 2019, all regulatory authorities requested amendments and all TSOs submitted an amended proposal on 14 November 2019.

On 14 January 2020, the regulatory authorities referred to ACER the amended proposal for a decision. ACER is expected to approve the methodology in June 2020. With the final publication of ACER decision, TSOs will have 18 months to implement the ISH methodology.

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23 Settlement methodology for ramping and FCR energy between SAs

24 ENTSO-E has organised a number of public stakeholder workshops (on 23 March 2018 and 20–21 June 2018). A further period for public consultation was opened between 16 July and 18 September 2018. ACER opened a public consultation from 9 March to 29 March 2019.

25 **Major milestone reached towards the integration of European electricity balancing markets**

## 2.1.2 Allocation of cross-zonal capacity for exchange of balancing capacity or sharing of reserves

### Methodology for the allocation of cross-zonal capacity based on the co-optimisation allocation process (Article 40, EB regulation)<sup>26</sup>

On 17 December 2019<sup>27</sup>, this all TSO's proposal was submitted to ACER after a period of public consultation from 15 May to 31 July 2019 and two stakeholder workshops on 4 February and 6 June 2019. ACER has until June 2020 to decide on this proposal.

The methodology document submitted by the TSOs propose to analyse the impact of the implementation of a co-optimised CZC allocation process in various subjects such as governance of the CZC allocation optimisation function; technical feasibility of the implementation of the CZC allocation optimisation function; flow-based compatibility; compatibility with the methodology for the price coupling algorithm and the continuous trading matching algorithm; impact analysis on the operational security of the interconnected transmission system; the linkage between standard balancing capacity bids over time and between products, and between standard balancing capacity bids and day-ahead market bids; the reasoning for the two-step approach; and cost estimation, categorisation and sharing. This impact will be covered by means of a document, to be developed by all TSOs in cooperation with all NEMOs. This document will be the basis to provide the algorithm requirements to NEMOs.

### Methodology for the allocation of the cross-zonal capacity market-based allocation process (Article 41, EB regulation)

As of 18 December 2019, the following six CCRs have submitted a proposal to their relevant regulatory authorities: Core, Hansa, Nordic, Baltic, Italy North and Greece-Italy. All these CCRs provided the opportunity to their stakeholders to comment on the proposals (Core<sup>28</sup>, Hansa<sup>29</sup>, Nordic<sup>30</sup>, Baltic<sup>31</sup>, Italy North<sup>32</sup> and Greece-Italy<sup>33</sup>). The relevant regulatory authorities have until June 2020 to adopt a decision on these proposals.

### Methodology for the allocation of cross-zonal capacity based on an economic analysis (Article 42, EB regulation)

As of 18 December 2019, the following three CCRs have submitted a proposal to their relevant regulatory authority: Core, Italy North and Greece-Italy. All these CCRs have allowed their stakeholders to comment on the proposals (Core, Italy North and Greece-Italy). The three CCRs have submitted these methodologies to the relevant regulatory authorities, which have until June 2020 to adopt a decision on these proposals.

26 ENTSO-E organised a public stakeholder workshop on 6 June 2019 and 4 February 2019. ENTSO-E also ran a consultation on this proposal from 15 until 31 July 2019. A public consultation by ACER was held between 19 February to 10 March 2020.

27 [ENTSO-E press release](#) on the submission on the co-optimisation allocation process proposal Article 40 of the EB regulation and standard balancing capacity products Article 25 of the EB regulation

28 Core CCR conducted a public consultation on Article 41 of the EB regulation between 20 September and 21 October 2019.

29 Hansa CCR conducted a public consultation on Article 41 of the EB regulation between 20 September and 21 October 2019.

30 Nordic CCR conducted a public consultation on Article 41 of the EB regulation between 3 September and 4 October 2019.

31 Baltic CCR conducted a public consultation on Article 41 of the EB regulation between 4 November and 4 December 2019.

32 Italy North CCR held a public consultation on Article 41 of the EB regulation between 11 October and 11 November 2019.

33 GRIT CCR held a public consultation on Article 41 of the EB regulation between 11 October and 11 November 2019.

## 2.2 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. Putting in place harmonised cross-border markets in all timeframes will lead to a more efficient European market and benefit customers.

Type	Proposal	CACM Art.	1 <sup>st</sup> submission	NRAs approval(s) or ACER decision	1 <sup>st</sup> TSOs' request for amendment	NRAs approval(s) or ACER decision	2 <sup>nd</sup> TSOs' request for amendment	2 <sup>nd</sup> NRAs approval(s) or ACER decision
All-TSO (I)	Capacity calculation Regions	15(3)	✓	✓*	✓**	✓	✓***	✓****

\* Referral to ACER from all NRAs

\*\* All TSOs drafted an amendment to Annex I of the CCRs established by ACER decision 06/2016 ("the draft CCR Amendment Proposal") to include the bidding zone border between Belgium and Great Britain (BE-GB) and to assign this new bidding zone border to the Channel CCR by 17 January 2018. The CCR amendment proposal was adopted upon the decision of the last regulatory authority concerned (14 February 2018).

\*\*\* All TSOs drafted an amendment to include the new bidding zone border: DK1-NL and its corresponding TSOs to the Hansa CCR, add the TSOs National Grid IFA2 Limited and ElecLink Limited to the FR-GB bidding zone border in the Channel CCR, and add the TSO Amprion to the BE-DE/LU bidding zone border in the Core CCR.

\*\*\*\* Referral to ACER from all NRAs

Table 1a – Development steps from submitting an article to the final approval

Type	Proposal	CACM Art.	1 <sup>st</sup> submission	Request for amendment	1 <sup>st</sup> submission after request for amendment	NRAs approval(s) or ACER decision	2 <sup>nd</sup> request for amendment	2 <sup>nd</sup> NRAs approval(s) or ACER decision
All-TSO (II)	ID cross zonal GOT ID cross zonal GCT	59	✓	✓	✓	✓*		
	Scheduled exchange	43	✓**	✓***	✓****	✓****		
		56	✓✓***	✓****	✓*****	✓*****		
	ID Cross zonal capacity pricing	55(3)	✓	Referred to ACER		✓		
	Congestion income distribution	73	✓	✓	✓	✓		
Common grid Model	16		✓	✓	✓	✓		
	17		✓	✓	✓	✓		
All-NEMO	Plan of the market coupling operator	7(2)	✓	✓	✓	✓		
	Day-ahead and intraday algorithm	37	✓✓✓	✓	✓✓✓	✓		
	MAX/MIN price	41	✓	Referred to ACER		✓		
		54	✓	Referred to ACER		✓		
	Back-up methodology	36	✓	✓	✓	✓		
Products accommodated	40	✓	✓	✓	✓	✓***		
	53(4)	✓	✓	✓	✓	✓		

\* Referral to ACER from all NRAs \*\* For day-ahead and intraday proposals, only the TSOs, which intended to calculate scheduled exchanges  
regulatory authorities and the Agency the proposal for the methodology for calculation of scheduled exchanges \*\*\* All TSOs submitted to all  
\*\*\*\* Day-ahead proposal \*\*\*\*\* Intraday proposal

Table 1b – Overview of All TSO and All NEMO CACM regulation deliverables (as of May 2020)

## 2.2.1 Main development in all TSO deliverables

### Capacity calculation regions (Article 15(3) of the CACM regulation)

ACER decision 04/2019 mandates that all TSOs analyse the optimal determination of the CCRs regarding Hansa and Channel by October 2020. At the moment, the TSOs are preparing a qualitative analysis and impact assessment on implementation timelines for the CACM CCM projects and the implementation of other regional methodologies.

### Common grid model methodology (Articles 16 and 17 of the CACM regulation)

All TSOs submitted the amended common grid model methodology (hereafter CGMM) by 11 March 2017 to appropriate regulatory authorities. On 11 May 2017, the amended methodology pursuant to the CACM regulation was approved by all regulatory authorities. The implementation of the methodology is ongoing.

The CGMM pursuant to the CACM regulation is referred to as the 'CGMM-v1-plus' because it is the first of three versions of the common grid models (CGM) methodology. The suffix 'plus' denotes the fact that this methodology was amended based on a request by the regulatory authorities. The CGMM-v1-plus covers the preparation of the CGM for the (D-1) and (D-2) timeframes, referred to in Article 14 of the CACM regulation as the intraday capacity calculation timeframe and day-ahead capacity calculation timeframe, respectively. The CGMM-v2-plus (prepared pursuant to the FCA regulation and explained in more detail below) addresses the (M-1) and (Y-1) timeframes, and the CGMM-v3 (prepared pursuant to the system operation regulation and also explained in more detail below) covers the intraday (D-1) and (Y-1) timeframes. Apart from procedural provisions, such as subject matter, scope and definitions, the CGMM contains both rules for the process to be applied when preparing individual grid models (IGMs), common grid models (CGMs) and the data to be included in both IGMs and CGMs.

To complete its legal obligations, ENTSO-E established the CGM programme to coordinate the development and delivery of infrastructure, applications and communications for a CGM building process with the required security, data quality, interoperability and automated processes. The deliverables include, among others, the following:

- › An Operational Planning Data Environment (OPDE) platform for secure and traceable pan-European data storage, exchange and management.
- › A secure pan-European private meshed linked Physical Communication Network (PCN) based on leased lines and TSO-owned private lines and backbones.

TSOs, RSCs and the CGM programme jointly demonstrated the basic CGM building process, respecting processing times and achieving data quality levels. The programme will continue working with TSOs and RSCs to enable a transition from a basic to a full CGM building process, finalising business requirements, IT delivery of subsequent upgrades and the roll-out of the PCN.

Although the terminology used in the three versions of the common grid model methodology is not entirely consistent for legal reasons, and while there are differences between the descriptions of the building processes for different timeframes, the consolidation of the three methodologies into a single document was initiated.

As the consolidation of the CGM-related methodologies is not required by law and has been undertaken at the initiative of TSOs, there is no legal deadline for the submission of the drafts of the consolidated documents. TSOs are, however, informing stakeholders regarding the relevant developments via the European stakeholder committees and, eventually, will also seek comments on the consolidated methodologies by way of public consultation.

## 2.2.2 Main developments in the NEMO deliverables

### Multiple nominated electricity market operator arrangements (Articles 45 and 57 of the CACM regulation)

The multiple nominated electricity market operator arrangements (abbreviated as MNA) started in 2018, and since then different regions and projects have progressively gone live. The MNA in CWE bidding zones went live on 2 July 2019 as a result of the cooperation of 18 parties (nine TSOs, three NEMOs and six third parties) over two years of work.

### Proposal for products that can be taken into account by nominated electricity market operators in the intraday coupling process (Articles, 9(1), 9(6)(h) and 53(1) of the CACM regulation)

The proposal for intraday products has been amended to consider the decision from ACER<sup>34</sup> on intraday pricing and to include the products related to intraday auctions. This proposal is part of the package approved by ACER on January 2020 together with the algorithm methodology.

34 ACER decision No 05/2020

## 2.2.3 Main development on the joint work of the TSOs and NEMOs

### Day-ahead and intraday algorithms (Article 37 of the CACM regulation)

#### Legal proposal:

All TSOs submitted the updated requirements for the DA and ID algorithm to reflect the decision from ACER<sup>35</sup> on the intraday pricing to NEMOs, in turn, the NEMOs included these requirements in the algorithm methodology proposal and submitted it on 31 July 2019. The submitted document included the timeline for the introduction of 15 minutes to the intraday auctions.

During Q3/Q4 2019, ACER opened a public consultation to which all TSOs submitted a response on 18 November 2019. ACER finalised the proposal for a decision in early January 2020 and the Board of Regulators opinion was issued on 22 January 2020.

On 30 January 2020, ACER published its decision<sup>36</sup> to incorporate advanced features such as the flow-based capacity calculation and 15-minutes products for the day-ahead time-frame. For intraday, the decision from ACER confirms the requirements from the TSOs on the intraday auctions. TSOs and NEMOs have until the end of 2022 to introduce this new functionality in the intraday market.

#### CACM report:

The first CACM annual report for 2018 in accordance with Article 20(3) of the algorithm methodology (ACER decision 26 July 2018) has been drafted by the NEMOs in cooperation with TSOs. The report has been approved by the NEMO Committee on 29 November 2019. On 10 December 2019, in the context of the Trilateral Coordination Group meeting, NEMOs submitted the report to regulatory authorities, ACER and EC. The report is to be published on the NEMO Committee<sup>37</sup> and ENTSO-E websites.<sup>38</sup>

#### Cost report:

In September 2019, all NEMOs and TSOs published the 2018 report<sup>39</sup> on the cost of establishing, amending and operating the SDAC and SIDC. The CACM 2019 cost report, according to Article 80 of CACM regulation, which details the cost for establishing, amending and operating the SDAC, SIDC and the market-coupling regional projects, will be submitted at the same time as this report.

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35 [ACER decision No 01/2019](#)

36 [ACER decision No 04/2020](#)

37 [All NEMOs Committee CACM Annual Report 2018](#)

38 [2019 Cost Report](#) – All NEMOs Committee website & ENTSO-E website

39 [All NEMOs Committee 2018 cost report](#) and [ENTSO-E website](#)

## 2.2.4 Collaboration of TSOs and NEMOs with third parties: The CACM global non-disclosure agreement

Following up on the information presented in the previous edition of this report (ENTSO-E Market Report 2019) this section outlines the details of this agreement and updates the signatories that have joined between August 2019 and May 2020.

This non-disclosure agreement is in effect for the observer-ship (hereafter **CACM Global NDA**). Within the frameworks of the SDAC and SIDC, this CACM Global NDA covers the exchange of confidential information. The CACM Global NDA came into effect in February 2016 and fulfils CACM regulation obligations for the completion of the single day-ahead and intraday coupling.

This NDA has replaced individual NDAs from early implementation projects prior to the date the CACM entered into force.<sup>40</sup>

In accordance with the CACM Global NDA, the parties must give their consent to include any third party (Article 8 of the CACM Global NDA).

On 10 September 2019, TSOs unanimously approved the admittance of BELEN to the CACM Global NDA. On 23 September 2019, all NEMOs added to their approval.

Table 2 lists all parties under the CACM Global NDA (as of May 2020) and the date upon which each became part of this agreement.

Name of party	Member since
Affärsverket Svenska Kraftnät	23 February 2016
Amprion GmbH	23 February 2016
Austrian Power Grid AG	23 February 2016
Britned Development Limited	23 February 2016
Creos Luxembourg S.A	23 February 2016
Elia System Operator NV/SA	23 February 2016
Energinet Elsystemansvar A/S	23 February 2016
Fingrid Oyj	23 February 2016
National Grid Interconnectors Limited	23 February 2016
Red Eléctrica de España, S.A.U.	23 February 2016
REN - Rede Eléctrica Nacional, S.A.	23 February 2016
RTE Réseau de transport d'électricité	23 February 2016
Statnett SF	23 February 2016
TenneT TSO B.V	23 February 2016
TenneT TSO GmbH	23 February 2016
TransnetBW GmbH	23 February 2016
50Hertz Transmission GmbH	23 February 2016
Vorarlberger Übertragungsnetz GmbH	23 February 2016
Elektroenergien Systemen Operator EAD	23 February 2016
Swissgrid AG	23 February 2016
Cyprus TSO	23 February 2016
ČEPS a.s	23 February 2016
Elering AS	23 February 2016
National Grid Electricity Transmission plc	23 February 2016
SONI Limited	23 February 2016
Moye Interconnector Limited	23 February 2016
Independent Power Transmission Operator S.A	23 February 2016
Croatian Transmission System Operator Ltd.	23 February 2016
MAVIR – Hungarian Independent Transmission Operator Company Ltd	23 February 2016

table continued on the next page >>>

40 An overview of early implementation projects is provided in the [ENTSO-E Market Report 2019](#).

Name of party	Member since
EirGrid plc	23 February 2016
Landsnet hf	23 February 2016
Terna – Rete Elettrica Nazionale S.p.A	23 February 2016
Litgrid AB	23 February 2016
AS 'Augstsprieguma tīkls'	23 February 2016
CGES AD	23 February 2016
MEPSO - Operator na elektroprenosniot sistem na Makedonija AD	23 February 2016
Polskie Sieci Elektroenergetyczne S.A	23 February 2016
Compania Națională de Transport al Energiei Electrice Transelectrica SA	23 February 2016
EMS – Javno Preduzeće Elektromreža Srbije Beograd	23 February 2016
Slovenská elektrizačná prenosová sústava, a.s	23 February 2016
ELES, d.o.o, sistemski operater prenosnega elektroenergetskega omrežja	23 February 2016
SP Transmission Limited	23 February 2016
Scottish Hydro Electric Transmission plc	23 February 2016
APX Power B.V. and APX Commodities Ltd.	23 February 2016
Belpex NV	23 February 2016
Croatian Power Exchange Ltd.	23 February 2016
EPEX SPOT SE	23 February 2016
Gestore dei Mercati Energetici S.p.A	23 February 2016
Nord Pool AS	23 February 2016
OMI - Polo Español S.A.	23 February 2016
OTE A.S.	23 February 2016
LAGIE, Operator of Electricity Market S.A	23 February 2016
HUPX Hungarian Power Exchange Company Limited by Shares	23 February 2016
EirGrid plc	23 February 2016
Towarowa Gielda Energii S.A.	23 February 2016
Operatorul Pieței de Energie Electrică și de Gaze Naturale SA	23 February 2016
OKTE a.s	23 February 2016
BSP Regional Energy Exchange LLC	23 February 2016
SONI Limited	23 February 2016
Independent Bulgarian Energy Exchange EAD	23 February 2016
EXAA Abwicklungsstelle für Energieprodukte AG	23 February 2016
SEEPEX	13 June 2016
Nemo Link Limited	26 July 2017
Operatori i Sistemit të Transmetimit Albania sh.a	29 January 2018
ElecLink Limited	9 March 2018
Kraftnät Åland	27 March 2019
Nasdaq Oslo ASA	1 April 2019
National Grid NSL Ltd.	28 June 2019
National Grid IFA2 Ltd.	28 June 2019
Berza elektricne energije d.o.o. (BELEN)	21 January 2020

\* Merger with and Assignment of rights to EPEX Spot SE as of 7 March 2017 \*\* Change of corporate name to EPEX Spot Belgium on 7 March 2017

\*\*\* Currently under the name of European Market Coupling Operator AS \*\*\*\* Assignment of rights to HEnEX as of 27 March 2019

Table 2 – Overview of global non-disclosure agreement signatories (in chronological order, as of May 2020)



## 2.3 Forward capacity allocation regulation

The FCA regulation, which entered into force on 17 October 2016, sets out rules regarding the type of long-term transmission rights that can be allocated via explicit auction, and the way holders of transmission rights are compensated in case their rights are curtailed. The overarching goal is to promote the development of liquid and competitive forward

markets in a coordinated way across Europe and to offer market participants the ability to hedge the risk associated with cross-border electricity trading.

The reader can follow the progress of the implementation of this regulation in Table 3.

Proposal	FCA article(s)	1 <sup>st</sup> submission	Request for amendments	TSO submission after request for amendment	NRAs approval(s) or ACER decision	2 <sup>nd</sup> TSO proposal	ACER decision
Harmonised Allocation Rules	51	✓			✓*✓**	✓	✓***
Single Allocation Platform	49 59	✓			✓		
Congestion Income Distribution	57	✓	✓	✓	✓		
Cost of ensuring firmness and remuneration of LITRs	61	✓					
Common Grid Model	17****	✓	-	-	✓		
	18*****	✓	✓	✓	✓		

\* On 17 August 2017, all NRAs referred to ACER to adopt a decision \*\* On 2 October 2017, ACER took a decision (No 03/2017) \*\*\* On 29 October 2019, ACER adopted a decision (No 14/2019) \*\*\*\* Generation and load data provision methodology for long-term time frames \*\*\*\*\* Common grid model methodology for long-term time frames

Table 3 – Overview of all TSO FCA regulation deliverables (as of May 2020)

### Common grid model methodology (Articles 17 and 18 of the FCA regulation)

The CGMM-v2 was initially submitted to all regulatory authorities for approval in July 2017. Regulatory authorities requested an amendment, and the amended methodology – referred to as CGMMv2-plus’ – was resubmitted and approved by all regulatory authorities in July 2018. Even though the system operation regulation does not – unlike the CACM and FCA regulations – primarily aim at setting rules with respect to the calculation and allocation of cross-zonal capacity for different timeframes, it must nonetheless be mentioned in the present report because it also includes provisions related to the preparation of the common grid model. All TSOs transposed these provisions into the CGMM-v3 (i. e. the common grid model methodology pursuant to the system operation regulation), which was approved by all regulatory authorities in September 2018. The implementation of the methodologies is ongoing, starting with the short-term timeframes.

Parallel to the consolidation effort, TSOs will prepare rules for the preparation of the week-ahead CGM pursuant to Article 69 of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (hereafter **SO regulation**). The regulation does not contain requirements with respect to the regulatory review and approval of these additional provisions pertaining to the week-ahead CGM. While this material is to

be included in the consolidated version of the CGMM, it will be exempted from TSOs’ request for approval of the consolidated document to avoid modifying the contents with respect to what has already been approved by regulatory authorities.

### Cost of ensuring firmness and remuneration of long-term transmission rights (hereafter FRC) (Article 61, FCA regulation)

All TSOs have been developing a methodology to share costs incurred to ensure the firmness and remuneration of long-term transmission rights, pursuant to Article 61(3). Deadline for submission of the methodology is six months after TSOs have received the approval of FCA CID. This deadline was set for April 2020 due to the final approval received by the Bulgarian regulatory authority.

The methodology was submitted on 23 April to ACER<sup>41</sup>; it applies to all bidding zone borders and interconnectors, within and between Member States, where congestion income from forward capacity allocation is collected. The FCA FRC methodology follows the principles set out in the FCA CID methodology for sharing congestion income within a bidding zone border by applying the same sharing keys.

41 See [submitted version](#)

# 3. Balancing markets

The security of energy supply requires a continuous adjustment of power generation and consumption. As forecast errors (load and renewable generation), as well as technical disturbances (e. g. power plant outages), cannot be avoided, the TSOs operate load-frequency control processes in order to maintain network frequency within permissible limits. The respective energy is called balancing energy. The market that organises the procurement and settlement of the balancing energy is called the balancing market.

The EB regulation lays out detailed rules for the integration of balancing energy markets in Europe, with the objectives of fostering effective competition, non-discrimination, transparency and integration and, by doing so, enhancing the efficiency of the European balancing system as well as the security of supply. The EB regulation applies to all transmission systems and interconnections in the EU except those on islands that are not connected with other transmission systems via interconnections (i. e. Cyprus and Malta).

A core element of the EB regulation is the implementation of platforms for the exchange of balancing energy so that the balancing demand in each country is met by activation of the overall economically efficient bids in Europe under consideration of operational security constraints. TSOs are required to implement four platforms. The following implementation projects are in the lead of its design and implementation:

- › **Trans-European Replacement Reserves Exchange (TERRE) for the RR platform**
- › **Manually Activated Reserves Initiative (MARI) for the mFRR platform**
- › **Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation (PICASSO) for the aFRR platform**
- › **International Grid Control Cooperation (IGCC) for the IN platform**

## 3.1 RR platform – Trans-European Replacement Reserves Exchange (TERRE)

In October 2016, the TERRE project was officially appointed by ENTSO-E to implement the RR platform. This platform enables the exchange and optimised activation of a standard product for balancing energy and serves the EU target model for the integration of RR balancing markets.

The TERRE Cooperation Agreement frames the legal, contractual relationship between the TSOs participating in the TERRE implementation project. This contract defines the two roles considered and their respective responsibilities:

TERRE Members and Observers. The governance in place, the decision-making process and cost-sharing are also defined. Lastly, the LIBRA ownership and its management are specified.

The RR platform is based on the LIBRA solution, a common IT system which supports the exchange of balancing energy by pooling the available balancing energy bids and providing an optimised allocation of the bids to meet TSOs' imbalance needs.

### 3.1.1 Governance

The TERRE project is composed by:

- › 8 members<sup>42</sup> TSOs: ČEPS a.s., National Grid Electricity System Operator Limited, Polskie Sieci Elektroenergetyczne S.A., Red Eléctrica de España S.A.U., REN – Rede Eléctrica Nacional S.A., Réseau de Transport d'Electricité, Swissgrid AG and Terna-Rete Elettrica Nazionale SpA
- › 6 TSOs in the role of observers<sup>43</sup>: Independent Power Transmission Operator S.A., ESO – Electroenergien Systemen Operator EAD, National Power Grid Company Transelectrica S.A., MAVIR – Hungarian Independent Transmission Operator Company Ltd., Statnett SF and Affärsverket Svenska Kraftnät

42 Bear all the rights and responsibilities for operating the RR platform.

43 Follow the internal development of the RR platform but do not have any input into its operation.

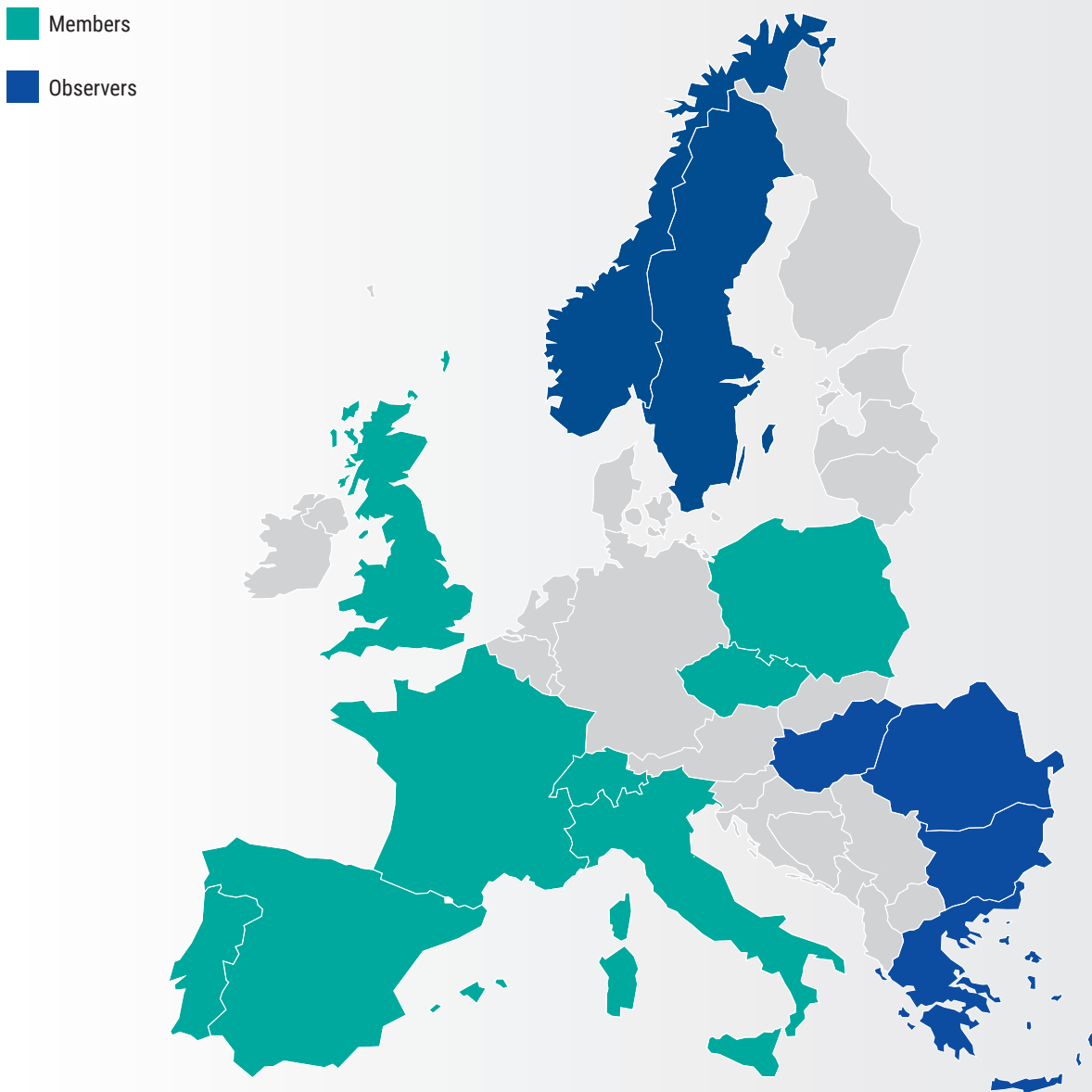


Figure 1 – RR platform: TSO members of the TERRE implementation project (as of April 2020)

The TERRE Steering Committee (abbreviated as **TSC**) is the decision-making body of the TERRE project, granted the ability to make a binding decision on any matter or question related to the TERRE project. Each of the TERRE Members and Observers has a representative in the TSC; however, only TERRE Members, through their representatives, have voting rights.

**The LIBRA platform management board (LPMB):**

- Regularly reviews IT solutions operation, security and performance.
- Makes all decisions concerning IT solutions maintenance, upgrades and enhancements.
- Proposes modifications to Standard Monitoring Procedures or the Operational Handbook as necessary.

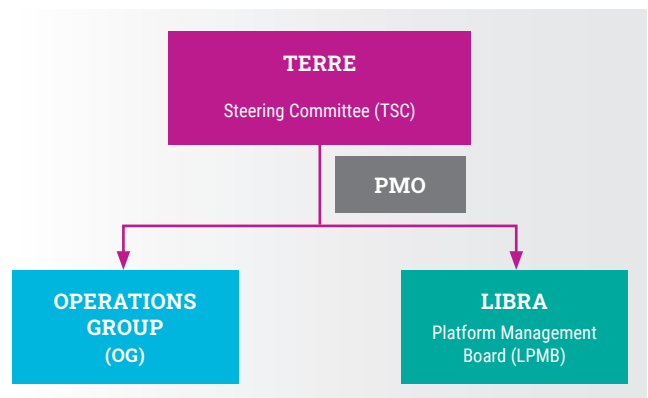


Figure 2 – Structure of the RR platform

**The operations group (OG) is charged with the following:**

- Operating the RR platform, meaning that the OWG will make all operational decisions concerning IT solutions on behalf of TERRE Members in relation to exceptional conditions, suspending or re-starting the RR process on an IT solution, etc.
- Dealing with day-to-day operational decisions regarding the RR platform and, consequently, the operation of IT solutions.
- Managing incidents.

**The IT monitoring staff is mandated to:**

- Carry out routine maintenance activities, as detailed by the Standard Monitoring Procedures approved by the OG.
- Handle all incidents related to IT solutions and within that context convene the OG when required.

The Market Supervision Module (MSM) performs business monitoring of the RR platform.

### 3.1.2 Operations

High-level architecture and an introduction to the IT solution used for the RR platform is briefly described below.

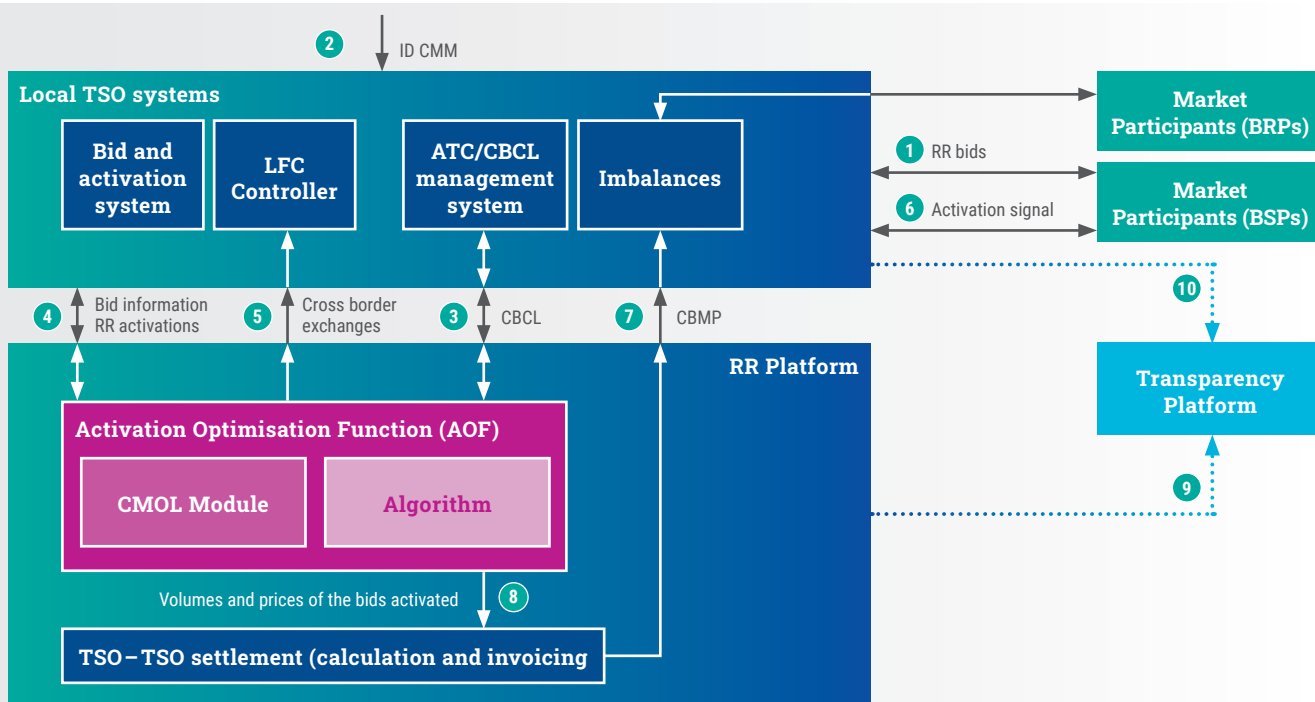


Figure 3 – RR platform: High-level architecture

Steps 1 to 10 (in green dots) included in Figure 3 are defined below:

1. Each TSO receives bids from the connected BSPs; in turn, each TSO sends the activation signal to the connected BSPs when the selected bids by the RR AOF are needed at the respective LFC area or bidding zone.
2. The available capacity from the intraday timeframe is considered when updating the TSOs’ RR balancing energy needs.
3. (Together with 2) Each TSO communicates the available RR cross-border network constraints at the Load-Frequency Controller and sends this information to the RR platform.
4. Each TSO forwards the standard RR balancing energy product bids received from the connected BSPs to the RR platform.
5. The RR platform returns the resulting cross-border schedules to TSOs.
6. The RR platform communicates back to the TSOs the selected bids and satisfying needs.
7. The RR platform provides the result of the calculation of the commercial flows between imbalanced areas subsequent to the matching process.
8. Based on the selected volumes and corresponding prices, the RR platform settles the expenditure and revenues between the TSOs participating in the scheme.
9. The information required concerning the LFC area or bidding zone activations from each TSO is transmitted to the ENTSO-E transparency platform.
10. The information required concerning the results from the RR platform is transmitted to the ENTSO-E transparency platform.

## IT solution

The RR platform is composed of five distinctive lots: Optimisation/Clearing algorithm, Data Management, Hosting, IT Monitoring and Financial Settlement. Each of the lots is briefly defined below:

1. Optimisation/Clearing algorithm – Awarded to Artelys. This module allows the optimisation of the bids using CMOL and the enhancement of the available cross-zonal interconnections.
2. Data Management – Awarded to Unicorn. This module handles data management, IT integration with the Optimisation Module and the IT interface with the ENTSO-E transparency platform, verification platform, market supervision module and financial service.
3. Hosting – Awarded to Unicorn. A cloud-based solution that ensures availability, scalability, performance, flexibility and security. This service has the flexibility of upgrading the hardware following future demand.

4. IT Monitoring – Awarded to EPEX SPOT. The main goal of this service is to follow the Standard Monitoring Procedures. These services have associated service level agreements (SLAs) between the contractor and the TSOs operating the platform.
5. Financial Settlement (TSO – TSO settlement) – The financial settlement is externally contracted to the Joint Allocation Office (JAO). This is a monthly billing system between TSOs through a centralised clearinghouse with the possibility to add new TSOs.

In addition to these five lots, the Market Supervision Module (MSM) was developed by ČEPS and is unique<sup>44</sup> to the RR platform. This module collects the data from the RR platform to facilitate the monitoring of the platform through predefined KPIs approved by the TSC. This module is defined in compliance with Regulation on Wholesale Energy Market Integrity and Transparency (REMIT).<sup>45</sup>

All service providers for each of the lots listed above are contracted until the end of Q2 2020, with optional 2 x 12 month extensions; thus, the TERRE implementation project has the flexibility to change the contracted parties until the indicated time, extend it or assign it to the part taken by TSOs in the project.

## 3.1.3 Evolution

After the positive results of the testing with LIBRA, on 6 January 2020, between 10:00 and 11:00, ČEPS a.s. was the first TSO to join the platform. On 3 March 2020, Red Eléctrica de España S.A.U., from 10:00 to 11:00, also joined the RR

platform with the participation of most Spanish BSPs enabled for RR process. The other TERRE TSOs will follow between Q3 2020 and Q1 2022. For more information, see Table 4 and press release<sup>46</sup>.

Country	TSO	Quarters of accession
Portugal	REN – Rede Eléctrica Nacional, S.A	End of Q3 2020
France	Réseau de Transport d'Electricité	Early Q4 2020
Switzerland	Swissgrid AG	Early Q4 2020
Great Britain	National Grid Electricity System Operator Ltd.	Early Q4 2020
Italy	Terna – Rete Elettrica Nazionale SpA	Q4 2020
Poland	Polskie Sieci Elektroenergetyczne S.A.	Early Q1 2022

By the end of September 2020: REN – Rede Eléctrica Nacional, S.A., Terna – Rete Elettrica Nazionale SpA and Swissgrid AG. Réseau de Transport d'Electricité will follow in early October 2020 and **National Grid Electricity System Operator Ltd.** in late October 2020.

Table 4 – Accession roadmap of the RR platform

The RR TSOs have to continue work on the following dimensions:

- RR platform stabilisation
- Cooperation with MARI balancing implementation project, to adapt LIBRA for the mFRR platform
- Single run process: Market design and IT implementation to have one single marginal price for both balancing and activation for system constraints

<sup>44</sup> TSOs are discussing the way to meet the reporting obligations of other platforms.

<sup>45</sup> Articles 2(1), 8(4) of REMIT regulation.

<sup>46</sup> [Press release](#)

## 3.2 mFRR platform – Manually Activated Reserves Initiative (MARI)

On 7 September 2017, 19 European TSOs (50Hertz Transmission GmbH, Independent Power Transmission Operator, Amprion GmbH, Austrian Power Grid AG, ČEPS a.s., Elia System Operator SA/NV, Energinet Elsystemansvar A/S, Fingrid Oyj, National Grid Electricity System Operator Limited, Red Eléctrica de España S.A.U., REN - Rede Eléctrica Nacional S.A., Réseau de Transport d'Électricité, Statnett SF, Affärsverket Svenska Kraftnät, Swissgrid AG, TenneT TSO B.V., TenneT TSO GmbH, Terna-Rete Italia S.p.A and TransnetBW GmbH) started working on the design of an mFRR

platform to address all the issues and questions, before the establishment of such a platform.

MARI implementation project applies a MoU on a contractual basis. In 2018, a second replaces the first MoU signed on 5 April 2017. It was signed by 27 TSOs and incorporates the requirements of the EB regulation and to replace the first MoU. The second MoU will be applicable until the MoU is replaced by the platform's cooperation agreements, which are currently being drafted.

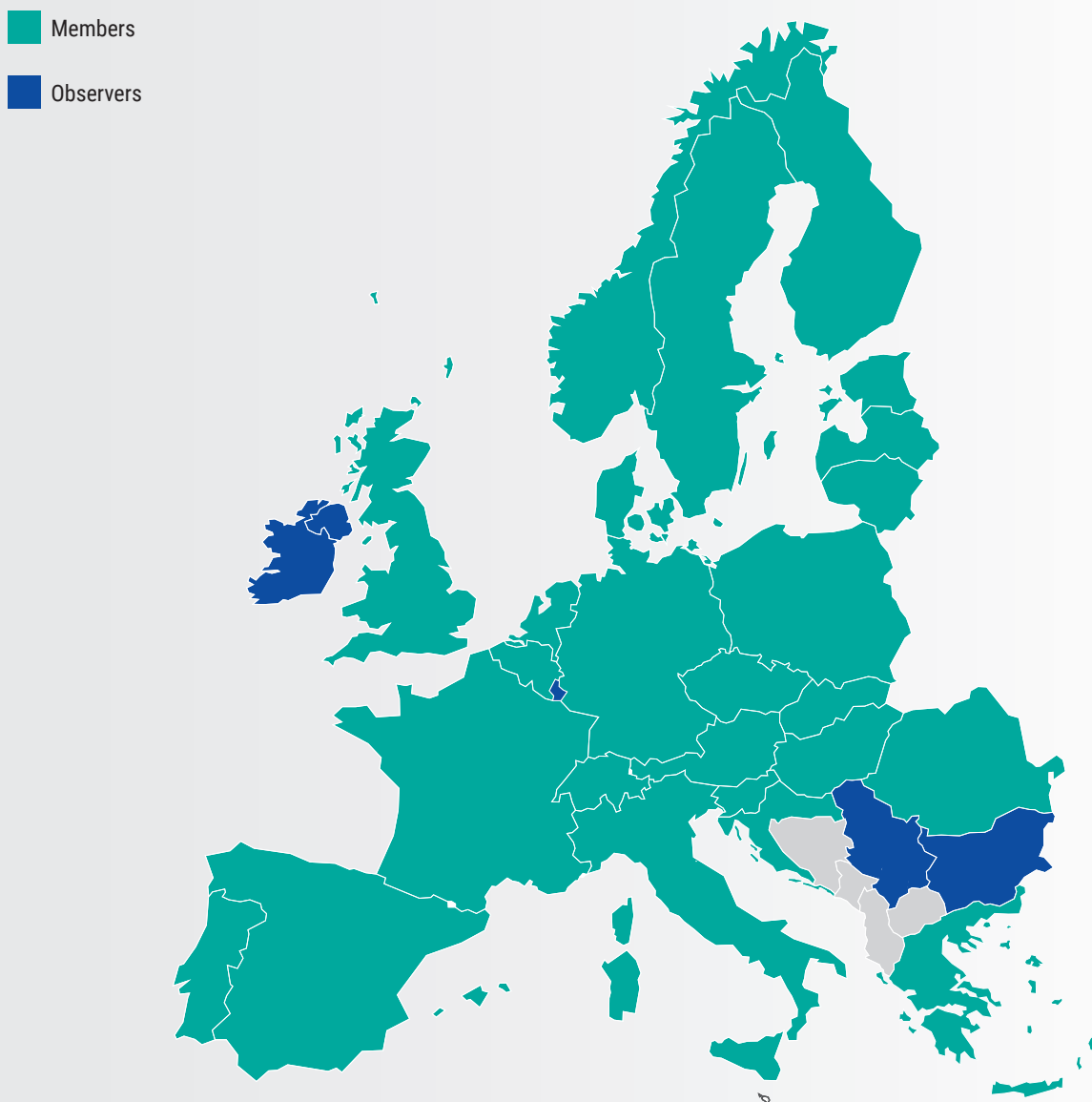


Figure 4 – mFRR platform: TSO members of the MARI implementation project (as of April 2020)



### 3.2.1 Governance

As noted before (see Section 3) the project leading the design and implementation of the mFRR platform is the MARI project, which comprises **33** TSO members:

- › 28 member TSOs: Affärsverket Svenska Kraftnät, Amprion GmbH, Augstsprieguma tīkls, Austrian Power Grid AG, ČEPS a.s., Croatian Transmission System Operator Ltd., Elering AS, ELES Ltd., Electricity Transmission System Operator, Elia System Operator SA/NV, Energinet Elsystemansvar A/S, Fingrid Oyj, Independent Power Transmission Operator S.A., Litgrid AB, MAVIR – Hungarian Independent Transmission Operator Company Ltd., National Grid Electricity System Operator Limited, National Power Grid Company Transelectrica S.A., Polskie Sieci Elektroenergetyczne S.A., Red Eléctrica de España S.A.U., REN – Rede Eléctrica Nacional, S.A., RTE Réseau de Transport d'Electricité, Slovenská elektrizačná prenosová sústava a.s., Statnett SF, Swissgrid AG, TenneT TSO B.V, TenneT TSO GmbH, Terna – Rete Electrica Nazionale S.p.A, Transnet BW GmbH and 50Hertz Transmission GmbH
- › 5 TSOs in the role of observer: Akcionarsko društvo Elektromreža Srbije, CREOS Luxembourg S.A., Electricity System Operator EAD, EirGrid plc, and System Operator for Northern Ireland Ltd.

The MARI project leads the development of the mFRR platform in close coordination with other implementation projects via ENTSO-E.

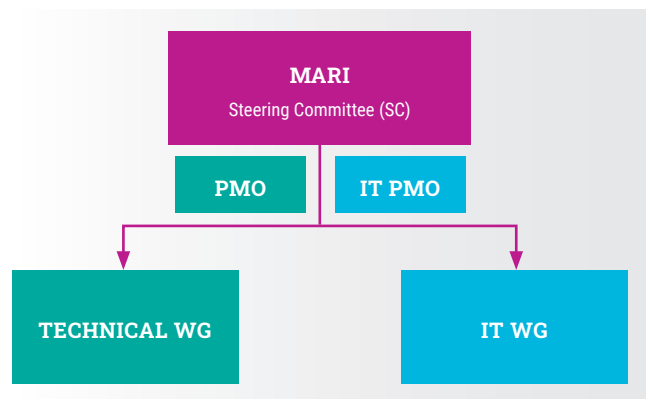


Figure 5 – MARI implementation project organisation (as of May 2020)

The MARI Steering Committee (hereafter MARI SC) provides guidance and makes decisions for the implementation of the mFRR platform. MARI SC is supported by the Technical Working Group (TWG) and the IT WG.

The TWG is responsible for making a proposal to the MARI SC that covers the design and operation of the mFRR platform. The IT WG is charged with the preparation of the requirement catalogue and ensures the coordination between the parties involved for the testing phase and going live.

## 3.2.2 Evolution

The mFRR TSOs are currently focused on the development of the mFRR platform as well as evolving their national design and IT systems to be ready once the mFRR platform goes live. The general planning can be found in the accession

roadmap<sup>47</sup> developed by the member TSOs implementing the mFRR platform. This accession roadmap<sup>48</sup> is updated at least biannually to give stakeholders current information on developments.

Country	TSO	Quarters of accession
Germany	50Hertz Transmission GmbH	Q1-Q2 2022
Germany	Amprion GmbH	Q1-Q2 2022
Austria	Austrian Power Grid AG	Q1-Q2 2022
Romania	National Power Grid Company Transelectrica S.A.	Q1-Q2 2022
Germany	TransnetBW GmbH	Q1-Q2 2022
Greece	Independent Power Transmission Operator S.A.	Q2 2022
Latvia	AS Augstsprieguma tīkls	Q2 2022
Estonia	Elering AS	Q2 2022
Slovenia	ELES Ltd. Electricity Transmission System Operator	Q2 2022
Belgium	Elia System Operator SA/BV	Q2 2022
Lithuania	Litgrid AB	Q2 2022
Hungary	MAVIR – Hungarian Independent Transmission Operator Company Ltd	Q2 2022
Great Britain	National Grid Electricity System Operator plc	Q2 2022
Spain	Red Eléctrica de España S.A.U	Q2 2022
Portugal	REN – Rede Eléctrica Nacional, S.A.	Q2 2022
Slovakia	Slovenská elektrizačná prenosová sústava, a.s.	Q2 2022
Switzerland	Swissgrid ag	Q2 2022
Italy	Terna – Rete Elettrica Nazionale SpA	Q2 2022
Germany	TenneT TSO GmbH	Q1-Q3 2022
Czech Republic	ČEPS a.s.	Q3 2022
Serbia	Akcionarsko društvo Elektromreža Srbije	Derogation
Denmark	Energinet Elsystemansvar A/S	Derogation
Finland	Fingrid Oyj	Derogation
Croatia	Croatian Transmission System Operator Ltd	Derogation
Poland	Polskie Sieci Elektroenergetyczne S.A.	Derogation
France	Réseau de Transport d'Electricité	Derogation
Norway	Statnett SF	Derogation
Sweden	Affärsverket Svenska kraftnät	Derogation
Netherlands	TenneT TSO B.V.	Derogation
Ireland	EirGrid plc	TBD
Bulgaria	ESO – Electroenergien Sistem Operator EAD	TBD
North Ireland	System Operator for Northern Ireland Limited	TBD

Derogations are requested in accordance with Article 62 of EB regulation. At the moment of writing this report these can be in any of these three states: considered/requested/granted.

Baltic TSOs (AS Augstsprieguma tīkls, Elering AS and Litgrid AB) depends on the neighbouring TSOs. Their aim is not to operate inefficiently in a decoupled mode with other areas on the mFRR platform. Detailed timing will be provided in a later stage.

Table 5 – Accession roadmap of the mFRR platform

The mFRR TSOs continuously align with the other projects to gain experience from pre-existing platforms and leverage synergies. After the mFRR platform goes live, mFRR TSOs have to work on the following dimensions:

- Assessment of additional features, which provides additional flexibility to BSPs.
- Cooperation with the RR implementation project, to find synergies in the evolution of LIBRA.
- Process optimisation following the attainment of operational experience.

<sup>47</sup> Preliminary **mFRR platform accession roadmap**.

<sup>48</sup> The accession of member TSOs to the mFRR platform is planned in accordance with the following accession roadmap. MARI member TSOs and ENTSO-E share this accession roadmap for informative purposes only and it does not, in any case, represent a firm, binding or definitive position of MARI as to the content, which is subject to change as the implementation progresses and new information becomes available.



### 3.3 aFRR platform – Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation (PICASSO)

In July 2017, eight TSOs (Elia System Operator SA/NV, Austrian Power Grid AG, TenneT TSO B.V, RTE Réseau de Transport d'Electricité, 50Hertz Transmission GmbH, Amprion GmbH, TenneT TSO GmbH and Transnet BW GmbH) signed a memorandum of understanding for the design, implementation and operation of the aFRR platform to integrate aFRR balancing markets. Since then, new members (up to 25) have joined the PICASSO implementation project.

On 12 January 2018, PICASSO was extended to eight additional TSOs who signed the first MoU. Between 2018 and 2019, a second MoU was signed by 25 TSOs to incorporate the requirements of the EB regulation and replaced the first MoU. The second MoU will be applicable until it is replaced by the platform's cooperation agreements, currently being drafted.

#### 3.3.1 Governance

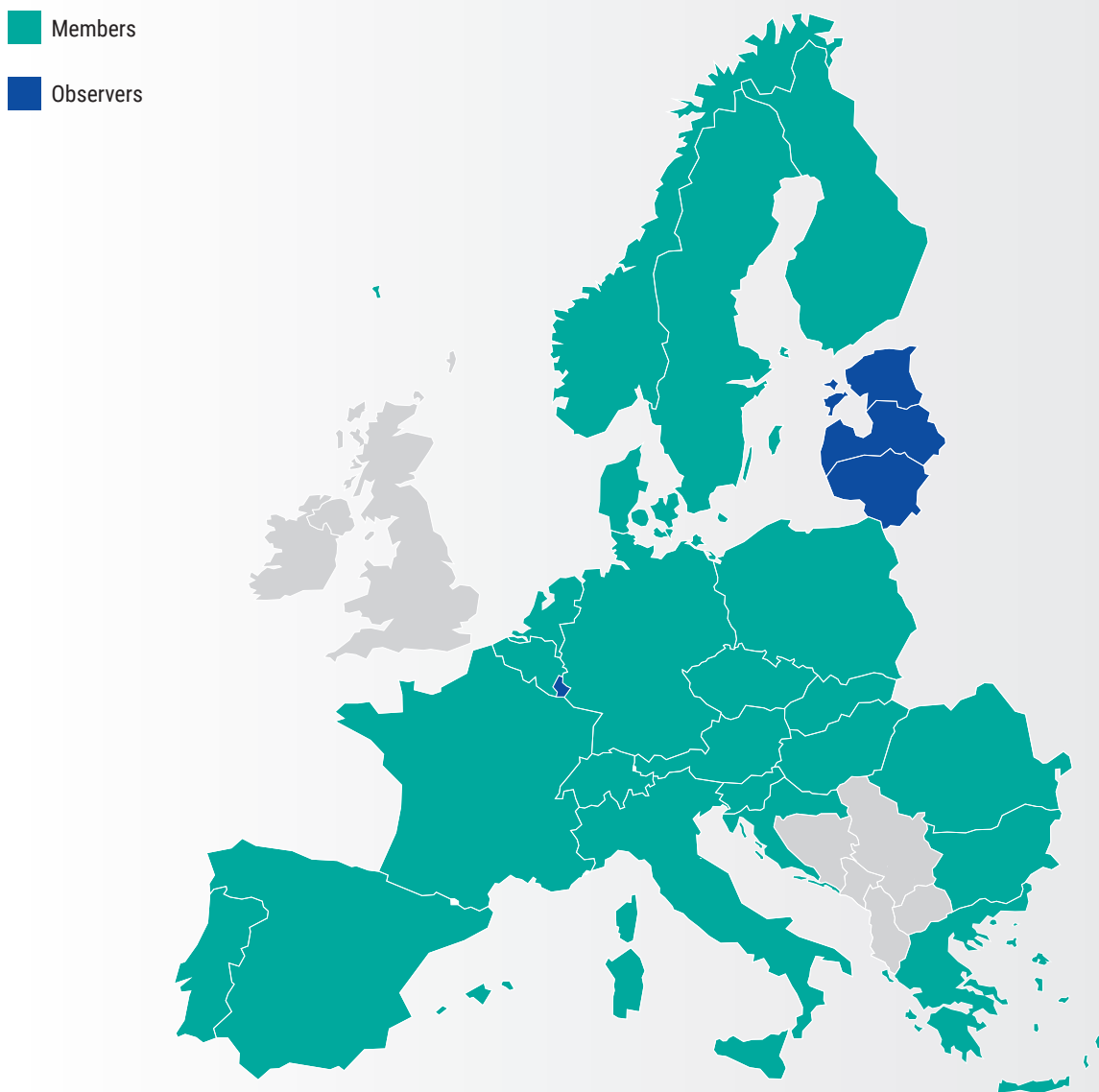


Figure 6 – aFRR platform: TSO members of the PICASSO implementation project (as of May 2020)

The PICASSO project leads the development of the aFRR platform in close coordination with other implementation projects via ENTSO-E and the IGCC implementation project (see 3.4 of this report).

As noted above (see Section 3), the PICASSO project leads the design and implementation of the aFRR platform and comprises 29 TSO members:

- › 25 member TSOs: Affärsverket Svenska Kraftnät, Amprion GmbH, Austrian Power Grid AG, ČEPS a.s., Croatian Transmission System Operator Ltd., ELES Ltd. Electricity Transmission System Operator, Electricity System Operator EAD, Elia System Operator SA/NV, Energinet Elsystemansvar A/S, Independent Power Transmission Operator S.A., Fingrid Oyj, MAVIR - Hungarian Independent Transmission Operator Company Ltd., National Power Grid Company Transelectrica S.A., Polskie Sieci Elektroenergetyczne S.A., Red Eléctrica de España S.A.U., REN – Rede Eléctrica Nacional, S.A., RTE – Réseau de Transport d'Electricité, Statnett SF, TenneT TSO B.V, TenneT TSO GmbH, Terna – Rete Electrica Nazionale S.p.A, Transnet BW GmbH, 50Hertz Transmission GmbH Slovenská elektrizačná prenosová sústava, a.s., and Swissgrid AG.
- › 4 in the role of observers: AS Augstsprieguma tīkls, Litgrid AB, Elering AS, CREOS Luxembourg S.A.

### 3.3.2 Evolution

The following tasks have been completed to date:

- The high-level design of the platform, which details flows of information and the processes involved in the operation of the aFRR platform.
- The development of the aFRR algorithm prototype including the pricing algorithm, which will serve as the basis for the activation optimisation function (hereafter the AOF). PICASSO TSO members are currently working on the technical design of the AOF and the TSO – TSO settlement function (See 2020 ENTSO-E Balancing Report, Section 3).
- Specification of the frequency restoration control error (FRCE) adjustment process.
- Development of the first accession roadmap.

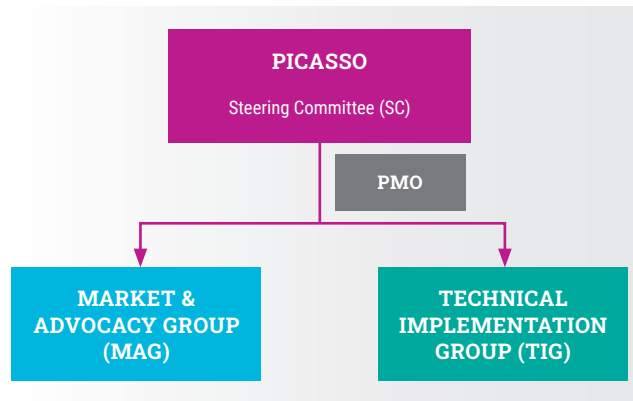


Figure 7 – PICASSO implementation project organisation (as of May 2020)

The PICASSO Steering Committee (hereafter **PICASSO SC**) is the board of the PICASSO implementation project. It is responsible for directing the project and making decisions on all issues related to the implementation of the aFRR platform in accordance with the implementation framework. The PICASSO SC is supported by various expert groups which are in charge of the design of the business processes (i. e. MAG and TIG).

The accession of new PICASSO TSOs members<sup>49</sup> to the aFRR platform is planned in accordance with the following accession roadmap. PICASSO TSO members and ENTSO-E share this accession roadmap for informative purposes only. It does not, in any way, represent a firm, binding or definitive position of PICASSO on the content, which is subject to change as the implementation progresses and new information becomes available.

Further detailed information can be found in the first<sup>50</sup> accession roadmap developed by the TSO members of the aFRR platform. This accession roadmap is updated at least biannually to provide stakeholders with current information on recent developments.

<sup>49</sup> All PICASSO member TSOs decided through PICASSO's Steering Committee, on 16 October 2019, to initiate the process for the adherence of the Baltic TSOs as observers of the project.

<sup>50</sup> [aFRR platform accession roadmap](#)

Country	TSO	Quarters of accession
Germany	50Hertz Transmission GmbH	Q3 2021–Q3 2022
Germany	Amprion GmbH	Q3 2021–Q3 2022
Austria	Austrian Power Grid AG	Q3 2021–Q3 2022
France	Réseau de Transport d'Electricité	Q3 2021–Q3 2022
Germany	TenneT TSO GmbH	Q3 2021–Q3 2022
Germany	TransnetBW GmbH	Q3 2021–Q3 2022
Czech Republic	ČEPS a.s.	Q1–Q3 2022
Slovenia	ELES Ltd. Electricity Transmission System Operator	Q1–Q3 2022
Belgium	Elia System Operator SA/BV	Q1–Q3 2022
Hungary	MAVIR – Hungarian Independent Transmission Operator Company Ltd	Q2–Q3 2022
Switzerland	Swissgrid ag	Q2–Q3 2022
Bulgaria	ESO – Electroenergien Sistemem Operator EAD	Q2–Q3 2022
Greece	Independent Power Transmission Operator S.A.	Q2–Q3 2022
Croatia	Croatian Transmission System Operator Ltd	Q3 2022
Slovakia	Slovenská elektrizačná prenosová sústava, a.s.	Q3 2022
Italy	Terna – Rete Elettrica Nazionale SpA	Q3 2022
Romania	National Power Grid Company Transelectrica S.A.	Q3 2022
Denmark	Energinet Elsystemansvar A/S	Derogation
Finland	Fingrid Oyj	Derogation
Poland	Polskie Sieci Elektroenergetyczne S.A.	Derogation
Spain	Red Eléctrica de España S.A.U	Derogation
Portugal	REN – Rede Eléctrica Nacional, S.A	Derogation
Norway	Statnett SF	Derogation
Sweden	Affärsverket Svenska kraftnät	Derogation
Netherlands	TenneT TSO B.V.	Derogation

For Denmark, Finland, Norway and Sweden accession is possible from Q3 2023–Q2 2024.

Table 6 – Accession roadmap of the aFRR platform

### 3.4 IN platform – International Grid Control Cooperation (IGCC)

In 2010, the German TSOs (50Hertz Transmission GmbH, Amprion GmbH, Transnet BW GmbH and TenneT TSO GmbH) began the first development phase of what came to be labelled Grid Control Cooperation (GCC), the seed of the IN platform. Shortly after, the operation of imbalance netting was extended to other countries, leading to the International Grid Control Cooperation (IGCC). Several years before entry into force of the EB regulation, several TSOs started participating in the IGCC: Energinet Elsystemansvar A/S joined in October 2011; TenneT TSO B.V, Swissgrid AG, ČEPS a.s. and Elia System Operator SA/NV in 2012; and Austrian Power Grid AG and RTE Réseau de Transport d'Electricité followed in 2014 and 2016, respectively.

In 2018, an additional nine TSOs became non-operational IGCC members through the signature of the so-called light accession agreement<sup>51</sup>. As of February 2019, Croatian Transmission System Operator Ltd. and ELES Ltd. Electricity Transmission System Operator have become members. Additionally, Terna – Rete Elettrica Nazionale SpA, Polskie Sieci Elektroenergetyczne S.A. MAVIR – Hungarian Independent Transmission Operator Company Ltd. and Slovenská elektrizačná prenosová sústava, a.s. became operational IGCC members in the first half of 2020.

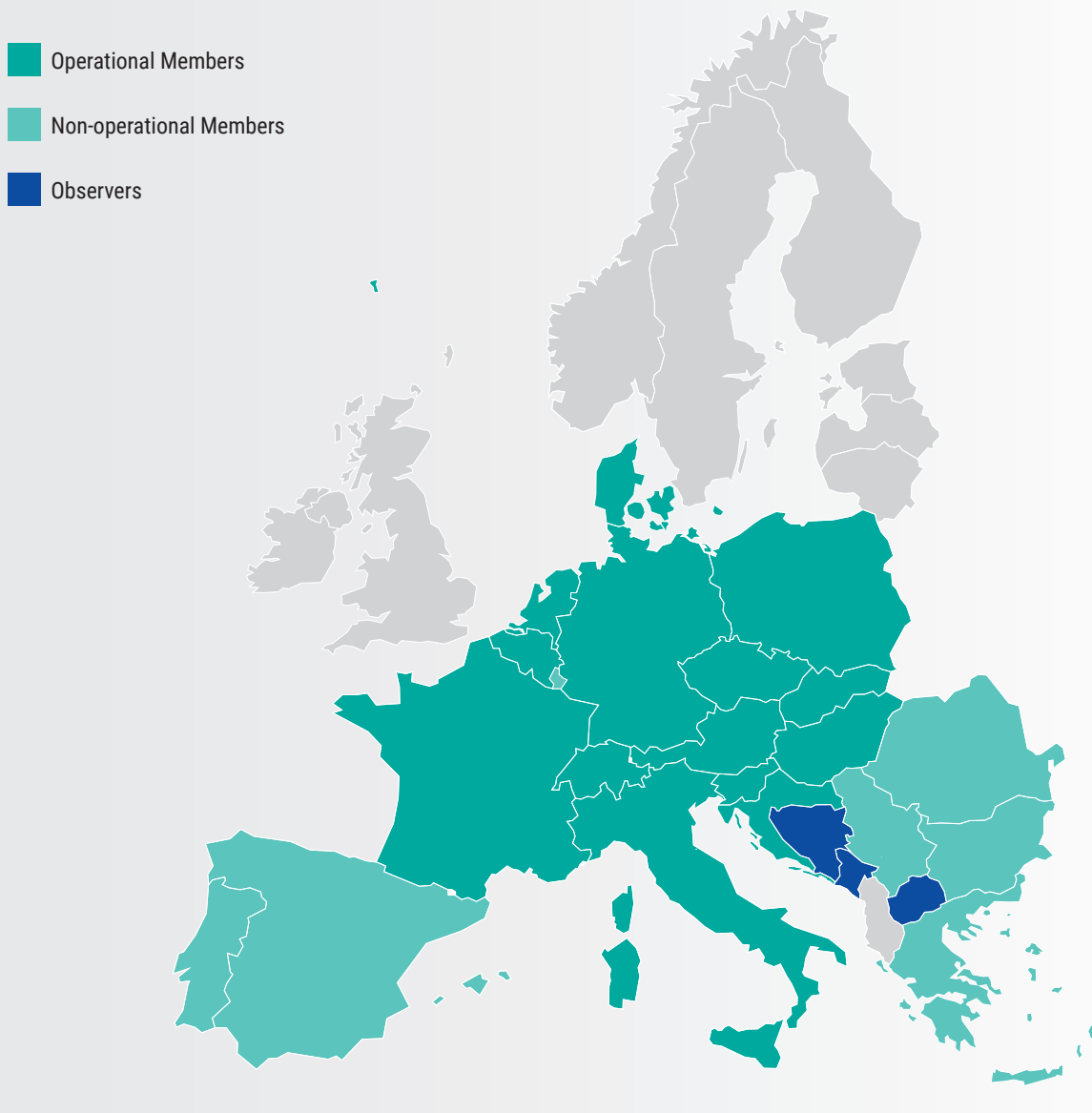


Figure 8 – IN platform: TSO members of the IGCC implementation project (as of May 2020)

51 This agreement allows a TSO to participate in the decision-making process prior to becoming operational.



### 3.4.1 Governance

As noted earlier (Section 3) the design and implementation of the IN platform is led by the IGCC implementation project, which has **27 TSOs**:

- › 17 TSOs are operational members: 50Hertz Transmission GmbH, Amprion GmbH, Austrian Power Grid AG, ČEPS a.s., Croatian Transmission System Operator Ltd., Elia System Operator SA/NV, Energinet Elsystemansvar A/S, ELES Ltd. Electricity Transmission System Operator, MAVIR – Hungarian Independent Transmission Operator Company Ltd. Polskie Sieci Elektroenergetyczne S.A., RTE Réseau de Transport d’Electricité, Slovenská elektrizačná prenosová sústava a.s., Swissgrid AG, TenneT TSO B.V NL, Transnet BW GmbH, TenneT TSO GmbH, Terna – Rete Elettrica Nazionale S.p.A.
- › 7 TSOs are non-operational members: Akcionarsko društvo Elektromreža Srbije, Creos Luxembourg S.A. Independent Power Transmission Operator S.A., Electroenergien Systemen Operator EAD, National Power Grid Company Tranelectrica S.A., Red Eléctrica de España S.A.U and REN - Rede Eléctrica Nacional, S.A.
- › 3 TSOs serve as observers: Crnogorski elektroenergetski sistem AD, Nezavisni operator sustava u Bosni i Hercegovini and Transmission System Operator of the Republic of North Macedonia

### 3.4.2 Operations

The IN process of the IGCC has successfully operated since 2011 without a major incident. In 2018 and 2019, approximately EUR 59.91 million and EUR 68.98 million in social welfare, respectively – giving a total of roughly EUR 128.90 million of social welfare – was saved due to netted imbalances.

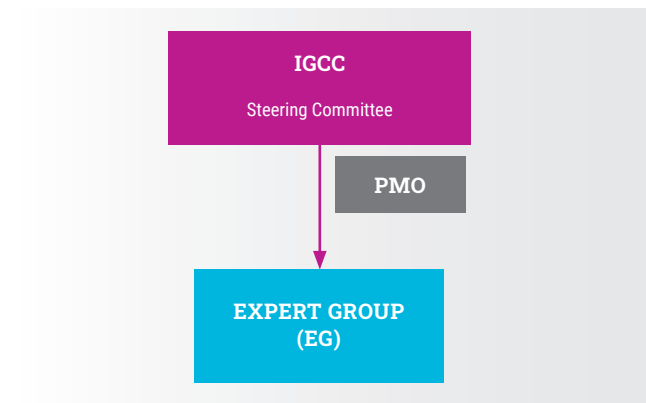


Figure 9 – IN platform: IGCC implementation project organisation (as of May 2020)

The IGCC Steering Committee (hereafter IGCC SC) is the Board for the IGCC implementation project. It is responsible for directing the project and taking the decisions on all issues related to the operation and implementation of the IN platform in accordance with the implementation framework. The IGCC SC is supported by the Expert Group (EG), which is in charge of the design of business processes.

The cumulative social welfare generated through international cooperation by IGCC since the start of the project in October 2011 is roughly EUR 500 million. The energy exchange caused by the activation of the IN process is currently published on [www.regelleistung.net](http://www.regelleistung.net). The reports on imbalance netting volumes are published on a dedicated site at ENTSO-E<sup>52</sup>.

52 Imbalance netting [website](#)

The figure below illustrates the high-level architecture of the IN platform.

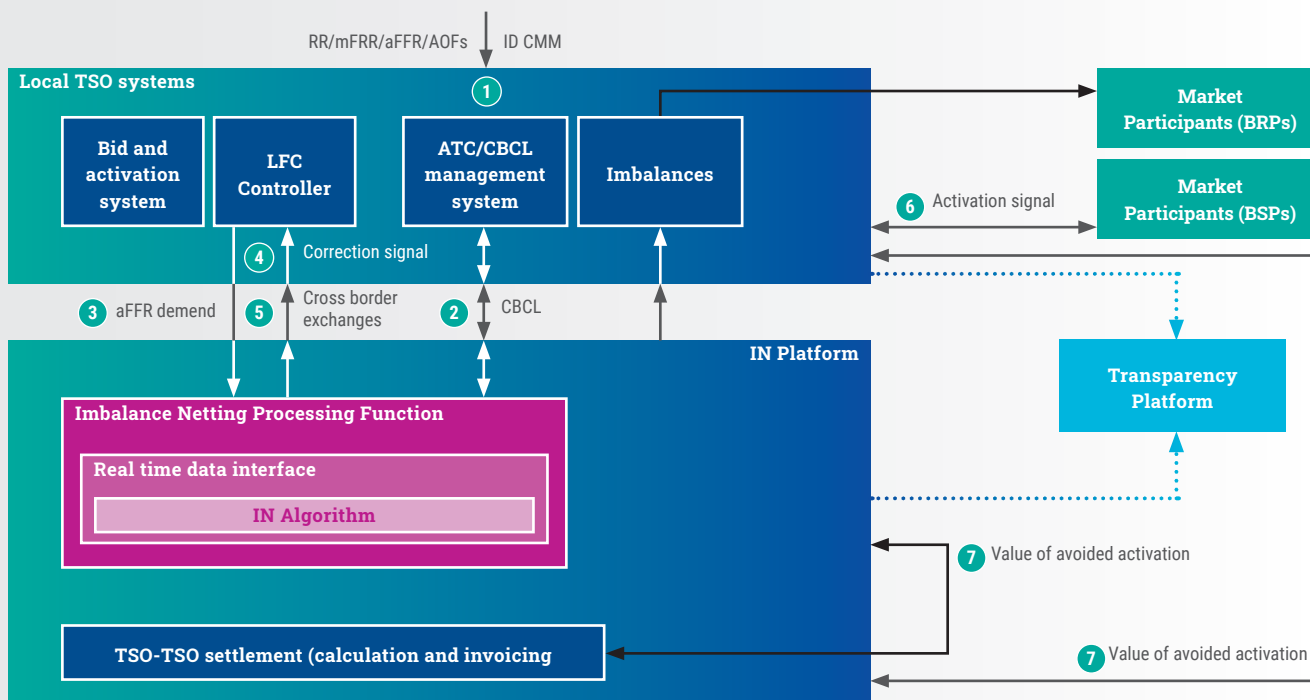


Figure 10 – IN platform: High-level architecture

Where the numbers in green depict the following process:

1. The available capacity coming from the intraday time-frame as well as from previous balancing timeframes is considered by each TSO.
2. Each TSO communicates the imbalance netting cross-border capacity limits to the IN platform.
3. Each TSO communicates the aFRR demand of its LFC area to the IN platform.
4. The IN platform calculates and sends a correction signal (the imbalance netting power interchange) to the LFC of each participating member.
5. The IN platform returns the cross-border exchanges to the participating members.
6. Each participating member sends the aFRR activation signal to the BSPs, taking into account the correction signal received from the IN platform.
7. Based on the inputs from the AOF, the TSO – TSO settlement function calculates and communicates the resulting settlement amounts to each participating member.

### 3.4.3 Evolution

The IN platform expects to continue to increase the number of TSOs connected within Q2 and Q3 2020 (See Table 7). As of May 2020, 17 TSOs from 14 countries are performing the IN process using the IGCC. Terna – Rete Elettrica Nazionale SpA,

Polskie Sieci Elektroenergetyczne S.A., MAVIR – Hungarian Independent Transmission Operator Company Ltd. and Slovenská elektrizačná prenosová sústava a.s. have recently started in 2020.

Country	TSO	Quarters of accession
Spain	Red Eléctrica de España S.A.U	Q2–Q3 2020
Portugal	REN – Rede Eléctrica Nacional, S.A	Q2–Q3 2020
Romania	National Power Grid Company Transelectrica S.A.	Q2–Q3 2020
Bulgaria	ESO – Electroenergien Sistemem Operator EAD	Q2–Q3 2020
Greece	Independent Power Transmission Operator S.A,	Q3 2020

Table 7 – Accession of TSOs to the IGCC implementation project

# 4 Single intraday and single day-ahead coupling

The single intraday and single day-ahead coupling section (Chapter 4) has been prepared in cooperation with the NEMO Committee. The NEMO Committee has reviewed the content and accompanying illustrations for compliance with confidentiality requirements. The information provided on the costs contained in this report is a summary of the full content from the 'CACM Cost Report 2019' to be released simultaneously by all NEMOs and all TSOs in June 2020.

## 4.1 Single intraday coupling

Pan-European single intraday coupling (hereafter **SIDC**) serves, at the time of this report, 27 countries (Figure 11) of which 22 are operational with at least one border.<sup>53</sup> In total, 33 TSOs and 16 NEMOs cooperate under the agreement aimed at governing the SIDC, namely the intraday operational agreement (hereafter **IDOA**).

SIDC enables continuous cross-border trading across Europe and is based on a common IT system with a shared

order book, a single capacity management module and a shipping module. The common IT system accommodates the continuous matching of orders from market participants in one bidding zone. Orders come from a participant's own bidding zone, or from any other bidding zone within the project's reach, provided that cross-zonal capacity is available. The IT system further allows for the participation of multiple NEMOs per country.

### 4.1.1 Governance

The intraday operational agreement governs the pan-European SIDC. This agreement rules the cooperation of TSOs and NEMOs regarding the establishment, amendment and operation of the coupling. It was agreed to by all TSOs and NEMOs of the EU Member States plus Norway.

The Slovakian parties, i. e. the TSO Slovenská elektrizačná prenosová sústava, a.s. and the NEMO OKTE a.s., have retroactively joined SIDC as of 1 January 2020 and plans to integrate the borders PL-SK, CZ-SK and SK-HU operationally are currently under investigation.

Several TSOs and NEMOs of non-EU Member States (e. g. the Serbian TSO EMS and Swissgrid AG) are currently in the process of becoming observers to SIDC.

<sup>53</sup> Austria, Belgium, Bulgaria, Croatia, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Latvia, Lithuania, Luxembourg, Norway, The Netherlands, Poland, Portugal, Romania, Slovenia, Spain and Sweden.

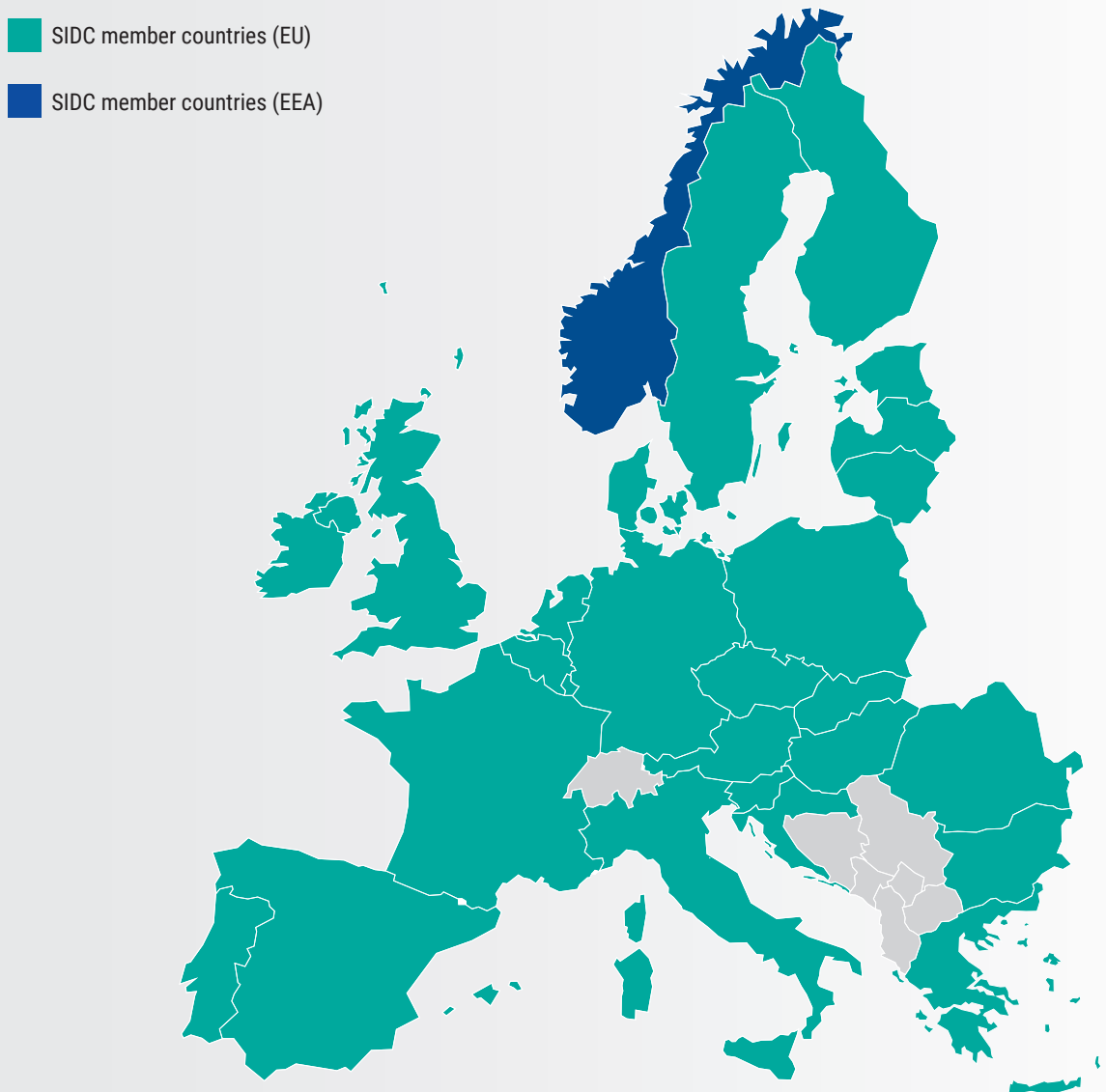


Figure 11 – Countries included in single intraday coupling (as of May 2020)

The signatory parties of the IDOA are listed below:

### TSOs

Affärsverket Svenska Kraftnät, Amprion GmbH, Augstsprieguma tīkls, Austrian Power Grid AG, Britned Development Limited, ČEPS a.s., CREOS Luxembourg S.A., Croatian Transmission System Operator Ltd., Electricity System Operator EAD, Elering AS, ELES Ltd., Electricity Transmission System Operator, Elia System Operator SA/NV, Energinet Ecosystemansvar A/S, EirGrid plc, Fingrid Oyj, Independent Power Transmission Operator S.A., Litgrid AB, MAVIR – Hungarian Independent Transmission Operator Company Ltd., National Grid Interconnectors Limited, National Power Grid Company Tranelectrica S.A., Polskie Sieci Elektroenergetyczne S.A., Red Eléctrica de España S.A.U., REN - Rede Eléctrica Nacional S.A., RTE Réseau de Transport d'Électricité, SONI Limited, Slovenská elektrizačná prenosová sústava a.s., Statnett SF, TenneT TSO B.V, TenneT TSO GmbH, Terna – Rete Electrica Nazionale S.p.A, Transnet BW GmbH and 50Hertz Transmission GmbH.

### NEMOs

BSP Energy Exchange LLC, Croatian Power Exchange Ltd., EirGrid plc, EPEX SPOT SE, European Market Coupling Operator AS, Gestore dei Mercati Energetici S.p.A, Hellenic Energy Exchange S.A., HUPX Hungarian Power Exchange Company Limited by Shares, Independent Bulgarian Energy Exchange, OKTE a.s., OMI POLO ESPAÑOL S.A., Operator of Electricity Market S.A., Operatorul Pieței de Energie Electrică și de Gaze Naturale S.A., OTE a.s., SONI Limited, and Towarowa Gielda Energii SA.<sup>54</sup>

The intraday operational agreement sets forth the rights and obligations of NEMOs and TSOs with respect to the implementation of the CACM regulation, which requires the cooperation of all TSOs and NEMOs at a European level, including sharing of common NEMO and TSO costs.

A TSO-only agreement complements the contractual framework of the TSOs Cooperation Agreement for Intraday

54 The Austrian NEMO EXAA Abwicklungsstelle für Energieprodukte AG exited from SIDC in Q1 2020 due to its inactivity in cross-zonal intraday markets.



Coupling (hereafter **TCID**), a NEMO-only agreement complements the All-NEMOs Intraday Operational Agreement (hereafter **ANIDOA**) and local arrangements contribute to the operation of the SIDC by specifying or completing the general principles described in the IDOA. The contracts above have been amended in 2019 to bring them in line with IDOA.

SIDC governance is regulated by the IDOA and accompanying documents, such as terms of reference. In October 2018, an interim governance was set up with the key objectives of securing the reliable operation and timely succession of new borders and markets. However, SIDC continues, in 2020, to be operationally organised based on a TSO-only, a NEMO-only and a joint TSO/NEMO structure. The introduction of the enduring governance will be completed in 2020/2021.

## 4.1.2 Operations

The SIDC has been operational in 14 countries since 12 June 2018, with first deliveries on 13 June 2018<sup>55</sup> and was extended to seven additional countries (Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania and Slovenia) with first deliveries on 20 November 2019<sup>56</sup>.

As of June 2018, only minor incidents have occurred. The joint TSOs and NEMOs SIDC IT system with one shared order book ('SOB'), a capacity management module ('CMM') and a shipping module ('SM') continue to perform at robust operational levels,<sup>57</sup> even after significant recent extensions. In total, more than 30 million trades have been executed within its two years of operation.<sup>58</sup>

In the figure below, all unplanned and planned instances of unavailability of SIDC since going live in June 2018 are presented. In 2018, the total downtime added up to 8 hours and 51 minutes, of which 46 minutes were unexpected and 8 hours and 5 minutes were planned. In the full year 2019, the total downtime equalled 25 hours and 42 minutes, of which 17 hours and 57 minutes were unexpected and 7 hours and 45 minutes planned. In the year 2020 (until end of April 2020), the total downtime has totalled only 1 hour and 50 minutes, none of which were unplanned. In sum, since going live about two years ago, the downtime has totalled 36 hours and 23 minutes, of which only 1 hour and 50 minutes occurred (planned) after the second wave went live.

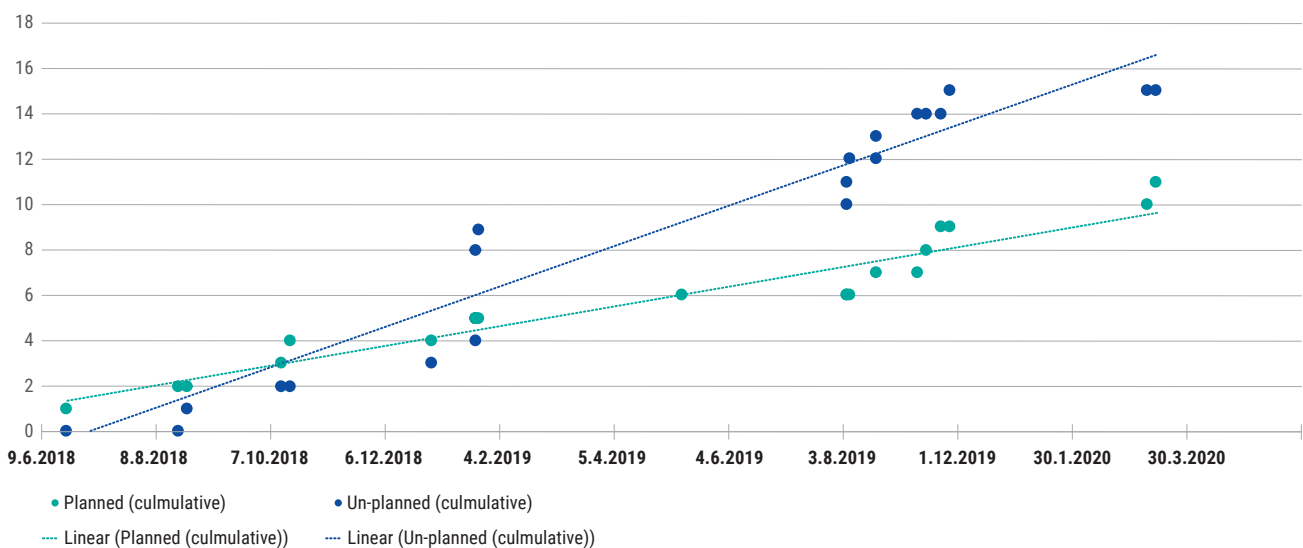


Figure 12 – Unplanned and planned unavailability of SIDC (as of April 2020)

During the observational period, three 'hotfixes' and one new release (i. e. Release 2) have been deployed. The 'hotfix' 1.5.10 fixed a file issue for explicit allocations, the 'hotfix' 1.5.11 solved issues related to CMM behaviour and SOB service levels and 'hotfix' 2.0.25 solved transit-related problems within the shipping module. The second release of the SIDC solution aimed mainly to ensure the robust operation

for newly added operational countries via the second wave to go live. Additionally, it introduced an increased depth of the Shared Order Book (SOB) from 31 to 100 and delivered more reporting indicators. All these planned non-availabilities have been prepared well in advance by TSOs and NEMOs in collaboration with market participants.<sup>59</sup>

55 See also [here](#).

56 See also [here](#).

57 Further information on the SIDC technical solution can be found [here](#).

58 See also [here](#).

59 Details on the operations of SIDC are published via the CACM Report: [Version 2018](#), [Version 2019](#).

In light of the COVID-19 pandemic, a wider variety of measures have been introduced to safeguard stable operations. These include the physical separation between members of the respective operational teams and enabling the relevant parties to run the market sessions remotely. Although the COVID-19 pandemic situation changes daily, under the current circumstances, SIDC expects no material impact on its ability to operate in the relevant coupled markets.<sup>60</sup>

In addition to monitoring of the availability of SIDC, various complementary key performance indicators (KPIs) are logged and assessed. Three types of indicators can be distinguished:

1. Indicators used for managing the coupling (e. g. OPSCOM operational reporting).
2. Indicators to monitor the service providers (e. g. Deutsche Börse's fulfilment of service level requirements).
3. Indicators (or raw data) to be provided regularly to stakeholders (e. g. continuous data provision to the ENTSO-E Transparency platform).

In the course of the further development of SIDC, additional measures to monitor and improve operations are regularly reviewed and, if needed, introduced via OPSCOM.

In respect to the management of the handling of harmonized minimum and maximum clearing prices, i. e. the price determined by matching the highest accepted selling order and the lowest accepted buying order in the electricity market, SIDC applies a dedicated fully aligned procedure to SDAC in accordance with Article 54(1) of CACM regulation.

In the event that the harmonised maximum and/or minimum clearing price is increased in SDAC above the harmonised maximum and/or decreased below the minimum clearing price in the SIDC, the price in SIDC also has to be at least equal to the price in SDAC.<sup>61</sup> The change in SIDC must be implemented and put into effect at the same time as SDAC.

Figure 13 depicts the actual minimum and maximum prices over cross-zonal traded products and all operational bidding zones per NEMO at SIDC. As of SIDC 'going live' in June 2018 until the end of 2019,<sup>62</sup> the absolute minimum hourly price is -999.00 €/MWh, and the absolute maximum hourly price is 7,000.00 €/MWh for a single trade.

Additionally, the ACER decision of 24 April 2018<sup>63</sup> on intraday cross-zonal gate opening was put into operation on 1 January 2019, prior to the set timeline on all borders of the first go-live wave and set into force for the countries that went operational when the second wave went live on 20 November 2019. A comprehensive summary of all currently operational borders can be found in Table 8.

The overview on the gate opening timings for borders in operation (see Table 8) distinguishes between borders that provide cross-border capacities at 15:00 h, and borders that provide cross-border capacities in line with the cross-zonal intraday gate opening time (CZIDGOT) proposal of the relevant capacity calculation regions.

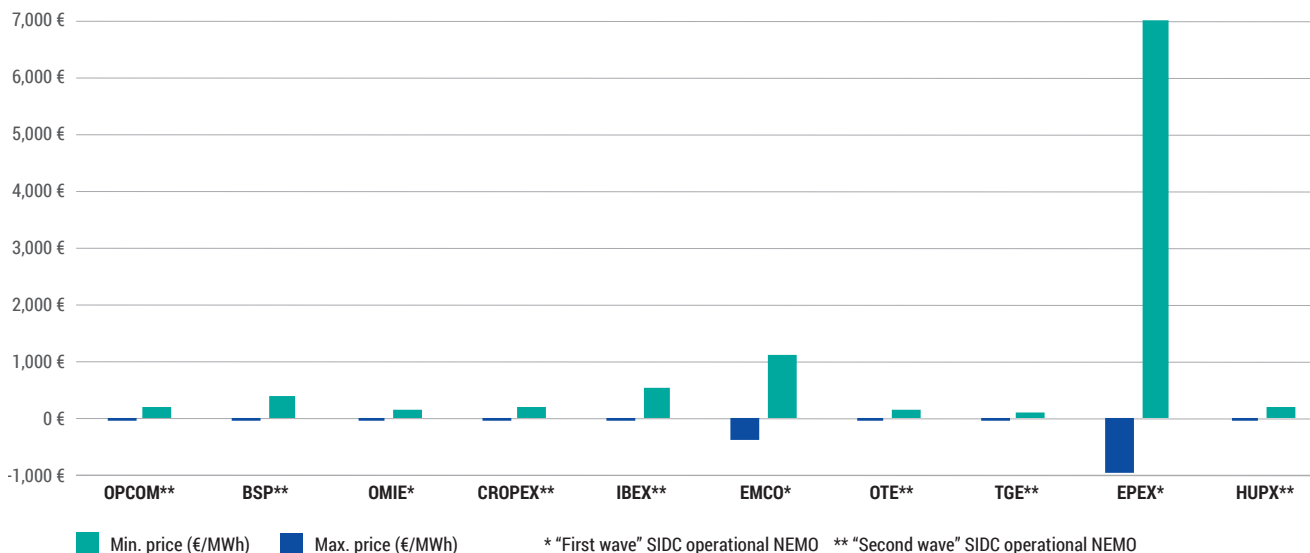


Figure 13 – Single intraday coupling minimum and maximum price monitoring (From 1 January 2019 to 31 December 2019)

60 See also [COVID-19 press release](#)

61 For the sake of clarity, the harmonized maximum clearing price for SIDC is 9,999.99 EUR/MWh and the harmonized minimum clearing price for SIDC is 9,999.99 €/MWh. These clearing prices are established per traded product and are valid for all operational bidding zones.

62 For the NEMOs that went live in the 'second wave' (i. e. OPCOM, BSP, CROPEX, IBEX, OTE, TGE and HUPX), the data only covered the period from 20 November until 31 December 2019.

63 [ACER decision No. 04/2018](#)

CCR	Bidding zone border*	Effective GOT** as of 1 January 2020	Cross-border capacities published at effective GOT	The point in time cross-border capacity is made available after effective GOT
Baltic	EE – FI EE – LV LV – LT	15:00 CET D-1	Calculated cross-border capacity	N.A.
	LT – SE4		0	As soon as possible after Effective GOT
	LT – PL	15:00 CET D-1	0	18:00 CET D-1
Core	DE – NL FR – BE BE – NL DE – FR DE – AT DE – PL DE – CZ CZ – PL CZ – AT HU – RO SI – AT HR – SI HR – HU	15:00 CET D-1	0	22:00 CET D-1*****
Hansa	DE – DK1 DK1 – NL DE – DK2 NO2 – NL PL – SE4	15:00 CET D-1	0	18:00 CET D-1
Nordic	DK1 – DK2 DK1 – NO2 DK1 – SE3 DK2 – SE4	22:00 CET D-1***	Calculated cross-border capacity	N.A.
	FI – SE1 FI – SE3 NO1 – NO2 NO1 – NO3 NO1 – NO5 NO1 – SE3 NO2 – NO5 NO3 – NO5 NO3 – SE2 NO3 – SE4 NO4 – SE1 NO4 – SE2 SE1 – SE2 SE2 – SE3 SE3 – SE4	15:00 CET D-1	Calculated cross-border capacity	N.A.
	NO3 – NO4	15:00 CET D-1	0	18:00 CET D-1**
SEE	RO – BG	15:00 CET D-1	0	18:00 CET D-1
SWE	FR – ES	22:00 CET D-1****	Under NRA's assessment	Under NRA's assessment
	ES – PT		Calculated cross-border capacity	15:00 CET D-1

\* Border of the "2 Wave" are displayed in cursive. \*\* Borders that provide cross-border capacities at 15:00h, as requested by the ACER decision No. 04/2018

\*\*\* Already in place today \*\*\*\* GOT 15h00 was implemented in MIBEL Intraday market in 12 November 2019. Since then, PT-ES cross-zonal capacities are offered from effective GOT (15h CET D-1) while FR-ES cross-zonal capacities are offered from 22h CET D-1. \*\*\*\*\* At the latest

Table 8 – Overview of single intraday coupling gate opening (as of June 2020)

### 4.1.3 Expenditures

TSOs and NEMOs provide on an annual basis a detailed cost report to ACER and the regulatory authorities in line with the requirements stemming from Article 80 of the CACM regulation.<sup>64</sup>

This report provides a summary of common costs of establishing and amending as well as operating the SIDC for 'all TSOs costs', 'all NEMOs costs' and 'all NEMOs and all TSOs costs'. In the figure below, the planned as well as actual costs, as of 2017, are depicted.<sup>65</sup>

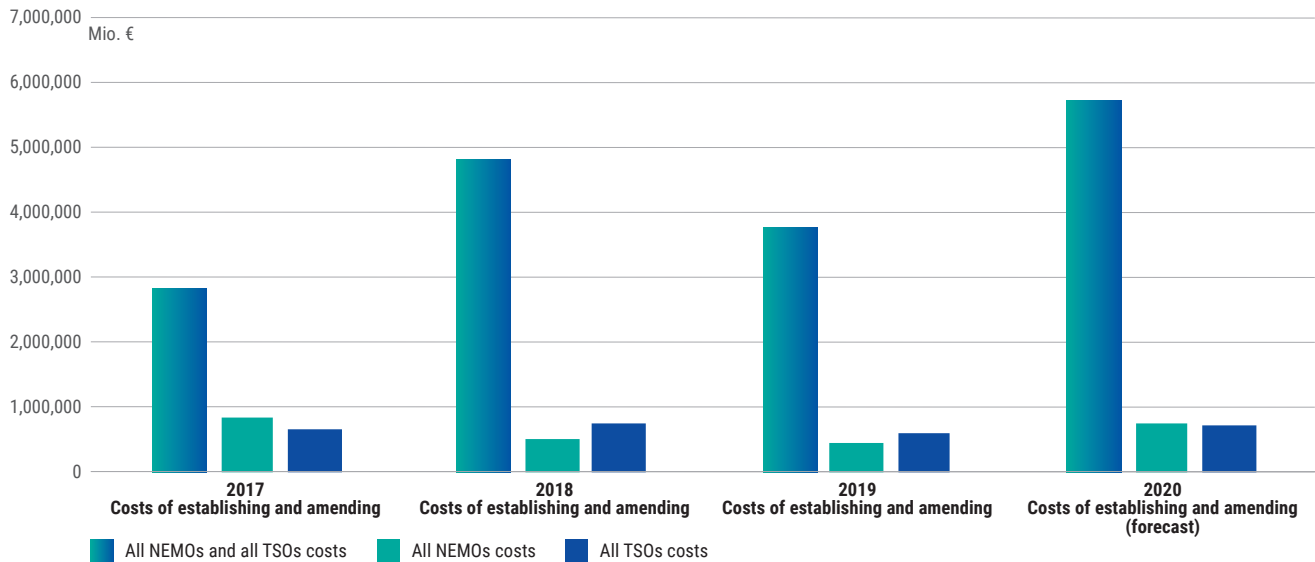


Figure 14 – Overview of single intraday coupling to establish and amend 'all TSOs costs', 'all NEMOs costs' and 'all NEMOs and all TSOs costs'

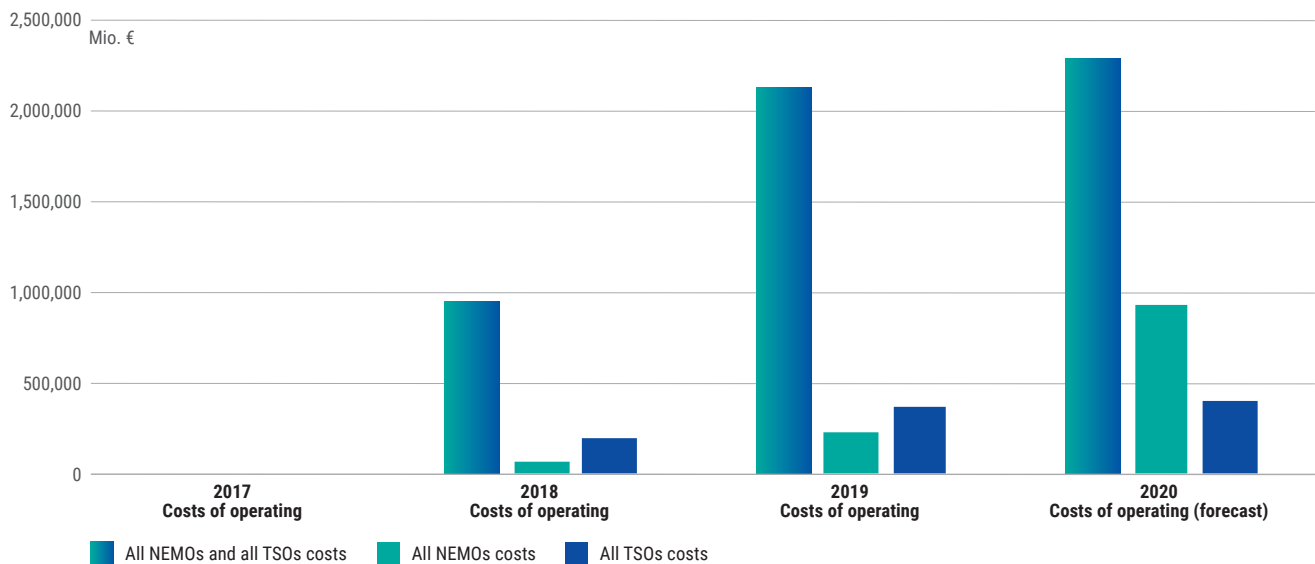


Figure 15 – Overview of single intraday coupling operational costs for 'all TSOs', 'all NEMOs' and 'all NEMOs and all TSOs'

All TSOs costs (e. g. to external TSO support) refer to and are governed by the TSO Cooperation Agreement for SIDC. All NEMOs costs (e. g. to third party services) refer to and are governed by the All NEMO Intraday Operational Agreement.

All TSOs and NEMOs costs (e. g. to the advancement of the SIDC Solution) refer to and are governed by the Single Intraday Coupling Operations Agreement.

64 CACM Cost Reports: **2018, 2019**

65 In line with the regulatory guidance costs for the coupling, projects are planned and shared between TSOs and NEMOs as of 14 February 2017.



## 4.1.4 Evolution

SIDC continues to be further developed with respect to topology and system functionalities.

Key to the further topology evolution of single intraday coupling is the planned go-live of the so-called third wave in which the following extensions projects will be part of:

### Local implementation project (LIP) 14

- LIP 14 covers the following borders: AT – IT, IT – FR, IT – SI, IT – GR and GR – BG
- TSOs: Terna – Rete Elettrica Nazionale S.p.A., Austrian Power Grid AG, RTE Réseau de Transport d'Electricité, ELES, Ltd., Electricity Transmission System Operator, Independent Power Transmission Operator S.A., and ELES Ltd. Electricity Transmission System Operator
- NEMOs: BSP Energy Exchange LLC, EPEX SPOT SE, Gestore dei Mercati Energetici S.p.A., Hellenic Energy Exchange S.A., European Market Coupling Operator AS. and Independent Bulgarian Energy Exchange
- Among the main achievements reached so far in this project, it is worth mentioning the finalisation of the 'Cooperation Agreement for the Design and Implementation Phases of the Intraday Italian Borders Working Table', to which the Bulgarian TSO and NEMO were added in early 2020. The project foresees the implementation of implicit auctions complementing the continuous trading allocation on selected bidding zone borders (Greece-Italy border, Italian bidding zone borders, Italy-Slovenia border), in accordance with the TSOs' proposal approved by the relevant regulatory authorities on complementary regional auctions in accordance with Article 63 of the CACM regulation.

- The most recent timeline agreed for this LIP considers:
  - Starting the individual test between April and September, and the integration test between Q4 2020 and Q1 2021 (January).
  - Going live in March 2021.

### Local implementation project on the PL – SK, CZ – SK and SK – HU borders

- This LIP, yet to be established, covers the following borders: PL – SK, CZ – SK and SK – HU
- TSOs: ČEPS a.s., MAVIR – Hungarian Independent Transmission Operator Company Ltd., Polskie Sieci Elektroenergetyczne S.A., and Slovenská elektrizačná prenosová sústava a.s.
- NEMOs: EPEX SPOT SE, European Market Coupling Operator AS, HUPX Hungarian Power Exchange Company Limited by Shares, OKTE a.s., OTE a.s., and Towarowa Gielda Energii SA

Subsequent to the multi-border LIPs going live is the inclusion of additional interconnectors (e. g. NordLink between DE and NO) within the current topology, which is facilitated via the standard change control process of the SIDC.

Further extensions of the SIDC are not currently formalised. For example, an interim intraday solution in Ireland and Northern Ireland has been implemented since October 2018 with the possibility of explicit cross-border auctions. Moreover, all local implementation projects and borders connected to or via the UK are on hold, as they depend on the outcome of Brexit.

Table 10 on the following page provides an overview of all SIDC extension initiatives.

CCR	Bidding zone border	Project	Planned go-live
Hansa	DE – NO	NordLink	Q4 2020
Channel/IU	FR – GB	–	depends on Brexit
Channel/IU	NL – GB	–	depends on Brexit
Channel/IU	GB – BE	–	depends on Brexit
Channel/IU	IR – UK	–	depends on Brexit
Core	CZ – SK	LIP	TBC
Core	PL – SK	LIP	TBC
Core	SK – HU	LIP	TBC
Core	BE – DE	AleGro	Q3/Q4 2020
GRIT	NORD – CNOR	LIP 14	Third wave
GRIT	CNOR – CSUD	LIP 14	Third wave
GRIT	CSUD – SUD	LIP 14	Third wave
GRIT	SUD – ROSN	LIP 14	Third wave
GRIT	ROSN – SICI	LIP 14	Third wave
GRIT	CSUD – SARD	LIP 14	Third wave
GRIT	IT – GR	LIP 14	Third wave
Italy North	AT – IT	LIP 14	Third wave
Italy North	IT – FR	LIP 14	Third wave
Italy North	IT – SI	LIP 14	Third wave

Table 10 – Single intraday coupling extension roadmap (as of May 2020)

In addition to the geographical extensions, various technical advancements are currently planned within SIDC.

### Transit shipping (interim & enduring solution)

The functionality of transit shipping is needed to handle the physical and financial handover of electricity between competitive and non-competitive NEMOs. To secure the timeliness of the second wave going live in November 2019, EMCO and EPEX/ECC implemented an interim six-month rotational scheme: EMCO provided transit shipping services to all NEMOs, and EPEX/ECC successfully took over this task in February 2020. Until November 2020, EMCO and EPEX/ECC will upon NRA request conduct a second round of transit shipping rotation. In the meantime, an assessment of different options for the enduring transit shipping solution is under investigation.

### XBID IT Solution upgrade (i.e. releases 3.0.)

The XBID IT Solution based on the SOB, CMM and SM modules continues to be periodically enhanced. In 2020 the third release of the system will be deployed starting with the release 3 of package 1, which will add important features. In 2021 the release packages 2 and 3 shall be deployed with a major focus in system enhancements such as the handling of losses on HVDC interconnectors.

### European Intraday Auctions

Work on the implementation of intraday auctions to enable capacity pricing is to be initiated in the SIDC. Handover from the working group under the NEMO committee to SIDC working groups took place in February 2020. In line with the ACER decision, SIDC aims to implement intraday auctions by the end of 2022.

## 4.2 Single day-ahead coupling

The pan-European single day-ahead coupling (hereafter **SDAC**) serves, at the time of this report, 27 countries. In total, 35 TSOs and 17 NEMOs cooperate under the agreement that governs the SDAC, namely the day-ahead operational agreement (hereafter **DAOA**).

The SDAC makes use of the day-ahead MCO function, with an algorithm called EUPHEMIA, to calculate electricity prices across Europe and to implicitly allocate auction-based cross-border capacity. In parallel to the multi-regional coupling

project (hereafter **MRC**), the 4M market coupling project (hereafter **4M MC**) also applies the day-ahead MCO function until the two operational projects are merged.

In total, SDAC serves more than 95 % of European electricity consumption, and the single algorithm calculates volumes in excess of 1,500 TWh/a. The welfare gains are estimated above € 1 billion per year, based on € 200 million average daily value of matched trades.<sup>66</sup>

### 4.2.1 Governance

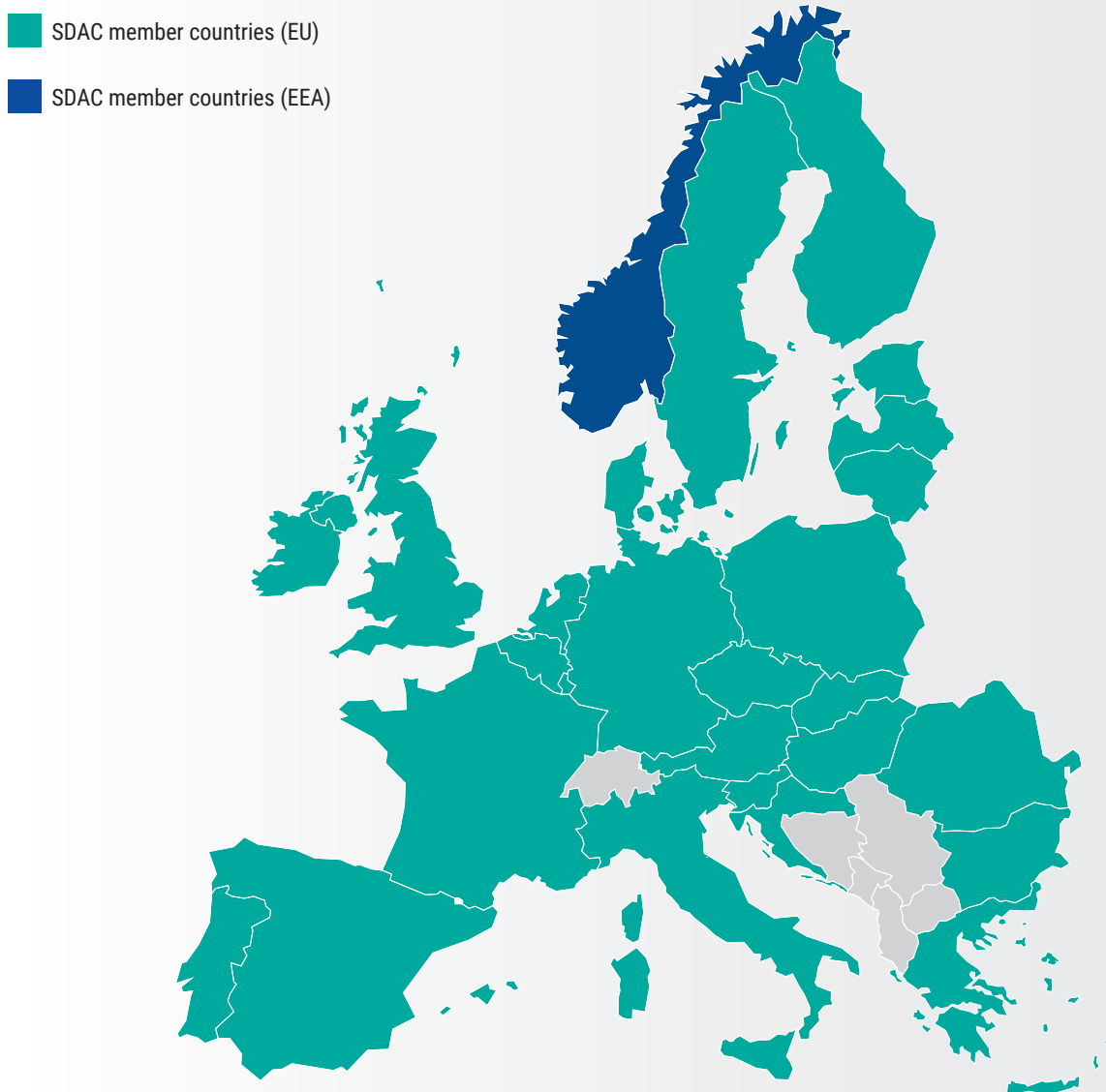


Figure 16 – Countries of single day-ahead coupling (as of May 2020)

66 See also: <https://www.energy-community.org/events/2019/06/AF.html>

The pan-European SDAC is governed by the day-ahead operational agreement, which entered into force on 28 March 2019. This agreement addresses the cooperation of TSOs and NEMOs regarding the establishment, amendment and operation of day-ahead coupling. It was agreed to by all TSOs and NEMOs of the EU Member States plus Norway.

The signatory parties of the DAOA are listed below:

### TSOs<sup>67</sup>

Affärsverket Svenska Kraftnät, Amprion GmbH, Austrian Power Grid AG, AS Augstsprieguma tīkls, BritNed Development Limited, ČEPS a.s., Creos Luxembourg S.A., Croatian Transmission System Operator Ltd., EirGrid plc, ESO – Electroenergien Systemen Operator EAD, Elering AS, ELES d.o.o., Energinet Elsystemansvar A/S, Elia System Operator SA/BV, ElecLink Limited, Fingrid Oyj, Independent Power Transmission Operator S.A., Litgrid AB, MAVIR - Hungarian Independent Transmission Operator Company Ltd., National Grid Interconnectors Ltd., National Grid IFA2 Ltd., National Power Grid Company Transelectrica S.A., Nemo Link Limited, PSE – Polskie Sieci Elektroenergetyczne S.A., Red Eléctrica de España S.A.U, REN – Rede Eléctrica Nacional S.A., RTE – Réseau de Transport d'Electricité, Slovenská elektrizačná prenosová sústava a.s., SONI Limited, Statnett SF, TenneT TSO B.V., TenneT TSO GmbH, Terna - Rete Elettrica Nazionale SpA, TransnetBW GmbH and 50Hertz Transmission GmbH

### NEMOs

BSP Energy Exchange LLC, Croatian Power Exchange Ltd., EPEX SPOT SE, EXAA Abwicklungsstelle für Energieprodukte AG, Gestore dei Mercati Energetici S.p.A, Hellenic Energy

Exchange S.A., HUPX Hungarian Power Exchange Ltd., Independent Bulgarian Energy Exchange EAD., European Market Coupling Operator AS, OMI POLO ESPAÑOL S.A., OTE a.s., OKTE a.s., Operatorul Pieței de Energie Electrică și de Gaze Naturale S.A., Towarowa Giełda Energii SA, SONI Limited, EirGrid plc and Nasdaq Oslo ASA<sup>68</sup>

The day-ahead operational agreement sets forth the rights and obligations of NEMOs and TSOs concerning the implementation of the SDAC, including common operation and further development. As the coupling is an implementation of the CACM regulation, it requires the cooperation of all TSOs and NEMOs at the European level (see also Figure 16).

The contractual framework is complemented by an all-TSOs agreement under the TSOs cooperation operational agreement for day-ahead coupling (hereafter **TCDA**). In the same fashion, NEMOs signed an all-NEMOs agreement, the all-NEMOs day-ahead operational agreement (hereafter **ANDOA**), and arrangements that contribute to the operation of the SDAC by specifying or completing the general principles described in the day-ahead operational agreement.

The SDAC governance is regulated by the DAOA and accompanying documents, such as terms of reference. In October 2018, an interim governance was set up with the key objectives of securing the reliable operation and timely succession of new borders and markets. However, SDAC continues in 2020 to be operationally organised based on a TSO-only, a NEMO-only, and a joint TSO/NEMO structure. The introduction of enduring governance will be finalised between 2020 and 2021.<sup>69</sup>

## 4.2.2 Operations

In SDAC, two coupling projects are parallel in operation using an infrastructure based on EUPHEMIA. These projects are MRC and 4M MC.<sup>70</sup> The figure below depicts the current status of SDAC markets.

### 4.2.2.1 Operations of MRC

At the time of this report, the multi-regional coupling project integrates 21 countries,<sup>71</sup> representing more than 95 % of European electricity consumption and averaging circa 1.500 TWh/year coupled in one market solution.

MRC continues to operate successfully without full decoupling. In fact, no full decoupling of markets has occurred

since the start of this project in February of 2014. However, two partial decouplings took place in the observed period.

The first case of partial decoupling occurred on Friday, 7 June 2019, which affected the day-ahead trades for Saturday, 8 June. More specifically, due to missing EPEX SPOT order books for the CWE area and the GB area, these areas were decoupled. The root cause was a corrupt order unintentionally entered into EPEX SPOT's trading system. Within hours after the incident, a fix has been developed and successfully implemented. Following the partial decoupling of CWE and GB from MRC, shadow auctions for cross-zonal capacity were run by TSOs and the Joint Allocation Office (JAO), and NEMOs ran local auctions for each local, national market area. Following a

67 Akcionarsko društvo Elektromreža Srbije (EMS), Transmission System Operator of the Republic of North Macedonia (MEPSO) and Swissgrid AG (Swissgrid) have been confirmed by the SDAC as observers.

68 As of 7 June 2019.

69 This organisation will merge the single day-ahead and single intraday coupling based on Article 10 of the CACM regulation.

70 Details on the operations of SDAC (MRC and 4M MC) are published via the CACM report: Version 2018, Version 2019

71 MRC operational countries are Austria, Belgium, Croatia, Denmark, Estonia, Finland, France, Germany, Ireland, Italy, Latvia, Lithuania, Luxembourg, The Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden and the UK.



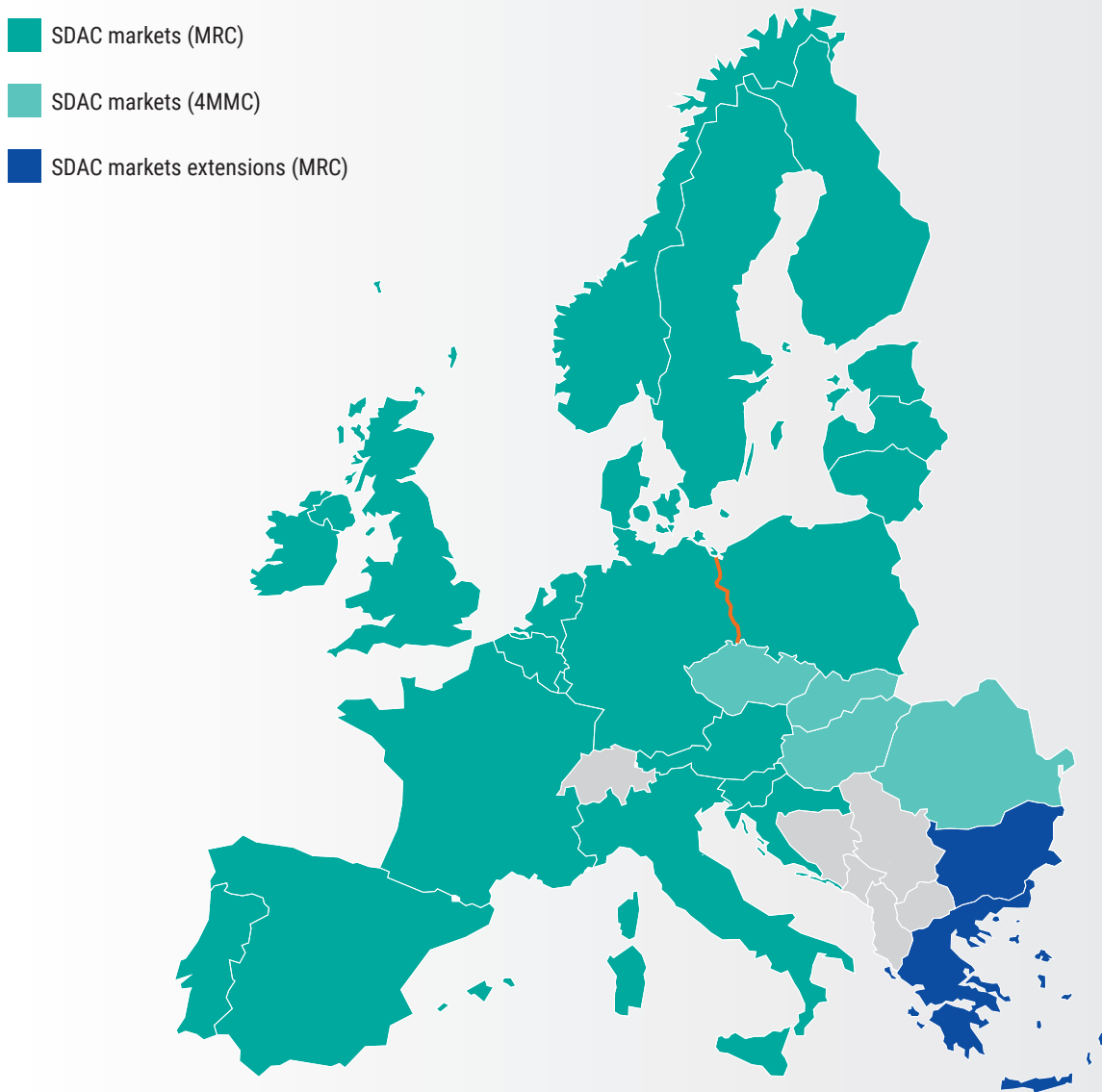


Figure 17 – Countries with single day-ahead coupling (As of May 2020)

delayed declaration of the partial decoupling from the Incident Committee, the shadow auction results were sent to market participants with delay, making it very difficult to nominate volume granted in shadow auctions. Moreover, the local spot market auctions in the decoupled areas were subject to further delays beyond the foreseen timelines. Although this partial decoupling did not lead to any grid security issues anywhere in Europe, the incident caused a major disruption of the day-ahead market within the multi-regional coupling and processes on market parties and TSOs' side.<sup>72</sup>

The second case of partial decoupling occurred on Tuesday, 4 February 2020, which affected the day-ahead trades for Wednesday, 5 February. More specifically, due to missing EMCO order books for the CWE area, three interconnectors were decoupled. The root cause was a specific bid that could

not be processed in the EMCO local trading system. Within hours of the incident, a fix was developed and successfully implemented. Following the partial decoupling of EMCO CWE from MRC, shadow auctions for cross-zonal capacity were run for three interconnectors by JAO. Shadow auction results were sent to market participants. For the three impacted interconnectors, i. e. DK2-DE (Kontek), DK1-NL (COBRA cable) and SE4-DE (Baltic cable), fallbacks were triggered in line with standard procedures. More specifically, for DK2-DE (Kontek) and DK1-NL (COBRA cable), shadow auctions were held, and for SE4-DE (Baltic cable) the capacity was returned to the owners.<sup>73</sup>

In light of the partial decoupling, the Joint Allocation Office provides regularly operational information on the shadow auction process to registered market participants.

<sup>72</sup> See detailed report on the [MRC partial decoupling of 7 June 2019](#).

<sup>73</sup> See detailed report on the [MRC partial decoupling of 4 February 2020](#).

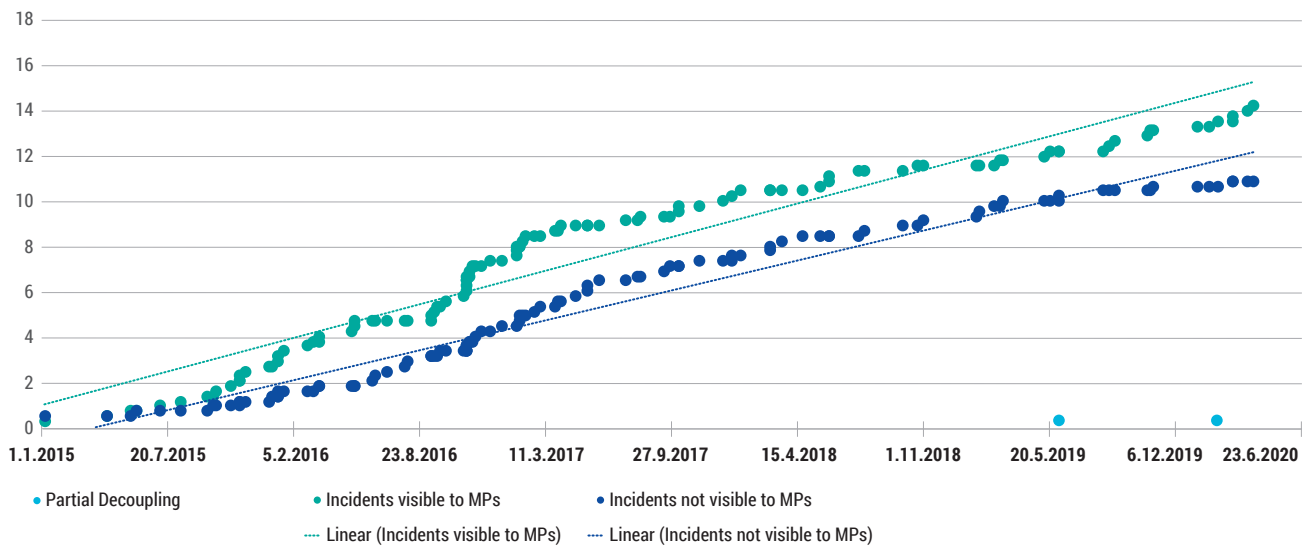


Figure 18 – MRC incidents between 2015 and 2020 (as of April 2020)

Additionally, the preparation of shadow auctions testing with market participants is ongoing and is currently planned for September 2020. It has been decided that JAO will always provide an informative one-pager on what has happened in the case of decoupling (shadow auctions) to all market participants. Moreover, SDAC introduced in March 2020 a default structure and content list for the decoupling report and agreed on a clear action and delivery plan to ensure that a report will be published via the NEMO/TSO project websites within 18 working days after the incident.

Moreover, several operational incidents have occurred: some were communicated actively to market participants; and some were not communicated, in line with MRC operational procedures. In any case, all operational incidents are analysed frequently and changes, e. g. of processes, are introduced to mitigate relevant risks via OPSCOM. Figure 18 depicts these two types of incidents.

In total, 114 incidents in MRC occurred in the period from February 2015 until end of May 2020, of which 34 occurred between June 2019 and May 2020 (i. e. the period after the last market report provided data). In respect to severity, only 18 incidents, of the 66 that occurred in the current reporting period, were visible to market participants (i. e. could not be solved within the procedural timings).

In light of the COVID-19 pandemic, a wider variety of measures has been introduced to safeguard stable operations. These include a physical separation between members of the respective operational teams and enabling the relevant parties to run market sessions remotely. Although the COVID-19 pandemic situation changes from day to day, under the current circumstances, SDAC (MRC) expects no material impact on its ability to operate in the relevant coupled markets.<sup>74</sup>

In addition to the monitoring of the incidents and their severity in MRC, various complementary KPIs are logged and assessed. Two types of KPIs are to be distinguished: 1) KPIs used for managing MRC (e. g. OPSCOM operational reporting) and 2) KPIs (or raw data) to be provided regularly to stakeholders (e. g. continuous data provision to the ENTSO-E transparency platform).

In the course of further development of MRC, additional measures to monitor and improve operations (e. g. the computational time or the maximum time allowed for calculation) are regularly reviewed and, if needed, introduced via OPSCOM.

In respect to the management of the handling of harmonized minimum and maximum clearing prices, i. e. the price determined by matching the highest accepted selling order and the lowest accepted buying order in the electricity market, MRC applies a dedicated procedure in accordance with Article 41(1) of Commission Regulation (EU) 2015/1222 of July 2015.

In the event that a clearing price exceeds a value of 60 % of the predefined harmonized maximum clearing price in at least one market time unit (hour) in a day in an individual market area or multiple market areas, the harmonized maximum clearing price for the MRC auction shall be increased by 1,000 €/MWh based on regulatory guidance.<sup>75</sup> For example, the maximum clearing price is currently set to 3,000 €/MWh. Therefore, the clearing price detection of 60 % is set to 1,800 €/MWh, and the NEMO that detects a clearing price that reaches or trespasses it for one of its areas of responsibility needs to take actions. The new maximum clearing price will be set to 4,000 €/MWh, and the new 60 % detection value shall also be updated to 2,400 €/MWh. However, no adjustment is 'pre-set' due to missing regulatory guidance

74 See also [COVID-19 press release](#)

75 For the sake of clarity, a second auction is executed in MRC in case the 'preliminary' market clearing price exceeds 500,00 €/MWh or -150,00 €/MWh.

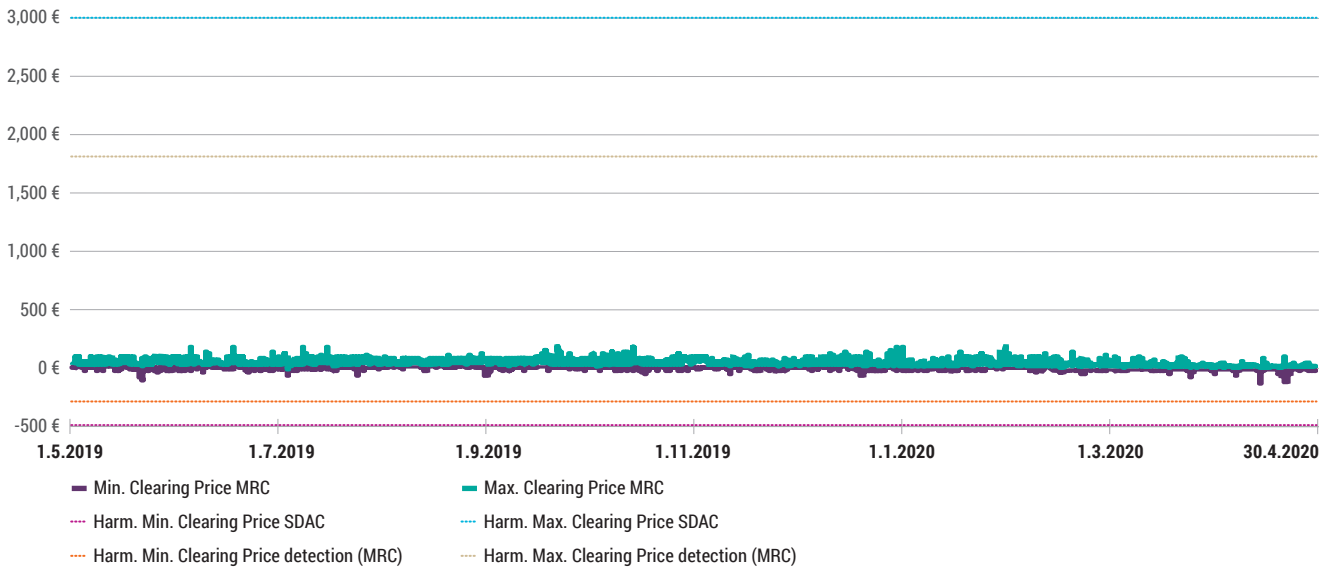


Figure 19 – MRC minimum and maximum clearing price monitoring (From 1 May 2019 to 30 April 2020)

(i. e. no procedure to deal with the adjustment of negative prices is available).

The overall process of detection and adjustment is planned to take approximately five weeks, in line with the relevant regulations.

Figure 19 depicts the factual minimum and maximum clearing prices across operational bidding zones at MRC. As of the

SDAC introduction in April 2019, the absolute minimum hourly clearing price is -115.31 €/MWh, and the absolute maximum hourly clearing prices is 205.25 €/MWh. As the observed minimum and maximum clearing prices are significantly lower than the applied detection values, no adjustments of the harmonized minimum or maximum clearing prices have been triggered in the observed period.

#### 4.2.2.2 Operations of 4M MC

Since the start of the 4M MC on 19 November 2014, it has operated successfully with only 22 minor incidents and one occurrence of decoupling. The 4M TSOs and NEMOs solved the problems immediately, analysed their causes and improved processes to mitigate the risk of further incidents (see figure 20).

On 19 March 2016, a technical issue (incorrect Java behaviour) led to a decoupling. A problem downloading ATC data caused a breach of the deadline on 20 September 2017. Until 30 April 2020, only three incidents occurred that were visible to market participants; all 19 additional incidents involved minor issues without visibility for market participants. Since the last market

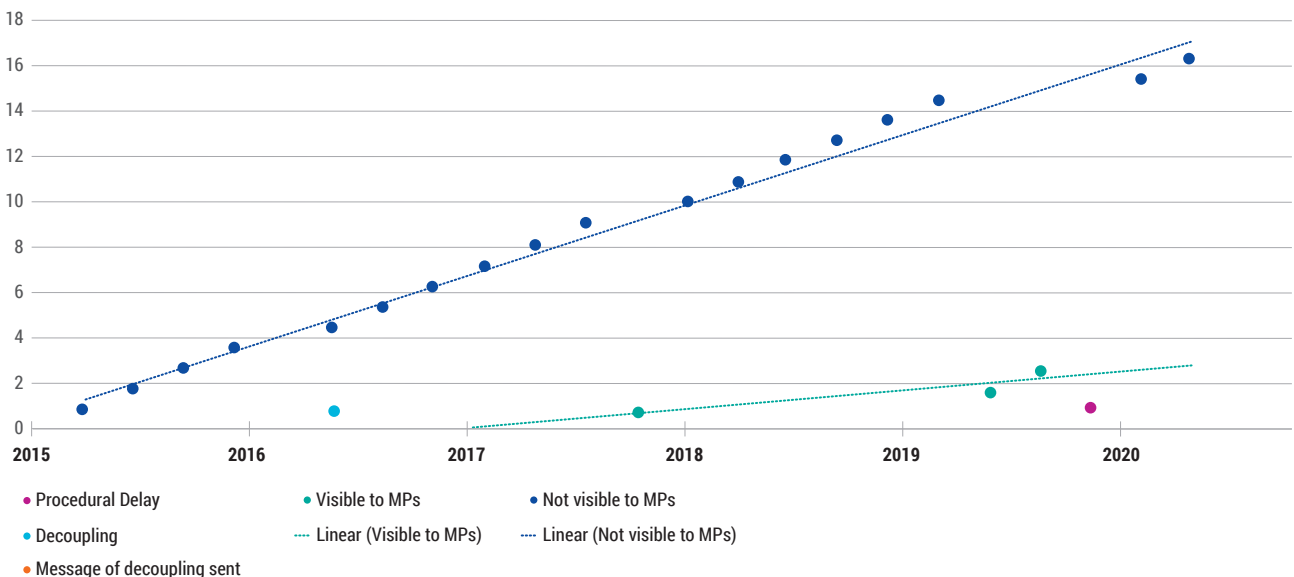


Figure 20 – 4M MC operational indicators (from 2015 to 2020)

report, only two minor operational incidents occurred; neither was visible to market participants.

In respect to the management of the handling of harmonized minimum and maximum clearing prices, i. e. the price determined by matching the highest accepted selling order and the lowest accepted buying order in the electricity market, 4M MC applies a dedicated procedure in accordance with Article 41(1) of CACM regulation.

Aligned with MRC, the 4M MC project monitors the harmonised minimum and maximum clearing prices based on a 60 % threshold.<sup>76</sup> In the event that a clearing price exceeds a value of 60 % of the predefined harmonized maximum clearing price in at least one market time unit (hour) in a day – in an individual market area or multiple market areas in any of the 4M MC bidding areas – the harmonized maximum clearing

price changes in both MRC and 4MMC regions at the same time. The relevant procedures in accordance with the ACER decision are elaborated in the mirror, and the harmonized maximum clearing prices are changed in both regions if the threshold mentioned is reached in either of these coupled regions.

Figure 21 depicts the factual minimum and maximum clearing prices over all operational bidding zones at 4M MC. Once SDAC ‘went live’ in April 2019, the absolute minimum hourly clearing price is -48.14 EUR/MWh, and the absolute maximum hourly clearing price is 159.39 EUR/MWh. As the observed minimum and maximum clearing prices are significantly lower than the applied detection values, no adjustments of the harmonized minimum or maximum clearing prices have been triggered in the observed period.

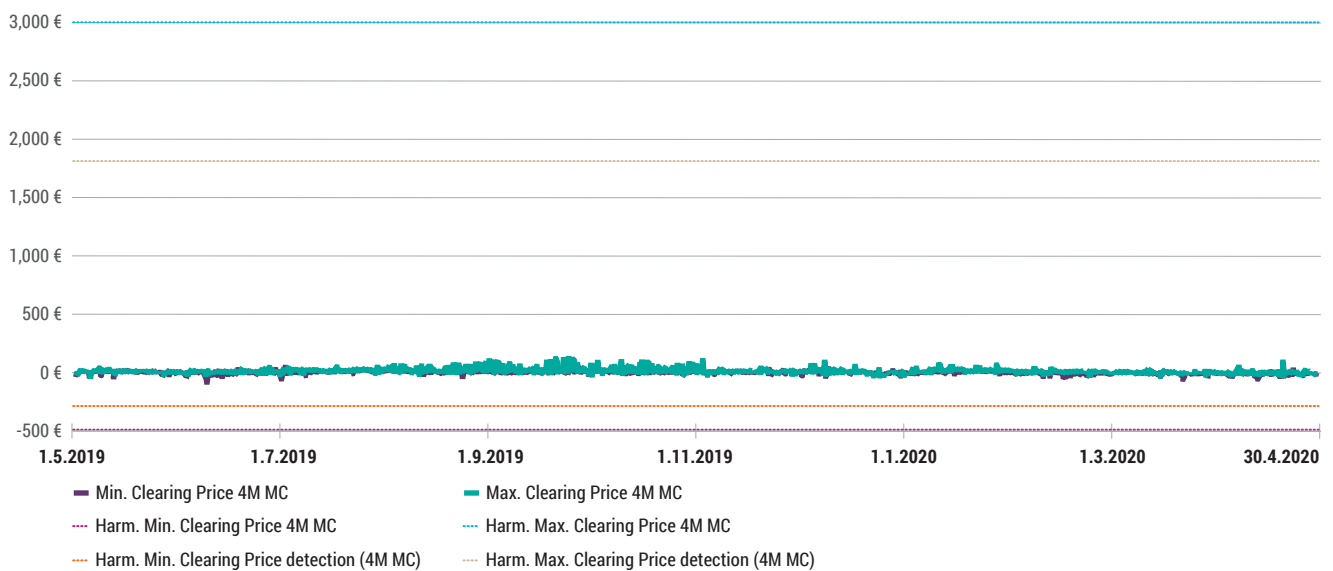


Figure 21 – 4M MC minimum and maximum clearing price monitoring (From 1 May 2019 to 30 April 2020)

76 For the sake of clarity, a second auction is executed in 4M MC in case the ‘preliminary’ market clearing price exceeds 500,00 €/MWh or -150,00 €/MWh.

## 4.2.3 Expenditures

TSOs and NEMOs provide on an annual basis a detailed cost report to ACER and the regulatory authorities in line with the requirements stemming from Article 80 of the CACM regulation.<sup>77</sup>

This report provides a summary of common costs of establishing and amending as well as of operating the SDAC for 'all TSOs costs', 'all NEMOs costs' and 'all NEMOs and all TSOs costs'. In the figure below, the planned, as well as actual costs as of 2017, are depicted.<sup>78</sup>

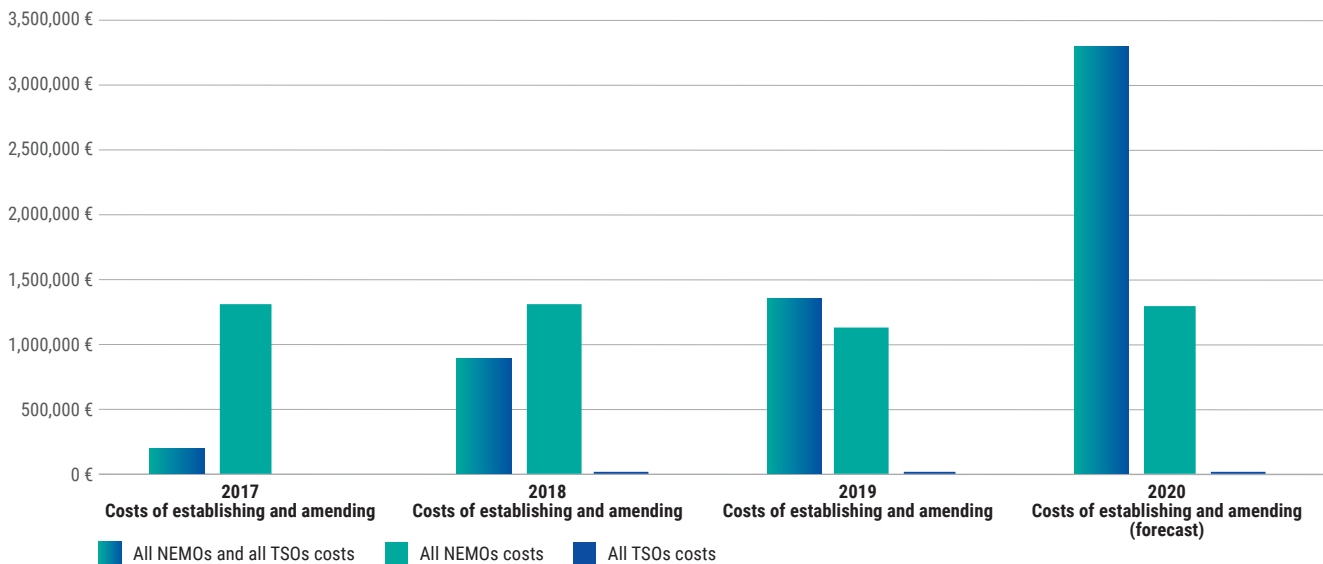


Figure 22 – Overview of single day-ahead coupling to establish and amend 'all TSOs costs', 'all NEMOs costs' and 'all NEMOs and all TSOs costs'

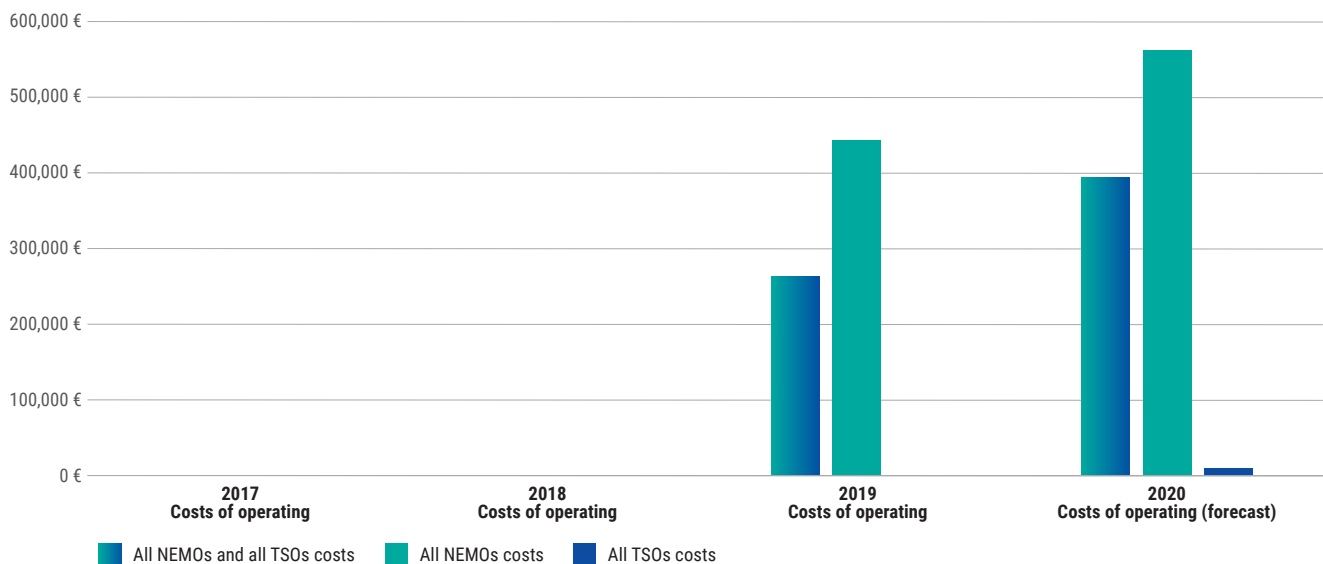


Figure 23 – Overview of single day-ahead coupling operating costs for 'all TSOs', 'all NEMOs' and 'all NEMOs and all TSOs'

All TSOs common costs (e. g. to Project Managers and Conveners) refer to and are governed by the TSO Cooperation Agreement for SDAC. All NEMOs common costs (e. g. to third party services) refer to and are governed by the All NEMO

Day-Ahead Operational Agreement. All TSOs and NEMOs common costs (e. g. to the introduction of the Multiple NEMO Arrangement) refer to and are governed by the Single Day-Ahead Coupling Operations Agreement.

<sup>77</sup> CACM Cost Reports: **2018, 2019**

<sup>78</sup> In line with the regulatory guidance costs for the coupling, projects are planned and shared between TSOs and NEMOs as of 14 February 2017.

## 4.2.4 Evolution

The SDAC is continuously being developed with respect to topology and system functionalities.

During the current reporting period, three extensions and functional projects went live under the market coupling of regions:

1. CobraCable
2. ElecLink went live on October 2019
3. Nordic MNA went live on 3 June 2020

Table 11 lists all bidding zone borders adhering to the CACM regulation that are not fully coupled (as of May 2020). In any case, the displayed target times are indicative and do not account for contingencies. Moreover, some of the extensions might partially or fully change or be cancelled in favour of alternatives.

CCR	Bidding zone border	Project/s	Planned go-live
Hansa	Germany – Norway	NordLink	End of 2020
Channel/IU	France – United Kingdom	IFA2	Mid 2020
Core	Belgium – Germany	AleGro	End of 2020
	Germany – Poland	Interim Coupling/Core FBMC project	to be confirmed/ May – September 2021
	Germany – Czech Republic	Interim Coupling/Core FBMC project	
	Poland – Slovakia	Interim Coupling/Core FBMC project	
	Poland – Czech Republic	Interim Coupling/Core FBMC project	
	Austria – Czech Republic	Interim Coupling/Core FBMC project	
	Austria – Hungary	Interim Coupling/Core FBMC project	
	Hungary – Croatia	Core FBMC project	May – September 2021
SEE	Bulgaria – Greece	IBWT	End of 2020
	Bulgaria – Romania	n.a.	End of 2020
GRIT	Italy – Greece	IBWT	End of 2020

Table 11 – Single day-ahead coupling extension roadmap (as of May 2020)

The key evolution of single day-ahead coupling is the operational ‘merge’ of MRC and 4M MC, which constitute the enduring phase in accordance with SDAC DAOA. The ‘DE-AT-PL-4M MC Project’ (hereafter **Interim Coupling**) aims to achieve this major advancement prior to the CCR Core

flow-based Market Coupling project going live. The Interim Coupling project was initiated on 21 December 2018 based on the request of concerned regulatory authorities. It covers the following bidding zone borders:

Bidding zone border	The current type of allocation
Germany – Czech Republic	Explicit allocation
Germany – Poland	Explicit allocation
Poland – Czech Republic	Explicit allocation
Poland – Slovakia	Explicit allocation
Austria – Czech Republic	Explicit allocation
Austria – Hungary	Explicit allocation
Czech Republic – Slovakia	Implicit allocation (4MMC)
Hungary – Slovakia	Implicit allocation (4MMC)
Hungary – Romania	Implicit allocation (4MMC)

Table 12 – Interim Coupling project bidding zone borders

The following TSOs and NEMOs are directly involved in the Interim Coupling project:

### TSOs

Austrian Power Grid AG, ČEPS a.s., MAVIR – Hungarian Independent Transmission Operator Company Ltd., Polskie Sieci Elektroenergetyczne S.A., Slovenská elektrizačná prenosová sústava, a.s., TenneT TSO GmbH, National Power Grid Company Transeletrica S.A., 50Hertz Transmission GmbH

### NEMOs

European Market Coupling Operator AS, EPEX SPOT SE, EXAA Energy Exchange Austria, HUPX Hungarian Power Exchange Ltd., OKTE, a.s., OPCOM SA, OTE, a.s., TGE Towarowa Giełda Energii S.A.

For the pre-coupling and post-coupling processes, a TSO common system currently operated in 4M MC project (modified TSO Management Function ('mTMF') module including TSO Cloud module) will be used. Modifications of the TSO common system have been agreed to meet the specific requirements of the Interim Coupling project (e. g. handling of technical profiles, Multi-NEMO Arrangements). Functionalities to accommodate situations when certain bidding zone borders would be decoupled (i. e. partial decoupling) are part of this technical solution. In such cases, the remaining part of the region would stay coupled, while the decoupled border would be operated in the shadow auction mode. For the Interim Coupling project, it was agreed that the standard fallback solution, shadow auctions, will be performed by JAO on all bidding zone borders.

Following the design phase of the project in the first half of 2019, the implementation phase was launched in November 2019, aiming at finalising the IT solution. The technical implementation will be followed by the testing phase, including joint testing activities with the entire SDAC, as well as member testing with market participants. The timeline of the finalisation of testing activities and the window to go live are to be confirmed by project parties.

In addition to the operational merging of MRC and 4M MC to establish enduring SDAC; the current plan is for the SEE region bidding zones borders to go live at the end of 2020. The bidding zone border of Bulgaria to Romania is set to go live following the operational start of the Interim Coupling project. A dedicated Request for Change for this bidding zone border was submitted in January 2020. The bidding zone border from Bulgaria to Greece will go live as organised via the Italian

Border Working Table project; this is intended to be done in close succession to Bulgaria and Romania 'going live'.

As the full integration of the SDAC poses several challenges (e. g. contractual, algorithmic and operational), the project will investigate no further extensions in 2020 and 2021 that are outside of the topology and not supported by the CACM regulation (i. e. the planned Core flow-based Market Coupling project going live).

In addition to the geographical extensions, various technical advancements are currently planned within SDAC.

### Multi-NEMO arrangement

The functionality to handle multiple NEMOs within and between bidding zones was introduced in SDAC in April 2019 and was first utilized in the CWE region in June 2019. In 2020 this functionality will sequentially be introduced in other regions and bidding zones:

- CCR Baltic<sup>79</sup> – Q4 2020
- Poland (SwePol cable & LitPol Link) – Q4 2020
- Hansa+<sup>80</sup> – Q4 2020/Q1 2021
- Nordic – June 2020

### Implementation of a 15 min MTU

The implementation of a 15 min MTU is complex and challenging, as it is impacted by many aspects and stakeholders. The legal deadline is 2021. The SDAC parties are assessing the best approach to tackle this project:

- **Stepwise:** Gradual implementation of 15 or 30 minutes. Requires also cross-matching (this includes product cross-matching<sup>81</sup> and network cross-matching<sup>82</sup>).
- **Big Bang:** Fifteen-minute MTU is introduced everywhere. Possible from 2025.

### Flow-based capacity allocation

In line with the legal requirements, the flow-based market coupling will in the coming years be sequentially extended beyond the CWE region which went live in May 2015 in SDAC. The next area to go live will be the CCR Core region in May 2021, which is comprised of the former CWE and CEE regions. Following this, flow-based is planned to be implemented for the CCR Nordic. Other CCRs will, in line with the requirements of the respective Capacity Calculation Methodologies, follow in the years thereafter.

79 At the moment of writing, the Baltic TSOs and NEMOs are preparing the necessary documentation (procedures, agreements, etc.) for when additional NEMO(s) express its(their) interest to start operations in Baltic bidding zones.

80 The implementation of MNA in CCR Hansa is organised via various border-to-border projects.

81 Possibility to define products under different time granularities.

82 Possibility to define network constraints under different time granularities.

# 5 Forward capacity allocation

All TSOs have appointed the Joint Allocation Office (hereafter **JAO**) in accordance with Article 49 FCA regulation<sup>83</sup> to act as the single allocation platform (hereafter **SAP**) for forward capacity allocation. The JAO is a joint service company currently owned by 25 TSOs<sup>84</sup> hosting SAP services for TSOs as of 1 November 2019.

The single allocation platform enables long-term auctions of transmission capacity and is currently serving TSOs from 22 countries. The IT system is scalable border by border, allowing for annual, non-calendar annual, half-yearly, quarterly,

monthly, weekly, weekend, daily and intraday auctions. It is up to the TSOs and regulatory authorities to decide what auctions are performed on individual borders.

## 5.1 Governance

In accordance with Article 1 of the approved SAP methodology, all TSOs and regulatory authorities bound to the FCA regulation agreed to appoint the JAO as the SAP operator. In doing so, all TSOs that issue long-term transmission rights developed and signed an agreement labelled a 'SAP Cooperation Agreement' (hereafter SAP CA) as included in Article 2(3) (g) of the SAP methodology. The agreement has retroactive entry into force for 1 October 2018. UK parties are currently part of the SAP CA, but the SAP CA does foresee the possibility that these parties may be forced to exit the agreement, depending on the outcome of the ongoing Brexit discussions. Some regulatory authorities (in Finland, Lithuania and Sweden) have exempted their TSOs pursuant to Article 30(1) of Commission Regulation (EU) 2016/1719 (FCA regulation) from issuing long-term transmission rights and, therefore, according to Article 30(7) of the FCA regulation, these TSOs are not part of the SAP CA.

The signatory parties of the SAP CA are as follows:

### TSOs

50Hertz Transmission GmbH, Amprion GmbH, AS 'Augstsprieguma tīkls', Austrian Power Grid AG, BritNed Development Limited, ČEPS a.s., Croatian Transmission System Operator Ltd., EirGrid plc, Electroenergien Sistemem Operator EAD, Elering AS, ELES Ltd., Electricity Transmission System Operator, Elia System Operator SA, Energinet Elsystemansvar A/S, Independent Power Transmission Operator S.A., MAVIR – Hungarian Independent Transmission Operator Company Ltd., Moyle Interconnector Limited, National Grid Interconnectors Limited plc, National Power Grid Company Tranelectrica S.A., Nemo Link Limited, Polskie Sieci Elektroenergetyczne S.A., Red Eléctrica de España S.A.U., REN – Rede Eléctrica Nacional, S.A., RTE Réseau de Transport d'Electricité, Slovenská elektrizačná prenosová sústava, a.s., Statnett SF, TenneT TSO B.V., TenneT TSO GmbH, Terna – Rete Elettrica Nazionale Società per Azioni, SpA and Transnet BW GmbH

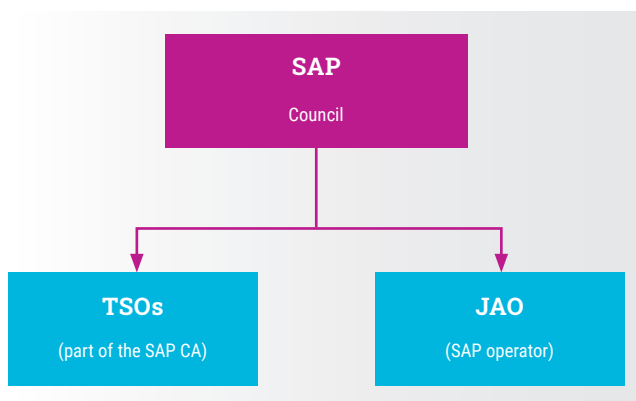


Figure 24 – Governance of SAP with respect to the JAO as an operator<sup>84</sup>

The SAP Council is the sole competent body that decides on matters related only to the fulfilment of SAP tasks in accordance with the FCA regulation. The real forum is then a communication and decision-making forum between the concerned TSOs and the SAP Operator to discuss matters of specific regional or geographic interest. The SAP Council shall ensure that TSOs' requests and decisions relating to a specific regional or geographical interest are appropriately addressed to the SAP Operator, and that the SAP Operator's requests relating to a specific regional or geographical interest are appropriately addressed to the concerned TSOs.

<sup>83</sup> All TSOs' proposal of 7 April 2017 for the establishment of a SAP in accordance with Article 49 of the FCA regulation and for the cost sharing methodology in accordance with Article 59 of the FCA regulation.

<sup>84</sup> Includes TSOs and companies operating undersea cable interconnectors.





Figure 25 – Countries with TSOs obligated to participate in the SAP Council that have signed the SAP Cooperation Agreement (as of May 2020)

The SAP Council met for the first time in November 2018 and has reconvened at least every six months thereafter. Additional teleconferences are also organized when necessary.

One representative represents each TSO, and if a representative is unable to attend a meeting, the TSO may be represented by a substitute or may designate a proxy to the representative of another TSO. SAP Council meetings are presided over by a chairperson, elected from among the TSOs. Voting can be

performed in person by representatives of TSOs at the physical meeting or via a written voting procedure.

The SAP Council is often a home to vibrant discussions on various topics, which can be suggested for the agenda in advance by any member of the SAP Council. As SAP Council and JAO Joint Service Council (a body dealing with non-SAP services provided by JAO) members tend to overlap, meetings of both bodies are held together.

85 Only the TSOs that issue Long-Term Transmission Rights with the obligation to be part of the SAP Council are representatives.

## 5.2 Operations

The JAO, as the SAP Operator, performs the following tasks in compliance with this SAP CA, SAP methodology and HAR:

1. The registration of market participants.
2. The operation of auction procedures.
3. The financial settlement of allocated long-term transmission rights with market participants, including management of collaterals according to the HAR.
4. The financial settlement including invoicing (distribution and collection of congestion income and compensations) of allocated long-term transmission rights with TSOS.
5. The organisation of a fallback procedure pursuant to Articles 42 and 46 of the FCA regulation.
6. Enabling the return of long-term transmission rights pursuant to Article 43 of the FCA regulation.
7. Facilitating the transfer of long-term transmission rights pursuant to Article 44 of the FCA regulation.
8. Receiving registration data of the ITRS from registered participants and incorporating this information in the auction tool.
9. Sending of rights documents to the registered participants, the TSOS and the ITRS.
10. Providing all necessary information to the registered participants, ITRS and TSOS in due time.
11. Management of the suspension and termination of contractual relations between the SAP operator and the registered participants in accordance with the HAR.
12. The publication of relevant market information pursuant to Article 47 of the FCA regulation and Articles 11 and 12 of Commission regulation (EU) 543/2013.
13. Reporting of information pursuant to Commission implementing regulation (EU) no. 1348/2014 Article 8(2) and Article 8(6) of regulation (EU) no. 1227/2011.
14. Providing and operating interfaces for data exchange with market participants.
15. Reporting the relevant information based on legislation or upon the decision of TSOS and on behalf of TSOS.
16. Providing a single point of contact to market participants.
17. Training of TSOs' operators and the registered participants' users.
18. Customer relationship (answering the registered participants' questions regarding the allocation rules, the process, the IT system, invoicing/self-billing, centralizing customer expectations, forwarding them to the TSOS and storing them in a dedicated file gathering all customers' expectations).
19. Management of auction contestations.
20. Management of registered participants' claims and communication as well as coordination with the TSOS regarding the procedure and handling the claims concerned regarding other issues than response time.

As of 2020, SAP covers 71 bidding zone directional borders and provides services by use of a common IT system for more than 361 registered market participants.<sup>86</sup>

No.	Border	Auctions	Type
1	AT - CZ	Y, M	PTR
2	AT - DE	Y, M	FTR Options
3	AT - HU	Y, M	PTR
4	AT - IT	Y, M	PTR
5	AT - SI	Y, M	PTR
6	GB - NL	Y, Q, M, W	PTR
7	NL - GB	Y, Q, M, W	PTR
8	BE - FR	Y, M	FTR Options
9	BE - NL	Y, M	FTR Options
10	BG - GR	Y, M	PTR
11	BG - RO	Y, M	PTR
12	CZ - AT	Y, M	PTR
13	CZ - DE (50Hertz)	Y, M	PTR
14	CZ - DE (Tennet)	Y, M	PTR
15	CZ - SK	Y, M	PTR
16	CZ - PL	Y, M	PTR
17	D1 - D2	Y, M	FTR Options

<sup>86</sup> A detailed description of the common IT System e-cat can be found in the ENTSO-E Market Report 2019.

No.	Border	Auctions	Type
18	D1 – DE	Y, M	FTR Options
19	D2 – D1	Y, M	FTR Options
20	D2 – DE	Y, M	FTR Options
21	DE – AT	Y, M	FTR Options
22	(50Hertz) DE – CZ	Y, M	PTR
23	(Tennet) DE – CZ	Y, M	PTR
24	DE – D1	Y, M	FTR Options
25	DE – D2	Y, M	FTR Options
26	DE – FR	Y, M	FTR Options
27	DE – NL	Y, M	FTR Options
28	DK1 – NL	Y, M	FTR Options
29	EE – LV	Y, Q, M	FTR Options
30	ES – FR	Y, M	PTR
31	ES – PT	Y, Q, M	FTR Options
32	FR – BE	Y, M	FTR Options
33	FR – DE	Y, M	FTR Options
34	FR – ES	Y, M	PTR
35	FR – IT	Y, M	PTR
36	GB – IE	Y, Q, M	FTR Options
37	GB – NI	Y, Q, M	FTR Options
38	GR – BG	Y, M	PTR
39	GR – IT	Y, M	PTR
40	HR – HU	Y, M	PTR
41	HR – SI	Y, M	PTR
42	HU – AT	Y, M	PTR
43	HU – HR	Y, M	PTR
44	HU – RO	Y, M	PTR
45	HU – SK	Y, M	PTR
46	IE – GB	Y, Q, M	FTR Options
47	FR – GB	Y, Q, M, W	PTR
48	GB – FR	Y, Q, M, W	PTR
49	IT – AT	Y, M	PTR
50	IT – FR	Y, M	PTR
51	IT – GR	Y, M	PTR
52	IT – SI	Y, Q, M, W	PTR
53	NI – GB	Y, Q, M	FTR Options
54	NL – BE	Y, M	FTR Options
55	NL – DE	Y, M	FTR Options
56	NL – DK1	Y, M	FTR Options
57	BE – GB	Y, Q, M	PTR
58	GB – BE	Y, Q, M	PTR
59	PL – CZ	Y, M	PTR
60	PL – SK	Y, M	PTR
61	PT – ES	Y, Q, M	FTR Options
62	RO – BG	Y, M	PTR
63	RO – HU	Y, M	PTR
64	SI – AT	Y, M	PTR
65	SI – HR	Y, M	PTR
66	SI – IT	Y, M	PTR
67	SK – CZ	Y, M	PTR
68	SK – HU	Y, M	PTR
69	SK – PL	Y, M	PTR
70	PL – DE	Y, M	PTR
71	DE – PL	Y, M	PTR

Table 13 – Overview of borders served, and products offered at SAP (as of May 2020)

Between June 2019 and May 2020, GB – BE auctions have been performed. During this period, two identical incidents with the same visibility on the market occurred:

- **Problem:** Both incidents were caused by SAP due to the late entering of ATC in the initial monthly auctions. The original auctions were cancelled, and the new auctions were created before the start of the auctions.
- **Solution:** Two new auctions needed to be created by SAP. Due to a quick turnaround of the SAP operators, the auction timings remained unchanged.

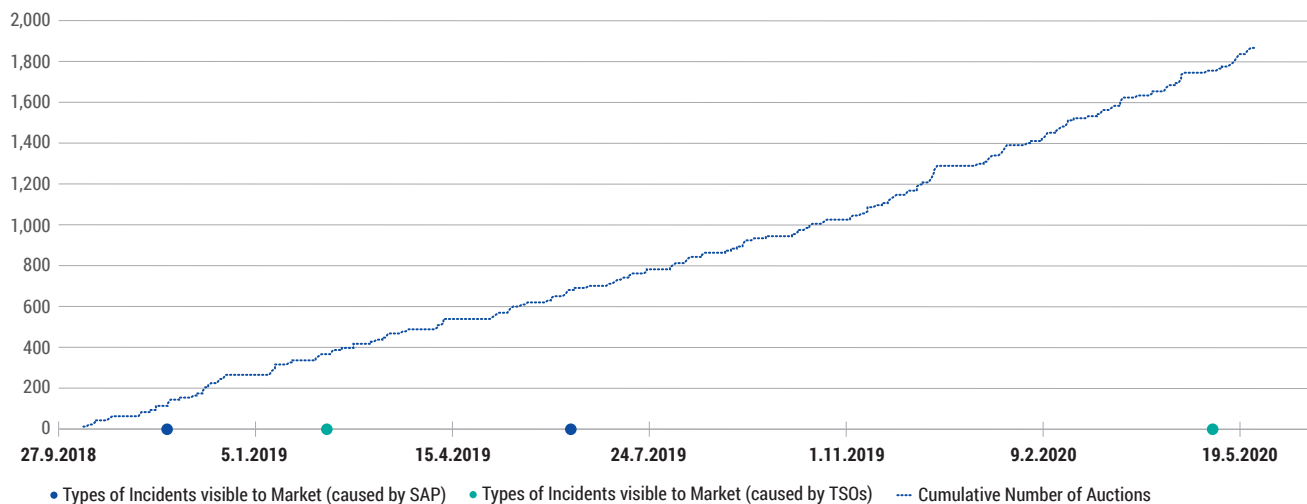


Figure 26 – Auctions and incidents of the single allocation platform (until the end of May 2020)

In Figure 26, the auctions (cumulative), as well as all visible incidents, are depicted daily. Of the 1,239 long-term auctions between June 2019 and May 2020, 99.7 %<sup>87</sup> were conducted without any incidents visible to market participants.

Currently, there are 23 detailed KPIs that are unified in three Meta-KPIs to monitor operations efficiently. Below these Meta-KPIs are introduced on a high-level basis:

### Fulfilling reporting obligations

Whether data to be reported was provided to the EMFIP and ACER platforms in line with Transparency and REMIT regulations and whether the data was correct.

### Operational effectiveness

#### SAP system availability

Following the SAP CA SLA, the auction system shall be available at least 99.2 % of the time per year, excluding planned maintenances. This shall also be measured by the availability of JAO infrastructure (internet connection). Forced outages or incorrect functioning of the Auction Tool impacting regular daily operation shall be resolved within four hours in 90 % of cases but no later than in eight hours.

#### Invoicing correctness

JAO performance is an indication of invoicing or self-billing processes. The indicator shows whether an invoice required correction.

#### Operational incidents

An indicator showing the number of incidents that might lead

to cancellation, postponement of an auction or contestation of auction results.

### Customer satisfaction

#### User satisfaction with JAO

General indicator of the happiness level of market participants with services provided by JAO, based on annual survey and score (1–5).

#### SAP's effectiveness in solving user's problems and requests

Statistics from JAO helpdesk on the number of requests or claims and time for solving them.

#### Website usability

The website is up to date and contains all published information (results, rules, methodologies, etc.).

### Customer interaction and satisfaction

Next to the operational KPIs, JAO has created a platform to gather the feedback and requests from users of the JAO eCAT system, related to IT interfaces and other services performed by the single allocation platform. The users' expertise and views are essential for the continuous improvement of the services provided by JAO. To organise discussions, JAO established the User's Group, which serves as a platform for relevant stakeholders.

The objectives of the User's Group are:

- To gather feedback and requests from system users.
- To create awareness of future evolutions of the system, provide information to stakeholders and receive constructive feedback.

87 Four out of 1,239 auctions had incidents visible to the market – although the capacity was still successfully allocated in all cases.

The User's Group will deal with the following matters:

– Provide advice to JAO on matters related to the IT interface and services provided by JAO.

– Provide a coordinated forum through which learning points are shared and could be used by JAO in the future.

Month	Fulfilling reporting Obligations	Operational Effectiveness	Customer Satisfaction	TOTAL	Quarterly Score
November 2018	8,50	9,00	7,77	8,42	7,92
December 2018	8,50	8,00	5,77	7,42	
January 2019	8,50	8,00	7,27	7,92	8,37
February 2019	8,50	10,00	8,77	9,09	
March 2019	8,50	10,00	5,77	8,09	
April 2019	8,50	10,00	8,27	8,92	8,15
May 2019	8,50	10,00	5,77	8,09	
June 2019	8,50	8,00	5,77	7,42	
July 2019	8,50	10,00	8,77	9,09	8,59
August 2019	8,50	8,00	8,27	8,26	
September 2019	8,50	9,50	7,27	8,42	
October 2019	8,50	10,00	7,27	8,59	8,81
November 2019	8,50	10,00	8,27	8,92	
December 2019	8,50	10,00	8,27	8,92	
January 2020	8,50	10,00	8,47	8,99	8,60
February 2020	8,50	10,00	7,47	8,66	
March 2020	8,50	10,00	5,97	8,16	

Table 14 – Overview operation Meta-KPIs of single allocation platform (as of the end of March 2020)

JAO may organise workshops on specific issues when needed or have bilateral contact or meetings with individual stakeholders. The User's Group will be informed about the timing and conclusions of these communications and meetings.

The User's Group ideally comprises representatives from key European stakeholder organisations interested in participating therein, in ensuring broad geographical coverage by the group.

At the last User's Group meeting, it was decided that the market data report does not provide the desired value. Further, no easy approach was found to present the relevant data as a one-pager, and users would rather appreciate news on changes in rules and procedures, a change of methodologies, HAR Annexes, etc. As a consequence, JAO has begun to make quarterly newsletters available as of Q1 2020.

## 5.3 Expenditures

This report provides a summary of TSOs common costs of establishing and amending as well as of operating the single allocation platform. In the figure below, the planned, as well as actual costs as of 2018, are depicted.<sup>88</sup>

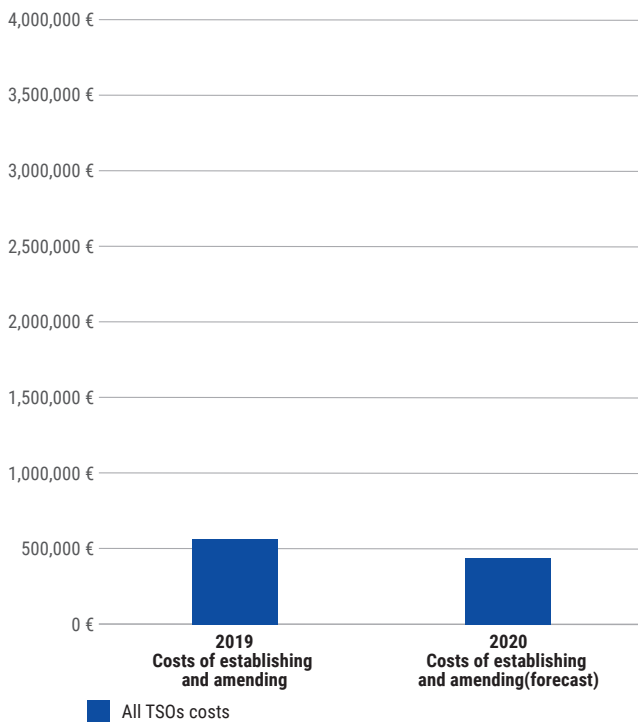


Figure 27 – Overview of the single allocation platform for establishing and amending costs

The reported establishment and development costs consist of annual depreciation and amortization of investments to establish and develop SAP on top of existing tools in JAO. The operational costs for SAP consist of annual depreciation and amortization of the tools and other assets used for LT auctions. Further, they consist of financial clearing and settlement of auction revenues (including bank fees) and operational support covering the entire LT allocation process, contact with market participants, service desk, risk management and other related services. Compared to SDAC/SIDC projects, the SAP costs cover the whole business chain for capacity allocation to market participants.

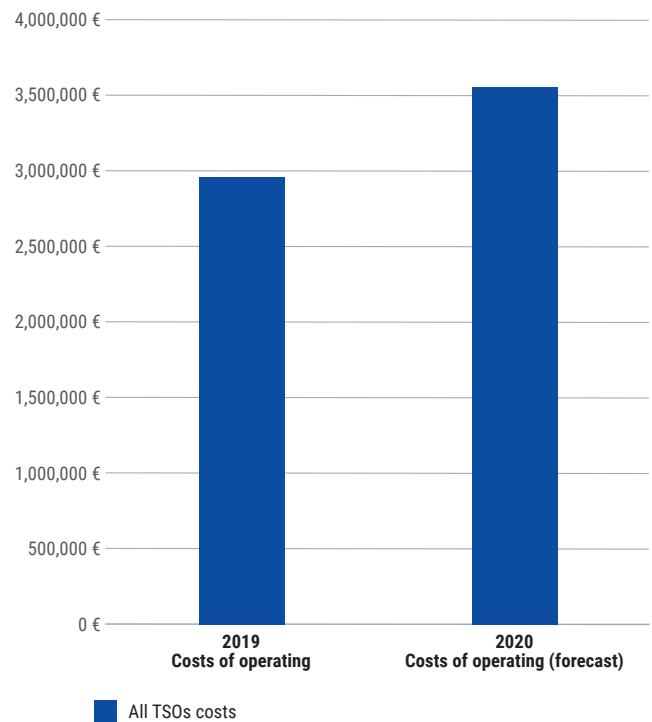


Figure 28 – Overview of the single allocation platform operating costs

The fee principles for the SAP are defined based on the SAP methodology, which is derived from the all-TSOs proposal for the establishment of the SAP in accordance with Article 49 and the cost-sharing methodology in accordance with Article 59 of the FCA regulation.

The SAP methodology is applicable to the costs of running the long-term auctions on the SAP borders only, and to the relevant SAP Tasks, as defined in Article 9 of the rules establishing the SAP as of October 2018 (i. e. the date of establishing the SAP).

<sup>88</sup> In line with the regulatory guidance costs for the coupling, projects are planned and shared between TSOs and NEMOs as of 14 February 2017.

## 5.4 Evolution

In line with the FCA regulation, all necessities resulting in SAP are fully implemented. However, there is still an effort to further improve SAP. Improvement ideas are both on the side of operations and market participants' options.

The key events that occurred for SAP in 2019 were the following:

- Eleclink joined the SAP Cooperation Agreement (SAP CA), thereby paying a full share of SAP establishment costs.
- The GB–NL border (BritNed) went live on 26 November 2019 with LTA for the following products: Y, Q, M, WND.
- IFA1 (GB–FR) went live on 1 December 2019 with LTA for the following products: Y, S, Q, M, WND.
- Cobra cable went live for LTA on 23 October 2019.
- The GB–BE border (NemoLink) went live with LTA on 6 May 2019 for the following products: Y, Q, M.

In the case of operations, there are mainly IT developments and procedural changes. The major improvement from the end of 2019 was the transition to digital sending of long-term capacity.

For market participants, there is a tendency to improve the flexibility of their hedging options while maintaining simplicity.

General improvements are then made in terms of websites, the helpdesk and communication to both market participants and TSOs.



# Glossary

<b>4M MC</b>	4M Market Coupling between the Czech Republic, Slovakia, Hungary, Romania	<b>CH</b>	Switzerland
<b>50Hertz</b>	50Hertz Transmission GmbH (1 out of 4 German TSO)	<b>CID</b>	Congestion income distribution
<b>ACER</b>	Agency for the Cooperation of Energy Regulators	<b>CEE</b>	Central Eastern Europe
<b>aFRR</b>	Frequency restoration reserves with automatic activation	<b>CMM</b>	Capacity management module
<b>AOF</b>	Activation Optimisation Function	<b>CMOL</b>	Common merit order list
<b>AL</b>	Albania	<b>CNTC</b>	Coordinated net transmission capacity
<b>ANIDOA</b>	All NEMOs Intraday Operational Agreement	<b>CWE</b>	Central Western Europe
<b>ANDOA</b>	All NEMOs Day-Ahead Operational Agreement	<b>CZ</b>	Czech Republic
<b>APG</b>	Austrian Power Grid AG	<b>CZC</b>	Cross-zonal capacity
<b>Amprion</b>	Amprion GmbH (1 out of 4 German TSO)	<b>DAOA</b>	Day-ahead operational agreement
<b>AST</b>	AS Augstsprieguma tikls (Latvian TSO)	<b>DC</b>	Direct current
<b>AT</b>	Austria	<b>DE</b>	Germany
<b>ATC</b>	Available transfer capability	<b>DK</b>	Denmark
<b>BA</b>	Bosnia and Herzegovina	<b>EE</b>	Estonia
<b>BE</b>	Belgium	<b>EB</b>	Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing
<b>BEPP</b>	Balancing Energy Pricing Periods	<b>Elia</b>	Elia System Operator SA
<b>BG</b>	Bulgaria	<b>ESO</b>	Electroenergien Sistemien Operator EAD
<b>BRP</b>	Balance responsible party	<b>EMS</b>	Akcionarsko društvo Elektromreža Srbije
<b>BSP</b>	Balancing service provider	<b>ENTSO-E</b>	European Network of Transmission System Operators for Electricity
<b>CA</b>	Cooperation agreement	<b>ES</b>	Spain
<b>CACM</b>	Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management	<b>FAT</b>	Full activation time
<b>CCM</b>	Capacity calculation methodology	<b>FB</b>	Flow-based
<b>CCR</b>	Capacity calculation region	<b>FCA</b>	Forward capacity allocation
<b>CGES</b>	Crnogorski Elektroprenosni Sistem AD	<b>FCR</b>	Frequency containment reserve
<b>CGM</b>	Common grid model	<b>FI</b>	Finland
<b>CGMM</b>	Common grid model methodology	<b>FTR</b>	Financial transmission right
		<b>FR</b>	France
		<b>FRR</b>	Frequency restoration reserves
		<b>GB</b>	Great Britain



<b>GCT</b>	Gate closure time	<b>MEPSO</b>	Macedonian Transmission System Operator AD
<b>GOT</b>	Gate opening time	<b>mFRR</b>	Frequency restoration reserves with manual activation
<b>GR</b>	Greece	<b>MNA</b>	Multiple NEMOs arrangement
<b>HAR</b>	Harmonised allocation rules	<b>MRC</b>	Multi-regional coupling
<b>HOPS</b>	Croatian Transmission System Operator Ltd.	<b>MTU</b>	Market time unit
<b>HR</b>	Croatia	<b>NEMO</b>	Nominated electricity market operator or power exchange
<b>HU</b>	Hungary	<b>NDA</b>	Non-disclosure agreement
<b>HVDC</b>	High voltage direct current	<b>NL</b>	Netherlands
<b>IDOA</b>	Intraday operational agreement	<b>NO</b>	Norway
<b>IDSC</b>	Intraday steering committee	<b>NOS BiH</b>	Nezavisni Operator Sustava u Bosni i Hercegovini
<b>IFA</b>	Interconnexion France-Angleterre	<b>NRA</b>	National regulatory authority
<b>IGCC</b>	International grid control cooperation	<b>OPSCOM</b>	Operational committee
<b>IE</b>	Ireland	<b>OST</b>	OST sh.a – Albanian Transmission System Operator
<b>IGM</b>	Individual grid model	<b>PCR</b>	Price coupling of regions
<b>IN</b>	Imbalance netting	<b>PICASSO</b>	Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation
<b>IPTO</b>	Independent Power Transmission Operator S.A.	<b>PL</b>	Poland
<b>IT</b>	Italy	<b>PMB</b>	PCR matcher and broker IT system
<b>JAO</b>	Joint allocation office	<b>PSE</b>	Polskie Sieci Elektroenergetyczne
<b>KPI</b>	Key performance indicator	<b>PT</b>	Portugal
<b>LIP</b>	Local implementation project	<b>PTR</b>	Physical transmission right
<b>LFC area</b>	Load-frequency control area	<b>RA</b>	Regulatory authorities
<b>LT</b>	Long-term	<b>REE</b>	Red Eléctrica de España S.A.U.
<b>LTTR</b>	Long-term transmission rights	<b>REN</b>	Rede Eléctrica Nacional, S.A.
<b>LU</b>	Luxembourg	<b>RO</b>	Romania
<b>MC</b>	Market coupling	<b>RS</b>	Serbia
<b>MARI</b>	Manually activated reserves initiative	<b>RR</b>	Replacement reserves
<b>MAVIR</b>	Magyar Villamosenergia-ipari Átviteli Rendszerirányító Zártkörűen Működő Részvénytársaság	<b>RTE</b>	Réseau de Transport d'Electricité
<b>MCO</b>	Market coupling operator		
<b>ME</b>	Montenegro		

<b>SAFA</b>	Synchronous area framework agreement	<b>Swissgrid</b>	Swissgrid AG (Swiss TSO)
<b>SA</b>	Synchronous areas	<b>TCDA</b>	TSO Cooperation Operational Agreement
<b>SAP</b>	Single allocation platform	<b>TCID</b>	TSO Cooperation Agreement for Single Intraday Coupling
<b>SAP CA</b>	Single allocation platform cooperation agreement	<b>TCOA</b>	TSO Cooperation Agreement for Day-ahead Coupling
<b>SDAC</b>	Single day-ahead coupling	<b>TenneT DE</b>	TenneT TSO GmbH (1 out of 4 German TSO)
<b>SE</b>	Sweden	<b>Terna</b>	Rete Elettrica Nazionale SpA (Italian TSO)
<b>SEPS</b>	Slovenská elektrizačná prenosová sústava, a.s. (Slovakian TSO)	<b>Transelectrica</b>	National Power Grid Company Transelectrica S.A. (Romanian TSO)
<b>SI</b>	Slovenia	<b>TransnetBW</b>	TransnetBW GmbH (1 out of 4 German TSO)
<b>SIDC</b>	Single intraday coupling	<b>TERRE</b>	Trans-European Restoration Reserves Exchange
<b>SEE</b>	South-East Europe	<b>TSO</b>	Transmission system operator
<b>SK</b>	Slovakia	<b>XBID</b>	Cross-border intraday project
<b>Statnett</b>	Statnett SF (Norway TSO)		
<b>SM</b>	Shipping module		
<b>SOB</b>	Shared order book		
<b>SONI</b>	System Operator for Northern Ireland Ltd.		
<b>SWE</b>	South-Western Europe		

The terms used in this document have the meaning of the definitions included in Article 2 of the CACM, FCA and EB regulations.

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