ENTSO-E
MARKET REPORT
2019

European Network of
Transmission System Operators
for Electricity

entsoe

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EDITORIAL

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

At ENTSO-E, we strive to establish the internal energy market and ensure its functioning. With our work, we support the ambitious European energy and climate targets.

This report combines three spheres of action: single day-ahead, single intraday coupling and forward capacity allocation.

Capacity allocation and congestion management harmonise how cross-border markets operate in Europe to increase competitiveness and the integration of renewables. These projects are thus the cornerstone of a European single market for electricity.

Implementation projects are well underway:

Single intraday coupling

- Single intraday coupling enables continuous cross-border trading across Europe.
- It is based on a common IT system with a shared order book, a single capacity management module, and a shipping module.
- The project includes 26 countries with 31 TSOs and 15 NEMOs.
- In total, more than 15 million trades have been executed since go-live in June 2018

Single day-ahead coupling

- Single day-ahead coupling uses a common price coupling algorithm to calculate electricity prices across Europe and to implicitly allocate auctions based on cross-border capacity.
- The project includes 27 countries with 33 TSOs and 16 NEMOs.
- The project is for the time being operationally split into the multi-regional coupling, covering most of Europe, and 4M market coupling covering the Czech Republic, Slovakia, Hungary, and Romania.

Forward capacity allocation

- Forward capacity allocation serves the allocation of long-term transmission rights across Europe.
- The task is organised by the Single Allocation Platform operated by the Joint Allocation Office, a cooperation of 28 TSOs from 22 different countries.
- In 2019, the project covers more than 1,000 auctions in 73 bidding zones with more than 300 market participants.

1 INTRODUCTION

ENTSO-E monitors the progress and potential problems with the implementation of the single day-ahead and intraday coupling in line with Article 82(2)(a) of the Commission Regulation (EU) 2015/1222 of 24 July 2015 (hereafter referred to as the "**CACM regulation**").

Similarly, Article 63(1)(a) of the Commission Regulation (EU) 2016/1719 of 26 September 2016, (hereafter referred to as the "**FCA regulation**"), requires ENTSO-E to monitor the progress and potential problems with the implementation of forward capacity allocation.

This ENTSO-E Market Report 2019 provides a full picture of the status quo of the projects single intraday and single day-ahead coupling (hereafter referred to as "**SIDC**"and "**SDAC**") and forward capacity allocation (hereafter referred to as "**FCA**"). In line with the ENTSO-E monitoring plan, this report covers the period from August 2018 to August 2019 and is delivered to ACER immediately after the reporting period.

As in its previous editions, this report begins by highlighting the transversal progress of the projects intraday and day-ahead coupling, depicting all TSO and all NEMO deliverables. Moreover, the status of deliverables of the forward capacity allocation project is described.

In addition, this report provides an account of the current state-of-play and the challenges in the implementation and recommendations for the further development of the single day-ahead and intraday coupling, in line with Article 31(3)(h) of the CACM regulation, and the forward capacity allocation, in line with Article 26(3)(f) of the FCA regulation. Moreover, indicators are provided for assessing and following the efficiency of the single day-ahead and intraday coupling in the longer term, in accordance with Article 31(3)(g) of the CACM regulation. Furthermore, this report covers reporting obligations stemming from Article 63(1)(d) of the FCA guideline, which requires elaboration on the effectiveness of the operation of the forward capacity allocation and the single allocation platform.

To fulfil the requirements above, ENTSO-E has committed, under its CACM monitoring plan[1] and FCA monitoring plan[2], to providing an annual joint report (hereafter referred to as the "**ENTSO-E Market Report 2019**")[3].

The ENTSO-E Market Report 2019 is organised into the following four chapters:

- Chapter 2 introduces the transversal progress of the single day-ahead and intraday coupling and the forward capacity allocation based on the various tasks assigned to all TSOs and all nominated electricity market operators (hereafter referred to as "**NEMOs**") by the capacity allocation and congestion management and forward capacity allocation regulations.
- Chapter 3 provides a detailed overview of the reporting period 2018/2019 and a glimpse of the next reporting period 2019/2020 in line with the relevant monitoring requirements of the CACM regulation.
- Chapter 4 provides this information for the relevant monitoring requirements of the FCA regulation.
- Chapter 5 contains a concise summary of the previous chapters.
- A glossary is included at the end of this report for convenience.

1 Prepared and submitted by ENTSO-E to ACER on 2 February 2016 in accordance with Article 82(3) of the CACM regulation (hereafter referred to as the "CACM monitoring plan"), and subsequently amended on 24 April 2018.

2 Prepared and submitted by ENTSO-E to ACER on 14 April 2017 in accordance with Article 63(2) of the FCA regulation (hereafter referred to as the "FCA monitoring plan"), and subsequently amended on 12 April 2018.

3 ENTSO-E has already published four reports monitoring the progress and potential problems with the implementation of the day-ahead and intraday coupling: 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 on the first report with a special emphasis on the six months following the initial report 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, covering the progress and potential problems in the implementation of the CACM and FCA regulations.


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2 TRANSVERSAL PROGRESS FOR SINGLE INTRADAY AND DAY-AHEAD COUPLING AND LONG-TERM CAPACITY ALLOCATION

2.1 Capacity allocation and congestion management regulation

The CACM regulation requires all TSOs and NEMOs to develop deliverables for the implementation of the single intraday and day-ahead coupling. The guideline also sets out the methods for calculating how much capacity market participants can use on cross-border lines without endangering system security. It also harmonises cross-border market operations in Europe to increase competitiveness and the integration of renewables. The CACM regulation is the cornerstone of a European single market for electricity.

For the implementation of single intraday coupling and day-ahead coupling, working groups developed different tasks and documents covering the necessary technical, legal, and administrative aspects. These documents are called proposals and need regulatory approval.

Table 1a shows the development steps from submitting an article to the final approval from national regulatory authorities or ACER, the Agency for the Cooperation of Energy Regulators. The rationale of this table is that a first submission happens due to a legal obligation, in this case by the CACM regulation. TSOs might not, but it is possible to, receive a request for amendments. A new amended proposal will follow that should be approved by all-NRAs or ACER. If a new proposal is requested after the approval, a subsequent proposal could be put forward. Table 1b on the next page shows the status of the CACM proposals.

Type	Proposal	CACM Art.	1st submission	1st request for amendment	1st submission after request for amendment	NRAs approval(s) or ACER decision	2nd request for amendment	2nd NRAs approval(s) or ACER decision
All-TSO (1)	Capacity calculation Regions	15(3)	✓	✓*	✓	✓	✓**	✓

* 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.

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

Type	Proposal	CACM Art.	1st submission	Request for amendment	1st submission after request for amendment	NRAs approval(s) or ACER decision	2nd request for amendment	2nd 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* 54**	✓* ✓**	Referred to ACER		✓* ✓**		
	Back-up methodology	36	✓	✓	✓	✓		
	Products accommodated	40 53(4)	✓* ✓**	✓* ✓**	✓* ✓**	✓* ✓**		

* Day-ahead and intraday proposals ** Day-ahead proposal *** Intraday proposal

Table 1b – Overview of All TSO and All NEMO CACM regulation deliverables (as of July 2019)

2.1.1 Main developments in all TSOs' deliverables

Request for Amendment Capacity Calculation Regions (Article 15(3) of the CACM regulation)

Following the amendment submitted in May 2018 by the TSOs, on 2 October 2018, all regulatory authorities have sent a letter to ACER, requesting that they adopt a decision on this "second proposal for amendment". ACER opened a public consultation[4] in February 2019, and they adopted a decision on the second proposal for amendment in March 2019.

Calculation of scheduled exchanges resulting from single intraday and day-ahead coupling (Articles 43 and 56 of the CACM regulation)

In September 2018, the TSOs that intended to calculate scheduled exchanges resulting from single day-ahead coupling received a request to amend the two proposals for intraday and day-ahead submitted in Q1 2018 (see table 1b for details) to all NRAs and ACER. Proposals amended according to NRA's request were submitted by December 2018. In February 2019, the relevant NRAs reached an agreement to approve the day-ahead proposal and to accept informal resubmission of the intraday proposal and the explanatory note complemented with cost coefficients as was done for the day-ahead scheduled exchanges proposal. Informal re-submission was done in February 2019 and approved in March 2019.

4 https://acer.europa.eu/Official_documents/Public_consultations/Pages/PC_2019_E_02.aspx

Intraday Capacity Pricing (Article 55(3) of the CACM regulation)

After the extension requested by the NRAs[5] in July 2018, the NRAs concluded to transfer the decision of this methodology to ACER. On 25 January 2019, ACER issued a decision (see table 1b for details). The chosen model introduces three pan-European implicit auctions to price cross-zonal capacity, which will complement the already existing single intraday coupling based on continuous trading. The implementation timeline and, where relevant, the conditions for the implementation of these three intraday auctions, will be developed in the framework of the amendment of the algorithm methodology. Based on this decision, all TSOs amended the intraday algorithm requirements to introduce the principle of the capacity pricing and submitted this new proposal to the NEMOs two months after ACER's decision (i.e. March 2019). All NEMOs are in the process of taking this change into account and will update the requirements in the amended algorithm methodology on that basis and submit it by August 2019.

Congestion Income Distribution (Article 73, CACM regulation)

This parallel amendment ensures that the wording and sharing keys used in the two proposals are in line.

Common Grid Model Methodology (Articles 16 and 17 CACM regulation)

All TSOs submitted the amended common grid model methodology (hereafter referred to as "**CGMM**") by 11 March 2017 to their NRAs. On 11 May 2017, the amended methodology pursuant to the CACM regulation was approved by all NRAs. The implementation of the methodology is ongoing.

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

Note that, while 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 building processes for different frames with respect to process deadlines and requirements for the definition of scenarios, the contents of the three methodologies are otherwise very similar. This last statement is also true for the other set of CGM-related methodologies, namely the generation and load data provision methodology (GLDPM) pursuant to the CACM regulation ("GLDPM-v1", which was approved by all NRAs without amendment) and the GLDPM pursuant to the FCA regulation ("GLDPM-v2").

Because of the high degree of overlap between the three versions of the CGMM and between the two versions of the GLDPM, it is envisaged to consolidate the methodologies into a single document each. The plans for consolidating the methodologies are described in the section pertaining to the FCA regulation.

2.1.2 Main developments in the NEMOs' deliverables

Plan for the market coupling operator function (Articles 7(3) of the CACM regulation)

NEMOs continue implementing the plan that was approved by all NRAs on 16 June 2017. In accordance with Article 7(3) of the CACM Regulation, the plan needed to be implemented by 16 June 2018. The implementation of the SIDC had reached its first step in June 2018 when the XBID platform went live. Some delays occurred on the implementation of the SDAC; the first step was reached on 31 March 2019, when all parties joined the agreement establishing the SDAC with two operations: Multi-Regional Price Coupling (hereafter referred to as "**MRC**") and 4M Market Coupling (hereafter referred to as "**4M MC**"). The technical capability of the Day Ahead algorithm to accommodate Multi-NEMO has been ready since March 2019. The first go-live of MNA arrangements concerned the CWE region, which went live in July 2019. The other MNA arrangements will go live according to the regional plans.

5 They declared the need to wait until ACER had decided on the intraday cross-zonal gate opening and gate closure times (see table 1b for details). On 23 February 2018, ACER decided on an extension of the period within which all NRAs shall reach an agreement on the all TSOs' proposal for CZIDCP by six months, until 28 August 2018.

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

The methodology covers the rules for development and maintenance of the price coupling algorithm for the day-ahead timeframe and the continuous trading matching algorithm for the intraday timeframe. It also covers the requirements that both algorithms must fulfil, including TSOs' requirements. ACER's decision (08/2018) introduced more enforceable provisions on NEMOs and also better reflected the cooperation of NEMOS with TSOs on decision-making processes. According to this decision, NEMOs, in cooperation with TSOs, should develop the algorithm change control methodology and the monitoring methodology to be submitted to all NRAs by August 2019. From June to July 2019, a joint all-NEMOs and all-TSOs public consultation[6] was run. The updated version of the algorithm methodology includes the change control methodology (in the main text of the proposal), the monitoring methodology for day-ahead and intraday (as an annex), and all the changes related to the introduction of the Intraday Auction (timeline in the main text, ID requirements as an annex, and products as a separate proposal).

Maximum and minimum prices (Articles 41 and 54 of the CACM regulation)

The implementation of the decisions is ongoing; new procedures are being implemented to trigger actions when the maximum and minimum prices are reached.

Back-up methodology (Article 36 of the CACM regulation)

All NRAs requested amendments to the NEMOs' back-up methodology, according to a joint decision by all NRAs on 24 July 2017 and a final individual NRA decision received on 30 August 2017. The NEMOs submitted their revised **proposal** on 13 November. All NRAs approved the proposal on 23 January 2018.

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

Based on the common work, TSOs and NEMOs of those Member States where more than one NEMO has been appointed have adopted the multiple NEMOs' arrangements proposal (hereafter referred to as the "**MNA Proposal**") that was submitted by each affected TSO to the relevant NRAs in accordance with Articles 45 and 57 of the CACM regulation.

Multi-NEMOs' proposals for cross-zonal capacity allocation and other necessary arrangements have to be developed by the TSOs in bidding zones where more than one NEMO offers trading services. In the event a NEMO is approved by the NRA to become a market operator in a bidding zone where a NEMO is already operating, the TSO must develop an MNA proposal. The MNA proposal covers both arrangements for single day-ahead coupling and single intraday coupling in the bidding zones for both pre-coupling and post-coupling arrangements. This will give more than one NEMO in one bidding zone non-discriminatory access to cross-zonal capacity in the day-ahead and intraday timeframes. This, in turn, ensures fair and non-discriminatory treatment of market participants, TSOs and NEMOs, and creates a level playing field for NEMOs, promoting effective competition in the generation, trading, and supply of electricity and simultaneously ensuring operational security and optimising the calculation and allocation of cross-zonal capacity. Moreover, these arrangements are focused on data exchange and financial arrangements to comply with the requirements of Articles 45 and 57 of the CACM regulation, respecting the need for a fair and orderly market and fair and orderly price formation and ensuring and enhancing the transparency and reliability of the information. The proposed MNA Proposals are flexible to more NEMOs in case more NEMOs wish to join at a later stage.

Technical solutions used in the MNA Proposal should ensure the maximum effectiveness of the process. To this end, data exchange between the TSOs and NEMOs should be executed using standard electronic formats complying with the standards specified by ENTSO-E for data exchange between market participants. The NEMOs will be responsible for acting as central counterparties (hereafter referred to as "**CCPs**") for clearing and settlement of the exchange of energy in accordance with Article 68(3) of the CACM regulation. Each NEMO will be connected to one CCP and establish the required contractual and financial arrangements. The CCP will clear the contracts resulting from the day-ahead and intraday trade with the market participants. The CCP will provide hub nominations to the TSOs. It is up to the CCPs to agree on how the clearing between them within a bidding zone should be managed. The leading principle should be that it should be done in as efficient and inexpensive a manner as possible.

The technical capability of the day-ahead algorithm to accommodate multi-NEMO has been ready since April 2019. The first go-live of an MNA arrangement concerned the CWE region, which went live in July 2019.[7] The other MNA arrangements will go live according to the regional plans.

6 https://consultations.entsoe.eu/markets/algorithm_methodologies/consult_view/

7 Next to EPEX and EMCO, the NEMO EXAA became operational in MRC (in CWE region) on trading day 2 July 2019 within the framework of the CWE MNA project.

2.1.3 Main developments on the joint work of the TSOs and NEMOs

Enduring governance

In response to the report from the Commission to the European Parliament and the Council[8], a letter was issued in October 2018 from the main single intraday and day-ahead coupling projects, namely the cross-border intraday steering committee and the multi-regional coupling steering committee. This letter stated that after months of discussion between NEMOs and TSOs on the new regulated governance to perform the couplings jointly, NEMOs and TSOs have reached a common understanding on which the so-called "enduring solution" for joint governance will be built. The solution will provide the most proper framework to address the most strategic and challenging topics. We expect the principles of the "enduring governance" to be approved by Q3 2019. During Q4 2019, the European Commission will approve the list of needs and/or amendments from each of the parties and the respective JSCs. As a result of this consensus, the starting point of this new governance is expected to occur at the end of 2019. In this fashion, the approval of the day-ahead and intraday Algorithm Methodologies by ACER on 30 July 2018 triggered that all NEMOs and all TSOs will have jointly developed a change control methodology and monitoring methodology by 1 August 2019.

Day-to-day management of the single day-ahead and intraday coupling (Article 10 of the CACM regulation)

All TSOs and all NEMOs had approved the overall structure of the single day-ahead and intraday market coupling governance at the end of 2018. The details are now being developed to have the provisions included in the agreements by the end of 2019. The go-live of this new structure is expected by Q3 2020.

2.1.4 Collaboration of TSOs and NEMOs with third parties: CACM global non-disclosure agreement

As described in the paragraph above, a non-disclosure agreement is in effect for the observership and non-disclosure agreement (hereafter referred to as "**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 entered into effect in February 2016 and fulfils CACM regulation obligations for the completion of the single day-ahead and intraday coupling.

The NDA has replaced individual NDAs from early implementation projects from before the CACM entered into force. These projects and the parties involved are as follows:

Price coupling of regions (hereafter referred to as "**PCR**")

- Cooperation amongst the following: Gestore dei Mercati Energetici S.p.A., OTE, a.s., EPEX Spot SE, APX Power B.V. and APX Commodities Ltd., Belpex NV, OMI-Polo Español, S.A, Operatorul Pietei de Energie Electrica si de Gaze Naturale, Towarowa Giełda Energii S.A., and Nord Pool AS[9] (hereafter referred to as "**PCR parties**").
- PCR parties collaborated for the technical assessment of a European day-ahead price coupling of regions and in the development, implementation, and operation of a coordinated matching function based on the decentralised coordinated calculation of market results, taking into account the available interconnection capacity.

North-West Europe (hereafter referred to as "**NWE**")

- Cooperation amongst the following: Affärsverket Svenska Kraftnät, Amprion GmbH, BritNed Development Limited, Creos Luxembourg S.A., Elia System Operator SA/NV, Energinet Elsystemansvar A/S, National Grid Interconnectors LIMITED, RTE Réseau de Transport d'Electricité, Statnett SF, TenneT TSO B.V., TenneT TSO GmbH, Transnet BW GmbH, 50Hertz Transmission GmbH, APX BV, APX UK, BELPEX, EPEX SPOT, and Nord Pool AS[10] (hereafter referred to as "**NWE parties**").
- NWE parties cooperated to design, implement, and operate a day-ahead market coupling covering the Central Western European region, the Nordic-Baltic region, and Great Britain.

South-West Europe (hereafter referred to as "**SWE**")

- Cooperation amongst the following: RTE Réseau de Transport d'Electricité, Red Eléctrica de España, S.A.U., REN – Rede Eléctrica Nacional, S.A., EPEX SPOT SE, and OMI-Polo Español, S.A (hereafter referred to as "**SWE parties**").
- SWE parties cooperated to implement South-West Europe price coupling using the PCR solution.

8 Ref {SWD(2018) 376 final} from July 2018 (for more information, check the following link: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SWD:2018:0376:FIN:EN:PDF)

9 Currently under the name of European Market Coupling Operator AS

10 Currently under the name of European Market Coupling Operator AS

MRC Cooperation

- The cooperation started by when the NWE parties and the SWE parties entered into a day-ahead operational agreement (hereafter referred to as DAOA) to operate the multi-regional price coupling.

Italian Borders Working Table Cooperation

- Cooperation amongst the following: Austrian Power Grif AG, Croatian Transmission System Operator Ltd., ELES, d.o.o., sistemski operater prenosnega elektroenergetskega omrežja, Independent Power Transmission Operator S.A., RTE Réseau de Transport d'Electricité, Swissgrid AG, TERNA - Rete Elettrica Nazionale S.p.A., BSP Energy Exchange LLC, Croatian Power Exchange Ltd., EPEX SPOT SE, EXAA Abwicklungsstelle für Energieprodukte AG, Gestore dei Mercati Energetici S.p.A., and LAGIE, Operator of Electricity Market S.A (hereafter referred to as "**IBWT parties**").

- The cooperation was started for the implementation phase of the Italian borders.

XBID cooperation

- Cooperation amongst the following: Gestore dei Mercati Energetici S.p.A, EPEX Spot SE, APX Power B.V. ad APX Commodities Ltd., Belpex NV, OMI-Polo Español, S.A, Nord Pool AS[11], Affärsverket Svenska Kraftnät, Amprion GmbH, Austrian Power Grid AG, Britned Development Limited, Creos Luxembourg S.A., Energinet Elsystemansvar A/S, Elia System Operator SA/NV, Fingrid OYJ, National Grid Interconnectors Limited, RTE Réseau de Transport d'Electricité, Statnett SF, Swissgrid AG, TenneT TSO B.V., TenneT TSO GmbH, and 50Hertz Transmission GmbH (hereafter referred to as "**XBID Parties**")

- XBID parties cooperated for the design, development, implementation, and operation of the European continuous implicit cross-border intraday market trading IT solution and the management of the continuous implicit intraday market.

In the reporting period, requests for adherence to the CACM Global NDA have been received from IFA-2[12], a future interconnector between France and the United Kingdom, which is in the certification process as TSO. Moreover, North Sea Link[13], a future interconnector between Norway and the United Kingdom, is in the certification process as TSO. Besides these two, another request came from Kraftnät Åland, a certified TSO in Finland that operated in the Åland islands. This adherence, along with the assignment of rights between LAGIE and Hellenic Energy Exchange S.A (HEnEX), was approved on 13 February 2019 by all TSOs with a qualified majority vote. The next steps are to complete the signing process of the adherence form by the requesting parties and to inform all parties of the CACM Global NDA.

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 Sistemen Operator EAD	23 February 2016
Swissgrid AG	23 February 2016
Cyprus TSO	23 February 2016

11 Currently under the name of European Market Coupling Operator AS

12 Signed on 26 June 2019

13 Signed on 26 June 2019

Name of party	Member since
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
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 Naţională 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 Giełda Energii S.A.	23 February 2016
Operatorul Pieţei de Energie Electrică şi 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 te Transmetimit – OST 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

* 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 July 2019)

The procedure to become a party to this CACM Global NDA is as defined below:

ENTSO-E is a signatory party of the NDA. Additionally, ENTSO-E facilitates the adherence process of new requesting parties. A new requesting party needs to send a request for adherence to ENTSO-E, and the request needs to be approved by all signatory parties of the CACM Global NDA. Practically speaking, the process is as follows:

- The requesting party sends a letter of request for adherence to ENTSO-E.
- ENTSO-E informs the signatory parties about the request and asks them to provide their consent.
- As the agreement is concluded between TSOs and NEMOs, and in order to collect their consent more efficiently, the TSOs use the all-TSOs meetings to collect TSO consent and NEMOs use the NEMOs committee, respectively.
- After collecting all consents, the requesting party needs to sign the adherence form.
- Following the signing of the adherence form, as of the signing date, the new party has access to all information covered by the NDA.

2.2 Forward capacity allocation regulation

The FCA regulation, which entered into force on 17 October 2016, sets out rules for long-term transmission rights (hereafter referred to as "**LTTRs**") and the way holders of transmission rights are compensated in case their right is curtailed. The overarching goals are to promote the development of liquid and competitive forward markets in a coordinated way across Europe and to enable market participants to hedge their risk associated with cross-border electricity trading. To deliver these objectives, several steps are required. They are implemented as described in this section.

Table 3 presents the development steps from submitting an article to the final approval from national regulatory authorities or ACER, the Agency for the Cooperation of Energy Regulators. The rationale of this table is that a first submission happens due to a legal obligation, in this case by the forward capacity allocation regulation. It is not always expected – but possible – to receive a request for amendments. A new amended proposal will follow, which should be approved by all-NRAs or ACER. If a new proposal is requested after the approval, a subsequent proposal could be put forward. Table 3 shows the status of the FCA proposals.

Proposal	FCA article(s)	First submission	Request for amendments	Submission after request for amendment	NRAs approval or ACER decision	Subsequent amendment proposal
Harmonised Allocation Rules	51	✓			✓*	✓**
Single Allocation Platform	49 59	✓			✓	
Congestion Income Distribution	57	✓	✓	✓		
Common Grid Model	17*** 18****	✓ ✓	– ✓	– ✓	✓ ✓	

* On 17 August 2017, all NRAs referred to ACER to adopt a decision. ** Ongoing

*** 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 July 2019)

HAR – Harmonised Allocation Rules (Article 51 of the FCA regulation)

According to Article 68(5) of the forward capacity allocation regulation, the allocation rules and the border or region specific annexes included will be periodically reviewed by the allocation platform and the relevant TSOs at least every two years, involving the registered participants. This biennial review is without prejudice of the competence of National Regulatory Authorities to request at any time amendments of the allocation rules, and the annexes included, in accordance with the existing legislation. A public consultation was run for the biennial review[14] from 20 May to 20 June 2019.

14 https://consultations.entsoe.eu/markets/har-review-main-body-and-annexes/

Single Allocation Platform and the respective cost-sharing methodology (Articles 49 and 59 of the FCA regulation)

On 1 October 2018, the Joint Allocation Office (hereafter referred to as "**JAO**") became the single allocation platform (hereafter referred to as "**SAP**") for all European TSOs that operate in accordance with EU legislation, since it was able to implement and fulfil all regulatory obligations and requirements.

Congestion Income Distribution (Article 57 of the FCA regulation)

All NRAs had six months to reach an agreement, and in January 2019, a request for amendment was received. The proposal, amended in line with remarks from the NRAs, was submitted by 15 March 2019. Since this proposal relies on the principles and wording of the CACM proposal, NRAs agreed on a common decision on the FCA CID proposal on 22 May 2019.

Common Grid Model Methodology (Articles 17 and 18 of the FCA regulation)

The common grid model methodology describes the legally binding rules for the preparation of individual grid models and their merging into the common grid model. As noted above, three European regulations, namely the CACM regulation, the FCA regulation, and Commission Regulation (EU) 2017/1485, establishing a guideline on electricity transmission system operation each require the preparation of the CGMM. At the explicit request of all NRAs, a separate version of the CGMM was prepared for each of the three regulations. The three versions of the CGMM are referred to as CGMM-v1-plus (for the CACM regulation), CGMM-v2-plus (for the FCA regulation), and CGMM-v3 (for the system operation regulation). In addition to the CGMM, the regulations as mentioned above require all TSOs to develop a generation and load data provision methodology (hereafter referred to as "**GLDPM**") that sets out rules ensuring that all TSOs have the data they require to build their individual grid models. There are two versions of the GLDPM, the GLDPM-v1 (pursuant to the CACM regulation) and the GLDPM-v2 (pursuant to the FCA regulation). There is no GLDPM-v3, i.e. no GLDPM pursuant to the system operation regulation, because the regulation itself contains dedicated rules on data exchange in its Articles 40 to 53.

The CGMM-v2 was initially submitted to all NRAs for approval in July 2017. NRAs requested an amendment, and the amended methodology – referred to as "CGMM-v2-plus" – was resubmitted and approved by all NRAs in July 2018. All NRAs approved the 'GLDPM-v2' in December 2017.

Even though the System Operation regulation does not – unlike the CACM regulation and the FCA regulation – primarily aim at setting rules with respect to the calculation and allocation of cross-zonal capacity for different time frames, 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 NRAs in September 2018.

The three versions of the common grid model methodology and the two versions of the generation and load data provision methodology are jointly referred to as the CGM-related methodologies. As was noted above, despite the three CGMMs and the two GLDPMs covering different time frames, the similarities between the documents are such that TSOs aim for the consolidation of the three (two) methodologies into a single document each. These consolidated methodologies will not differ in contents from the three (two) versions already approved but will nonetheless be submitted for regulatory approval. Subject to agreement by NRAs, at the end of the consolidation process, there will be a single, legally binding CGMM and GLDPM. This should make it much easier for anyone involved in the CGM process to work with an authoritative version of the methodologies that provides the detailed legal framework governing the implementation of the more general requirements set out in the Network Codes (i.e. the three regulations above).

In parallel with the consolidation effort, TSOs will prepare rules for the preparation of the week-ahead common grid model pursuant to Article 69 of the system operation 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 NRAs. As the consolidation of the CGM-related methodologies is not required by law and is undertaken at the initiative of TSOs, there is no legal deadline for the submission of the drafts of the consolidated documents. TSOs are, however, keeping stakeholders abreast of developments in this respect via the European stakeholder committees and, eventually, will also seek comments on the consolidated methodologies by way of public consultation.

3 SINGLE INTRADAY AND SINGLE DAY-AHEAD COUPLING

3.1 Single intraday coupling[15]

The pan-European single intraday coupling (hereafter referred to as "**SIDC**") serves, at the time of this report, 26 countries. In total, 31 TSOs and 15 NEMOs cooperate under the agreement aimed at governing the single intraday coupling, namely the intraday operational agreement (hereafter referred to as "**IDOA**").

Single intraday coupling 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 bids and orders from market participants in one bidding zone. Bids and 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.

3.1.1 Governance

The intraday operational agreement governs the pan-European single intraday coupling. This agreement rules the cooperation of TSOs and NEMOs regarding the establishment, amendment, and operation of the coupling. It was agreed by all TSOs and NEMOs of the EU Member States plus Norway but excluding Slovakian parties[16].

The signatory parties of the IDOA are listed below:

TSOs

Affärsverket Svenska Kraftnät, Amprion GmbH, Augstsprieguma tīkls, Austrian Power Grid AG, Britned Development Limited, National Power Grid Company Transelectrica S.A., 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 Elsystemansvar A/S, EirGrid plc, Fingrid OYJ, Independent Power Transmission Operator S.A, Litgrid AB, Mavir Ltd., National Grid Interconnectors 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, SONI Limited, 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, EXAA Abwicklungsstelle für Energieprodukte AG, Gestore dei Mercati Energetici S.p.A, Hellenic Energy Exchange S.A., HUPX Hungarian Power Exchange Company Limited by Shares, Independent Bulgarian Energy Exchange, OMI, POLO ESPAÑOL S.A., Operator of Electricity Market S.A., Operatorul Pieţei de Energie Electrică şi de Gaze Naturale S.A., OTE a.s., SONI Limited, and Towarowa Giełda Energii SA.

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. The complementary regional intraday auctions, as referred to in Article 63 of the CACM regulation and the post-coupling processes, including rights and obligations of CCPs, are outside the scope of the intraday operational agreement and are outlined in local arrangements.

15 As of June 2019, ENTSO-E provides a dedicated landing website on which press releases concerning SIDC will be published (URL:https://www.entsoe.eu/network_codes/cacm/implementation/sidc/).

16 SEPS in its role as the Slovak TSO is actively involved in all activities that, in particular, contribute to the establishment of SIDC, e. g. development of respective regional and pan-European methodologies and implementation of enduring governance structures. In this context, SEPS evaluates the compliance of the currently implemented XBID solution and "LIP – approach" with the target SIDC according to the CACM regulation, which will be based on regional coordinated capacity calculation currently defined by ACER Decision 02/2019 on Day-ahead and Intraday Capacity Calculation Methodology in CORE CCR. In parallel, the Slovak TSO and NEMO seek assurance from competent authorities so that the XBID project in its current setup reflects requirements of the target solution and, therefore, participation in the project would ensure the fulfilment of CACM obligations.

Figure 1 – Countries included in the Single Intraday Coupling (as of July 2019)[17]

17 Integration of Swiss borders is not going to be possible since the intergovernmental agreement on electricity cooperation had not yet been reached by the end of 2016 [CACM Article 1(4) and (5)]. In consequence, Swissgrid left the project in January 2017.

The agreement was amended in early 2019 and re-signed by all parties for entering into force as of 1 February 2019. The main reason for the amendment was the need to update the provision relating to the shipping module, which is linked to the expiration of the so-called interim period for shipping. The new version provides for enduring rules regarding the shipping module. In addition to several minor changes, the quorum on voting members was adjusted in order to reflect the initial lesson learnt in single intraday coupling. The quorum was changed from 3/4 to 2/3, and an e-mail approval process using deemed acceptance was introduced; this required adoption of exhibit 10 of the rules of internal order.

A TSOs only agreement complements the contractual framework the TSOs cooperation agreement for intraday coupling (hereafter referred to as the "**TCID**")[18], a NEMO only agreement, the all-NEMOs intraday operational agreement (hereafter referred to as "**ANIDOA**"), and by local arrangements which 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.

The 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 an efficient transition from cross-border intraday to single intraday coupling and ensuring reliable operation of the future coupling. In 2020, the enduring governance will be introduced, which merges the organisation of single intraday and single day-ahead coupling SIDC and SDAC.

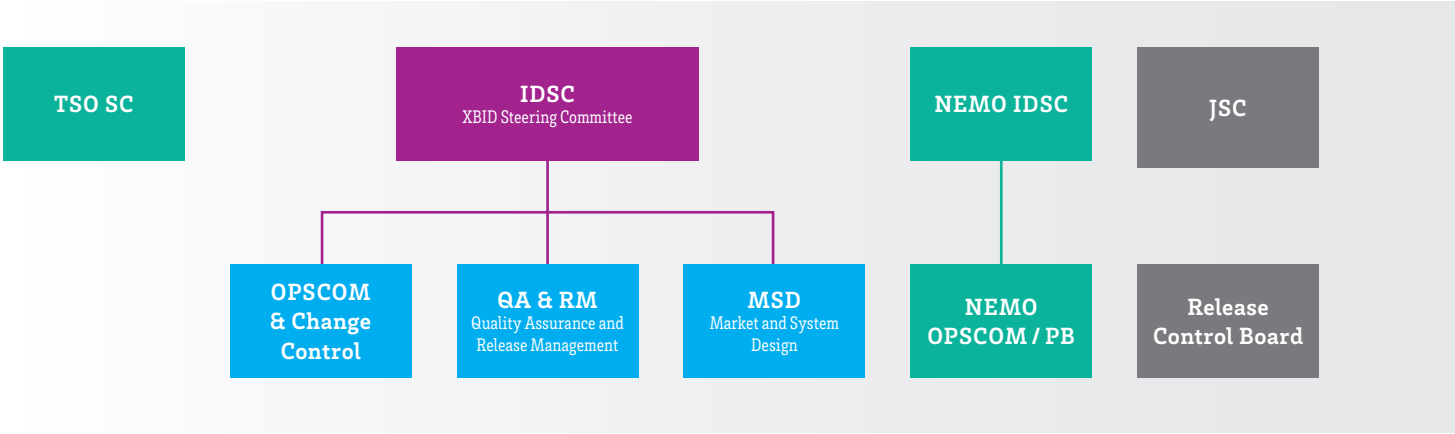

Figure 2 – SIDC interim governance (simplified)

The interim governance of single intraday coupling is based on a TSO-only, a NEMO-only, and a joint TSO-NEMO organisation. Moreover, a link with the key service provider Deutsche Börse AG via the NEMOs is included for the sake of overall transparency, as shown in the grey boxes in figure 2.

Decision-making

In the joint TSO-NEMO organisation, decisions are taken by all IDOA signatory parties at the intraday steering committee. Input for decision making is mainly provided by the operations committee OPSCOM on short-term operational matters (e.g. on daily operational measures), by the working group Quality Assurance and Release Management (hereafter referred to as "**QA&RM**") on medium-term evolutions (e.g. on the status of new release testing and deployment), and by the working group Market and by the working group System Design (hereafter referred to as "**MSD**") on longer-term evolutions (e.g. on future operational and/or legal requirements such as cross-zonal intraday pricing). Moreover, several expert bodies are active in single intraday coupling to ensure its long-term efficiency.

18 To align the quorum for voting members under the TCID (3/4) with the new quorum for TSO voting members under the amended IDOA (2/3), an amendment to the TCID was agreed. Besides this point, the amendment was used to implement a few other practicalities, like the process of updating contact and information details and allowing updating of TCID appendices by Steering Committee decisions, rendering hard contract amendments obsolete. The first amendment TCID entered retroactive to 1 May 2019 into force.

3.1.2 Operations

Single intraday coupling has been operational in 14 countries since 12 June, with first deliveries on 13 June 2018.[19] As of July 2019, only minor short-term incidents have occurred.[20] In total, more than 16 million trades have been executed within the first year of operation.[21]

Cross-border intraday is based on a common IT system with one shared order book ("SOB"), a capacity management module ("CMM"), and a shipping module ("SM")[22]. This means that orders entered by market participants for continuous matching in one country can be matched by orders similarly submitted by market participants in any other country within the project's reach as long as transmission capacity is available. The intraday solution supports both explicit access to CMM (where requested by NRAs) and continuous implicit trading.[23]

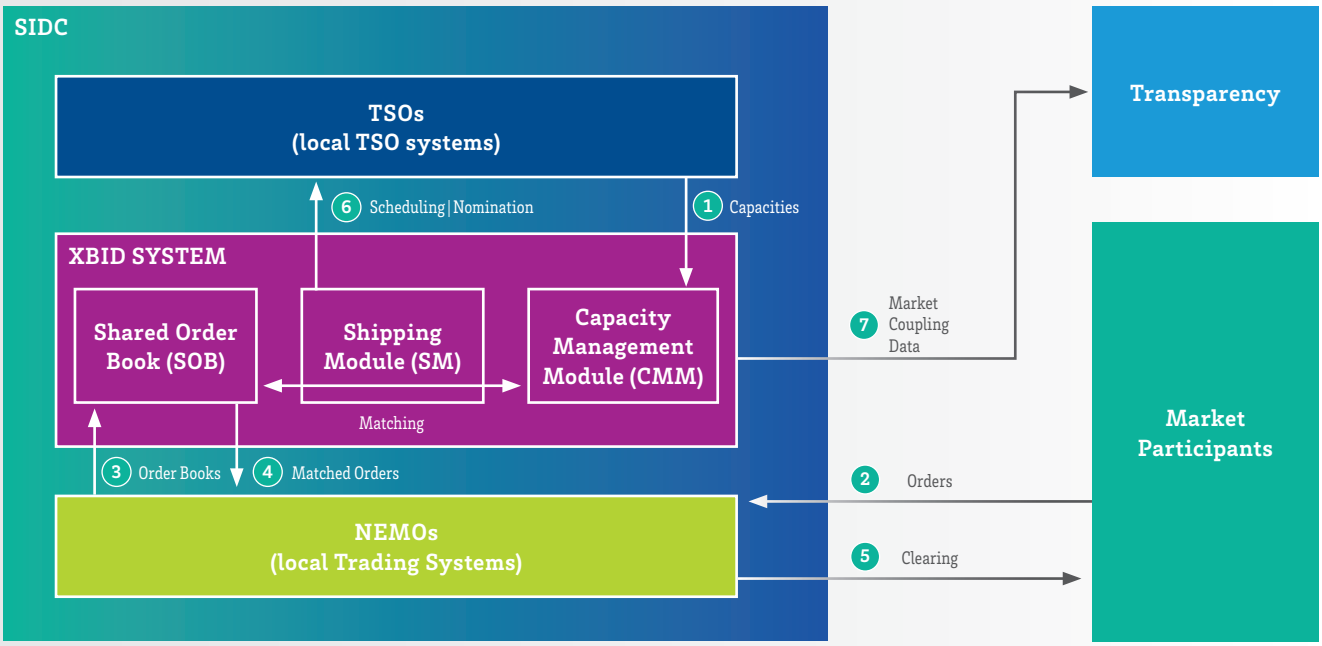

Figure 3 – SIDC technical high-level architecture (simplified)

19 **See also** http://www.elia.be/en/about-elia/newsroom/news/2018/20180614_Successful-launch-XBID-Solution-and-10-associated-Local-Implementation-Projects.

20 As a consequence of the robustness of the SIDC technical solution, it was unanimously decided by TSOs and NEMOs to remove the contracted "roll back" solutions (i.e. return to the situation before go-give of SIDC) as of September 2018.
See also https://en.energinet.dk/About-our-news/News/2018/09/06/XBID-Successful-Go-live-and-End-of-Rollback.

21 **See also** https://www.tennet.eu/news/detail/xbid-1st-anniversary-and-announcement-of-2nd-wave-go-live/

22 On Wednesday 15 May, the European Commission proposed to update the XBID shipping module, as a long-term solution, allowing for direct settlement between source and sink NEMO without "transit" shipping required.

23 Further information on the SIDC technical solution can be found at https://www.ceps.cz/assets/images/content/test/xbid/xbid.pdf.

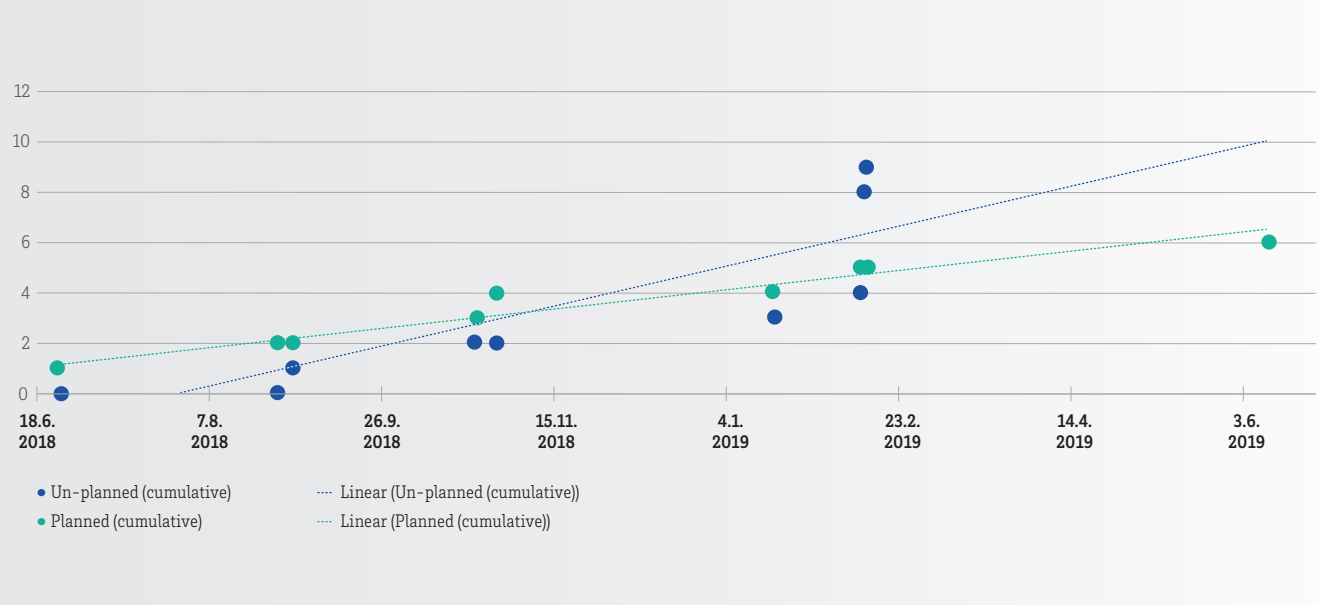

Figure 4 – Unplanned and planned non-availabilities of SIDC (as of June 18 2019)

The displayed technical solution has increased the liquidity of the newly coupled intraday continuous markets since orders submitted are matched with orders submitted in any other participating country or bidding zone. The capacity allocation and energy matching processes are executed simultaneously. As a consequence, market efficiency has increased to the benefit of all market participants.

In figure 4, all unplanned and planned non-availabilities of single intraday coupling since the go-live in June 2018 are presented. The unplanned non-availabilities, which were caused by a failure of data exchange between the modules SM, CMM, and/or SOB, range from 3 minutes to 5 hours and 56 minutes. The planned non-availabilities caused by the deployment of a "hot fix"[24] or new release[25] range from 1 hour to 5 hours and 30 minutes. In sum, the unplanned non-availabilities add up to 12h 2min, and 10h 5min in the case of planned non-availabilities (i.e. maintenance), in the first year of operation. All planned non-availabilities have been prepared well in advance by TSOs and NEMOs in collaboration with market participants.

24 From the go-live in June 2018 until end of June 2019, several "hot fixes" were put into operation, including the following: R1.4.10.1.1 deployment (fixing that exGTD is lost after order activation), R1.4.10.5 deployment (fixing that exGTD is lost after order activation and that the original trade is not saved in SM after trade cancellation/recall), and R1.5.9 deployment (implementing ACER bid-ask spread and volume-price data collectors and fixing other mistakes detected in reporting files).

25 At the end of October 2018, the major SIDC release 1.5 was deployed. This release includes, for example, several bug-fixes discovered in the prior/after go-live.

In addition to the monitoring of the availability of single intraday coupling, 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), and

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 single intraday coupling, additional measures to monitor and improve operations are regularly reviewed and, if needed, introduced via the OPSCOM.

The ACER decision of 24 April 2018[26] 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. A comprehensive summary can be found in table 4.

The overview on gate opening timings for borders in operation distinguishes between borders that provide cross-border capacities at 15:00 h, as requested by the ACER decision (i.e. "effective GOT"), 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.

26 ACER decision No. 04/2018
https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Individual%20decisions/ACER%20Decision%2004-2018%20on%20IDCZGTs.pdf

CCR	Bidding zone border	Effective GOT as of 1 January 2019	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
Core	DE – NL FR – BE BE – NL DE – FR DE – AT	15:00 CET D-1*	0	22:00 CET D-1**
Hansa	DE – DK1 DK1 – NL*** DE – DK2	15:00 CET D-1	0	18:00 CET D-1****
	NO2 - NL			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*****
SWE	FR – ES	22:00 CET D-1****	Under NRA's assessment	Under NRA's assessment
	ES – PT		Calculated cross-border capacity	N.A.

* Implementation date will be 30 days after NRAs' approval/ACER's decision on CCM. ** At the latest

*** Go-live of this border is foreseen for the beginning of September 2019. **** Approximate timing ***** Already in place today

Table 4 – Overview of Single Intraday Coupling gate opening (first go-live phase)

3.1.3 Evolution

The extension of single intraday coupling for those borders and/or bidding zones that are not yet coupled is organised via dedicated local implementation projects (hereafter referred to as "**LIPs**"). Local projects cover one or more borders and are organised by the relevant TSOs and NEMOs with tasks including the adaptation of local arrangements, such as procedures, shipping, and contracts or dedicated IT systems.

To go live in a structured manner, the single intraday coupling has jointly agreed on activities and deliverables as well as responsibilities assigned to the project bodies and local implementation projects. These include the following:

- go-live checklist and script
- launch strategy and planning (under the assumption that all parties of a local implementation project go live at the same time, i.e. a big bang approach is taken)
- operational organisation (IC, OPSCOM, etc.)
- intraday operational agreement and local agreements
- operational training
- go-live readiness monitoring
- NEMO members testing
- central communication to market participants on go-live status
- alignment of decentralised communications with local projects, etc.

A depiction of the local projects that aim to go live in the second wave (i.e. Q4/2019) and established projects or borders to be coupled in the third wave is provided in figure 5.

The key objectives of the second wave are as follows:

1. to further integrate the member states to achieve the single integrated intra-day market,
2. to increase the liquidity of intraday volumes in single markets, and
3. to improve intraday trading opportunities across Europe.

Local implementation projects 15 and 16 aim to go live in the course of the second wave of single intraday coupling. To do so, release two of the SIDC technical solution needs to be deployed. This release, amongst others, will ensure an efficient "hand-over" between monopolistic and multi-NEMO bidding zones.

Local implementation project 15

- LIP 15 covers the borders AT-CZ, AT-HU, AT-SI, DE-CZ, DE-PL, CZ-PL, HR-HU, HU-RO, RO-BG, and SI-HR.[27]
- The parties to this LIP are the TSOs and NEMOs.
- TSOs: 50Hertz Transmission GmbH, TenneT TSO GmbH, Austrian Power Grid AG, ČEPS a.s., ELES Ltd., Electricity Transmission System Operator, Croatian Transmission System Operator Ltd., Mavir Ltd., Polskie Sieci Elektroenergetyczne S.A., Electricity System Operator EAD, and National Power Grid Company Transelectrica S.A.
- NEMOs: BSP Energy Exchange LLC, Croatian Power Exchange Ltd., EPEX Spot SE, European Market Coupling Operator AS, Towarowa Giełda Energii S.A., OTE a.s., HUPX Hungarian Power Exchange Company Limited by Shares, OPCOM S.A., and Independent Bulgarian Energy Exchange.[28]

Local implementation project 16

- LIP 16 covers the borders LT-PL and SE4-PL.
- TSOs: Litgrid AB, Affärsverket Svenska Kraftnät, and Polskie Sieci Elektroenergetyczne S.A.
- NEMOs: European Market Coupling Operator AS, Towarowa Giełda Energii S.A., and EPEX Spot SE.

The following established local implementation projects or borders plan to go live in the third wave of SIDC.

Local implementation project 14

- LIP 14 covers the following borders: AT-IT, IT-FR, IT-SI, and IT-GR
- TSOs: Terna - Rete Elettrica Nazionale S.p.A., Austrian Power Grid AG, RTE Réseau de Transport d'Electricité, ELES, Ltd., Electricity Transmission System Operator, and Independent Power Transmission Operator S.A.
- NEMOs: BSP Energy Exchange LLC, EPEX Spot SE, EXAA Abwicklungsstelle für Energieprodukte AG, Gestore dei Mercati Energetici S.p.A., Hellenic Energy Exchange S.A., and European Market Coupling Operator AS.
- The expected go-live is included in the third wave of the cross-border intraday project (as cited in 3.1.3 of this report). Among the main achievements reached so far in this project, it is worth mentioning the finalisa-

27 The TSO and NEMO of Slovakia are not part of this LIP. The borders AT-SI, DE-CZ, CZ-PL, and RO-BG were added to LIP 15 in August 2018. HR-HU border adherence in August 2017 and SI-HR border adherence in November 2017. DE-CZ was in the initial scope.

28 EXAA is only an observer to this LIP.

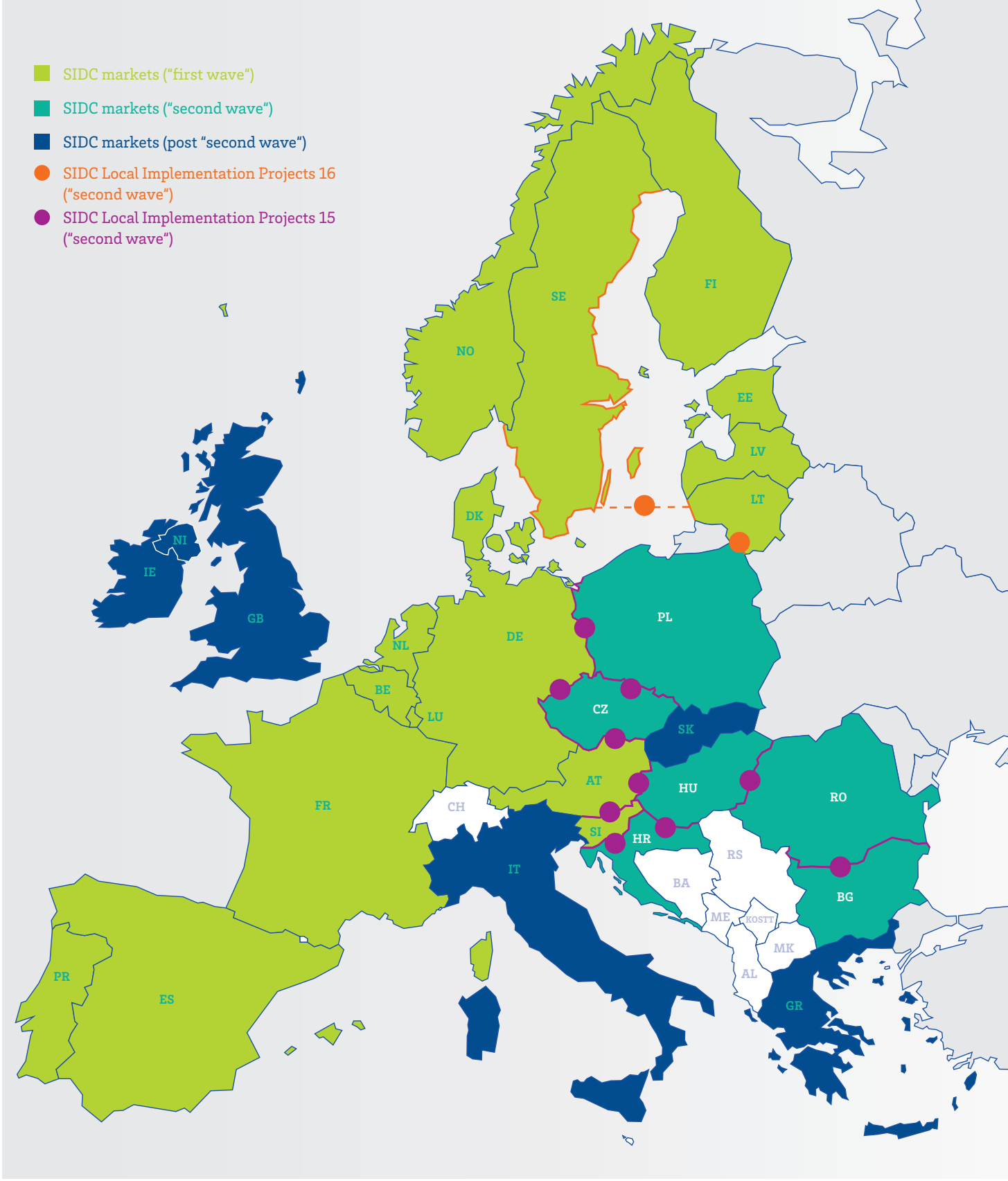

Figure 5 – Current state-of-play of SIDC with the different waves depicted (as of July 2019)

tion of the "Cooperation Agreement for the Design and Implementation Phases of the Intraday Italian Borders working table". The project foresees the implementation of implicit auctions complementing the continuous trading allocation, in accordance with the TSOs' proposal approved by the relevant NRAs on complementary regional auctions in accordance with Article 63 of the CACM regulation.

Next to the coordinated go-live of the multi-border LIPs is the inclusion of additional interconnectors (e.g. COBRAcable between NL and DK) within the current topology, which is facilitated via the standard change control process of the single intraday coupling.

All local implementation projects and borders connected to or via the UK are on hold, as they depend on the outcome of Brexit.

Further extensions of the single intraday coupling are currently not 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.

CCR	Bidding zone border	Project	Planned go-live
Baltic	LT-PL	LIP 16	2nd wave
Core	SI-HR	LIP 15	2nd wave
Core	HR-HU	LIP 15	2nd wave
Core	HU-AT	LIP 15	2nd wave
Core	HU-RO	LIP 15	2nd wave
Core	SI-AT	LIP 15	2nd wave
Core	CZ-DE	LIP 15	2nd wave
Core	CZ-AT	LIP 15	2nd wave
Core	CZ-PL	LIP 15	2nd wave
Core	DE-PL	LIP 15	2nd wave
Core	CZ-SK	-	tbd
Core	PL-SK	-	tbd
Channel	FR-GB	-	depends on Brexit
Channel	NL-GB	-	depends on Brexit
Channel	GB-BE	-	depends on Brexit
Core	BE-DE	-	Q3/Q4 2020
GRIT	NORD-CNOR	LIP 14	3rd wave
GRIT	CNOR-CSUD	LIP 14	3rd wave
GRIT	CSUD-SUD	LIP 14	3rd wave
GRIT	SUD-ROSN	LIP 14	3rd wave
GRIT	ROSN-SICI	LIP 14	3rd wave
GRIT	CSUD-SARD	LIP 14	3rd wave
GRIT	IT – GR	LIP 14	3rd wave
Hansa	PL-SE4	LIP 16	2nd wave
Italy North	AT – IT	LIP 14	3rd wave
Italy North	IT – FR	LIP 14	3rd wave
Italy North	IT – SI	LIP 14	3rd wave
SEE	RO-BG	LIP 15	2nd wave

Table 5 – Single intraday coupling extension roadmap (as of July 2019)

Regarding the future technical evolution of single intraday coupling, the full compliance with the CACM regulation requirements is a key challenge, e.g. the pricing of intraday capacities or the handling of direct current losses. These and other features are currently being specified and are to be included by use of change requests at a later stage. Moreover, additional investments in the technical infrastructure of single intraday coupling are likely to be needed to allow for handling the integration of additional bidding zones and borders in the future.

At the time of writing this report, several technical improvements are discussed for the third wave, which is planned to be implemented in 2020. Table 6 depicts new features and fixes, to which most TSOs agree. In any case, this list can change in the future based on considerations of project parties and following alignment with stakeholders.

For the second go-live phase of single intraday coupling, the following intraday cross-zonal gate opening timings will be applied for the relevant new borders. The timings of the first go-live phase borders will not be changed for the time being.

CCR	Bidding zone border	Effective GOT as of 1 January 2019	Cross-border capacities published at effective GOT	The point in time cross-border capacity is made available after effective GOT
Baltic	PL – LT	15:00 CET D-1	0	As soon as possible after Effective GOT
Core	PL – DE PL – CZ CZ – DE CZ – AT AT – HU AT – SI HR – SI HR – HU RO – HU	15:00 CET D-1	0	22:00 CET D-1
Hansa	PL – SE4	15:00 CET D-1	0	18:00 CET D-1
SEE	RO – BG	15:00 CET D-1	0	15:30 CET D-1

Table 6 – Overview of single intraday coupling gate opening (second go-live phase, as of July 2019)

3.2 Single day-ahead coupling[29]

The pan-European single day-ahead coupling (hereafter referred to as "**SDAC**") serves, at the time of this report, 27 countries. In total, 34 TSOs and 16 NEMOs cooperate under the agreement aimed to govern the single day-ahead coupling, namely the day-ahead operational agreement (hereafter referred to as "**DAOA**").

The single day-ahead coupling makes use of a common price coupling algorithm, called PCR 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 referred to as "**MRC**"), the 4M market coupling project (hereafter referred to as "**4M MC**") also applies PCR EUPHEMIA until the two operational projects are merged.

In total, SDAC serves more than 95% of the European electricity consumption, and the single algorithm calculates volumes in excess of 1.500 TWh/a. The welfare gains are estimated above 1B€ per year, based on 200 M€ average daily value of matched trades.[30]

3.2.1 Governance

The pan-European single day-ahead coupling is governed by the day-ahead operational agreement, which entered into force on 28 March 2019. This agreement rules the cooperation of TSOs and NEMOs regarding the establishment, amendment, and operation of the 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[31]

Independent Power Transmission Operator S.A., Affärsverket Svenska Kraftnät, Amprion GmbH, Austrian Power Grid AG, AS Augstsprieguma tïkls, BritNed Development Limited, ČEPS a.s., Creos Luxembourg S.A., EirGrid plc, ESO - Electroenergien Sistemen Operator EAD, Elering AS, ELES d.o.o., Energinet Elsystemansvar A/S, Elia System Operator SA/BV, ElecLink Limited, Fingrid Oyj, Croatian Transmission System Operator Ltd., Litgrid AB, MAVIR - Magyar Villamosenergiaipari Átviteli Rendszerirányító Zártkörűen Működő Részvénytársaság, National Grid Electricity Transmission plc, PSE - Polskie Sieci Elektroenergetyczne S.A., Red Eléctrica de España S.A.U, Rede Eléctrica Nacional S.A., 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, National Power Grid Company Transelectrica S.A., 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 Pieţei de Energie Electrică şi de Gaze Naturale S.A., Towarowa Giełda Energii SA, SONI Limited, EirGrid plc, and Nasdaq Oslo ASA[32].

The day-ahead operational agreement sets forth the rights and obligations of NEMOs and TSOs concerning the implementation of the single day-ahead coupling, including the 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.

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

29 ENTSO-E has prepared a dedicated landing website on which press releases concerning SDAC are published: https://www.entsoe.eu/network_codes/cacm/implementation/sadc/

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

31 EMS, MEPSO, and Swissgrid have been confirmed by SDAC as observers.

32 As of 7 June 2019

Figure 6 – Countries of single day-ahead coupling (as of July 2019)

Interim governance

The governance for the single day-ahead coupling is regulated by the day-ahead operational agreement and accompanying documents, such as terms of references. In April 2019, an interim governance was set up with the key objectives of securing an efficient transition from multi-regional coupling and 4M MC to a "merged" single day-ahead coupling and ensuring reliable operation of the respective operation. In 2020, the enduring governance will be introduced, which merges the organisation of single day-ahead and single intraday coupling based on Article 10 of the CACM regulation.

The interim SDAC governance is based on a TSO-only, a NEMO-only, a joint TSO-NEMO, and a separate multi-regional coupling and 4M MC operations organisation. Operational matters of multi-regional coupling are part of the joint TSO-NEMO organisation, while 4M MC operational and regional matters are part of the regional 4M MC cooperation.

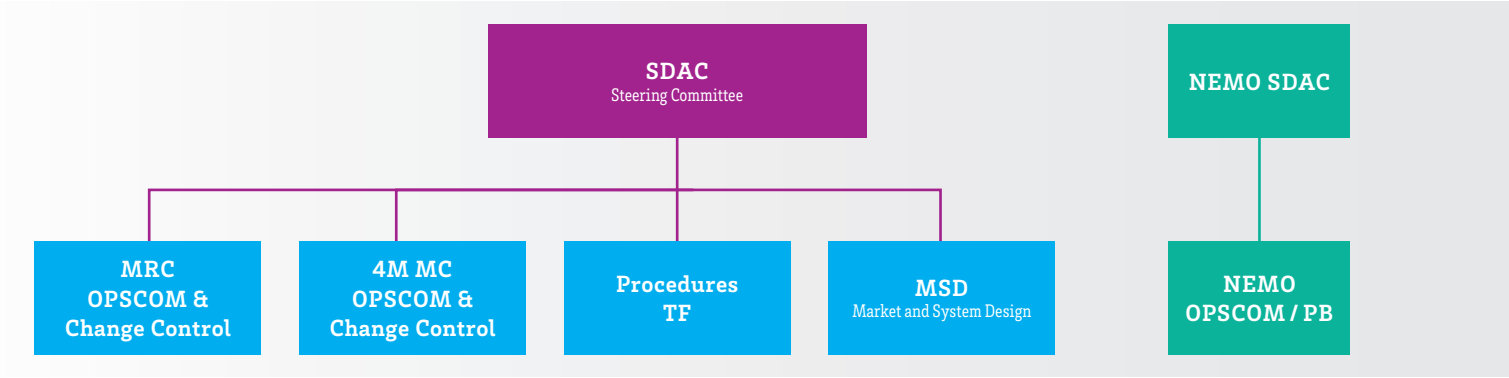

Figure 7 – Single day-ahead coupling "interim governance" (simplified)

Decision-making

In the joint TSO-NEMO organisation, decisions are taken by all DAOA signatory parties at the joint steering committee. Operational decisions referring to the operational projects, however, are only taken within the respective steering committee.

Input for decision-making is mainly provided by the operational committees of multi-regional coupling, or 4M MC for daily operational matters. The procedures task force decides on matters such as the status of new release testing and deployment, and the market and system design group decides on such issues as future operational and/or legal requirements like flow-based market coupling.

The input for decision-making is mainly provided by the operational committees on short-term operational matters (e. g. incident analysis, operational measures, change control, new release & request for Change management), by the procedures task force on medium-term evolutions (e. g. procedures drafting & testing, end-to-end testing), and by the market and system design group on long-term evolutions (e. g. requirements definition, roadmap & asset release definition, simulation facility, asset testing, communication). Moreover, several expert bodies, e. g. for legal matters or budgeting, are active in single day-ahead coupling to ensure its long-term efficiency.

3.2.2 Operations

In single day-ahead coupling, two coupling projects are in operation in parallel, using infrastructure based on EUPHEMIA. These are MRC and 4M MC. Figure 8 shows the current status of the coupled markets.

Figure 8 – Countries of single day-ahead coupling (as of July 2019)[33]

33 The bidding zone of Bulgaria operates under MRC without cross-zonal capacities.

The integration of multi-NEMO requirements in Euphemia triggered the implementation of the following features:

- The order books of the different NEMOs were aggregated at the bidding zone level. This allowed Euphemia to do most of the computation at the bidding zone level. It was considered that the scheduling areas were modelled explicitly in the database and that an explicit topology was provided for these scheduling areas
- De-aggregation of the traded volumes to NEMO trading hubs
- Flow calculation on all levels (bidding zone (BZ), scheduling area (SA), and NEMO trading hub (NTH))
- Provision of results at BZ, SA, and NTH levels (net positions, flows, matched volumes, surplus)
- Solving all indeterminacy subproblems at NEMO trading hubs and flow calculation level
- Implementation of rounding allocation/solution for the net positions and the flows on all levels
- Scheduled exchange calculation backup calculation process (degraded mode): implementation of a back-up calculation process to compute the scheduling areas and NEMO trading hub flows in the case of issues in computing the scheduling area and NEMO trading hubs flows, named degraded mode
- Ensuring consistency at different levels of the three flow calculation steps (between BZ, SA, and NTH)
- Minimisation of financial exposures when calculating inter-NEMO flows
- Approaching the virtual area and rounding residuals
- Decoupling solutions are respecting the provisions of the CACM regulation requirements for solutions under the multi-NEMO agreement.

The database scheme was significantly adapted, and new Matcher-Broker was subsequently released, to support the changes listed above.

The main adaptations are as follows:

- Input and output files' schemes were adapted to new requirements
- The shared configuration file was completed with new elements and the necessary interdependencies
- Improvements of the interface between matcher and broker to deal with new elements and the necessary interdependencies
- Improvements of the interface towards the Matcher-Broker operator related to new implemented elements.

3.2.2.1 Operations of multi-regional coupling

At the time of this report, multi-regional coupling integrates 20 countries,[34] representing close to 90 % of the European electricity consumption.

Multi-regional coupling continues to operate successfully without full decoupling. No decoupling of markets has occurred in the first five years of operations (i. e. from February 2014 until the end of May 2019). On 7 June (delivery day 8 June), however, a partial decoupling took place in all markets that are operated by EPEX Spot, whereas all other markets continued to be operated under the single algorithm.[35] As a first countermeasure, the Joint Allocation Office successfully conducted explicit shadow auctions on all relevant borders.[36] An investigation of the partial decoupling has been initiated, and possible changes might be introduced in the future.[37]

In general, several minor operational incidents have occurred in MRC operation since February 2014. They are analysed frequently, and changes, e. g. of processes, are introduced to mitigate relevant risks via OPSCOM. (See figure 9)

In total, 90 incidents in multi-regional coupling occurred in the period from February 2015 until the end of May 2019, of which 16 (i.e. seven visible and nine not visible to market participants) occurred between June 2018 and June 2019 (i.e. the period after the last market report provided data).[38] Moreover, in the overall reporting period, nine incidents of the second auction occurred. No second auction was executed in the period between June 2018 and the end of May 2019.

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

35 **See also** https://www.epexspot.com/en/press-media/news/details/news/Further_details_on_the_incident_on_Friday_7_6

36 These borders are AT-DE, AT-IT, AT-SI, BE-FR, BE-NL, D1-DE, D2-DE, DE-AT, DE-D1, DE-D2, DE-FR, DE-NL, ES-FR, FR-BE, FR-DE, FR-ES, FR-IT, GB-IE, GB-NI, IE-GB, IT-AT, IT-FR, NI-GB, NL-BE, NL-DE, NL-BE-GB, NL-GB-BE, and SI-AT.

37 **See also** https://www.epexspot.com/en/press-media/news/details/news/11th_June_2019_The_Day-ahead_Joint_Steering_Committee_has_today_initiated_an_in-depth_investigation_of_the_incident_on_the_7th_of_June

38 NWE day-ahead market coupling went live on 4 February 2014. As of 24 February 2015, MRC (incl. ES, PT, and IT) is in operation and monitored accordingly.

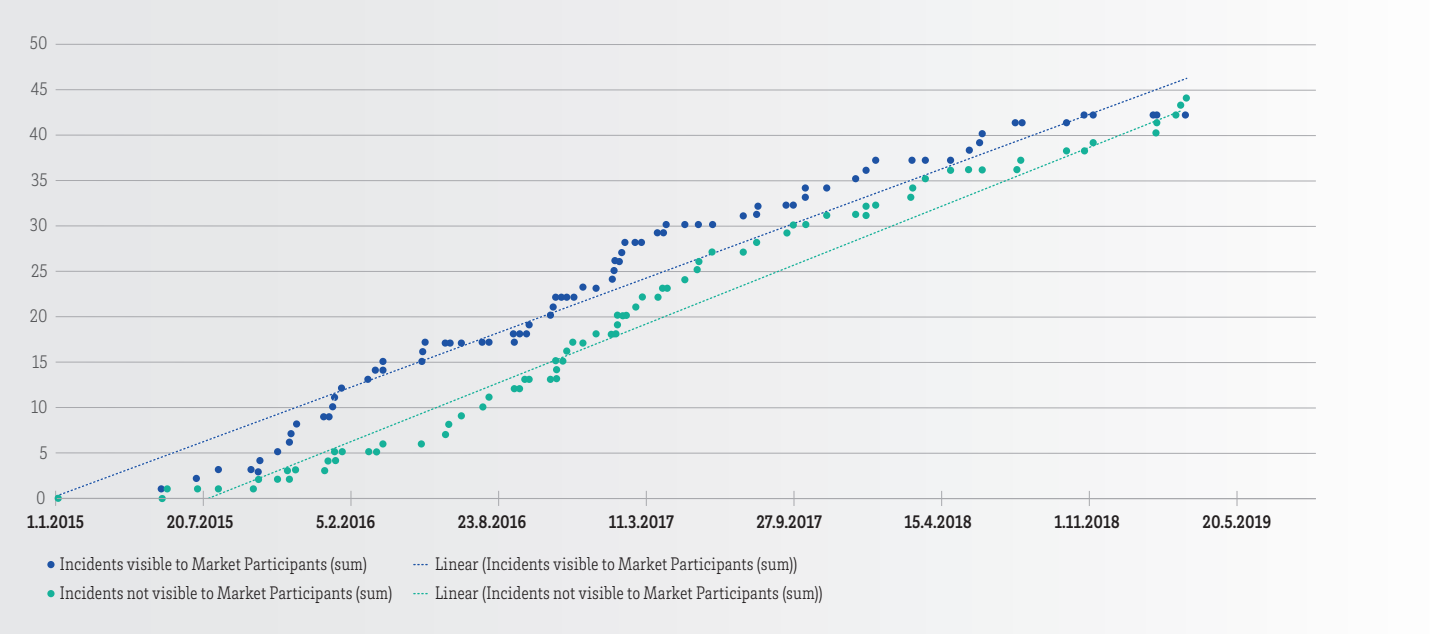

Figure 9 – MRC incidents between 2015 and 2019 (as of June 2019)

For the sake of simplicity, two types of incidents are depicted in figure 9.[39] Incidents that were visible to market participants (i. e. a message of potential decoupling was sent) are marked in **blue**. Incidents that were not visible to market participants (i. e. a solution for the cause of the incident was executed within the market coupling procedural deadlines) are marked in **green**. For both indicators, a trendline is shown, which highlights periods that are above or below the overall incident trend. With respect to both major severity types of incidents, it can be concluded for the reporting period that an overall decrease in the trend has occurred. This is, in particular, relevant for incidents visible to market participants.

In addition to the monitoring of incidents and their severity in the single day-ahead coupling, various complementary key performance indicators are logged and assessed. Two types of indicators are distinguished:

1) Indicators used for managing SDAC (e. g. OPSCOM operational reporting) and

2) Indicators (or raw data) regularly provided to stakeholders (e. g. continuous data provision to the ENTSO-E Transparency Platform).

In the course of the further development of single day-ahead coupling, 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, adopted via the OPSCOM.

To comply with Brexit, the multi-regional coupling will update the topology by 31 October 2019, at the latest. This means we exclude all relevant interconnectors to the UK and the relevant local order books and operate the Irish bidding zone in an isolated mode.[40]

The high-level technical architecture depicted in figure 10 on the following page has been in place since go-live in 2014 and is applicable to MRC and 4M MC operations. It relies on the price coupling of regions matcher/broker and the PCR algorithm as the main modules and the interfaces to the NEMOs and TSOs. Moreover, it provides a distinguisher between the local operator role, i.e. each NEMO collecting and distributing orders/trades, and the overall coordinator role, i.e. the NEMO that is in charge of the concerning market coupling session and validates the results based on the local validation of each NEMO.

The depicted third NEMO (role three) only provides – as an example – its data receives the coupling results and validates locally, the coordinator result. In price coupling of regions, all NEMOs may execute the matching process (if technically ready to perform it), even though, as shown in figure 10, it would be executed by a separate system.

39 The monthly operational reporting of MRC provides various sub-categories of incidents. This level of detail, however, is considered irrelevant to demonstrating the overall robustness and sustainability of the SDAC IT infrastructure.

40 See also EU communication of 10 April 2019: https://www.consilium.europa.eu/media/39042/10-euco-art50-conclusions-en.pdf

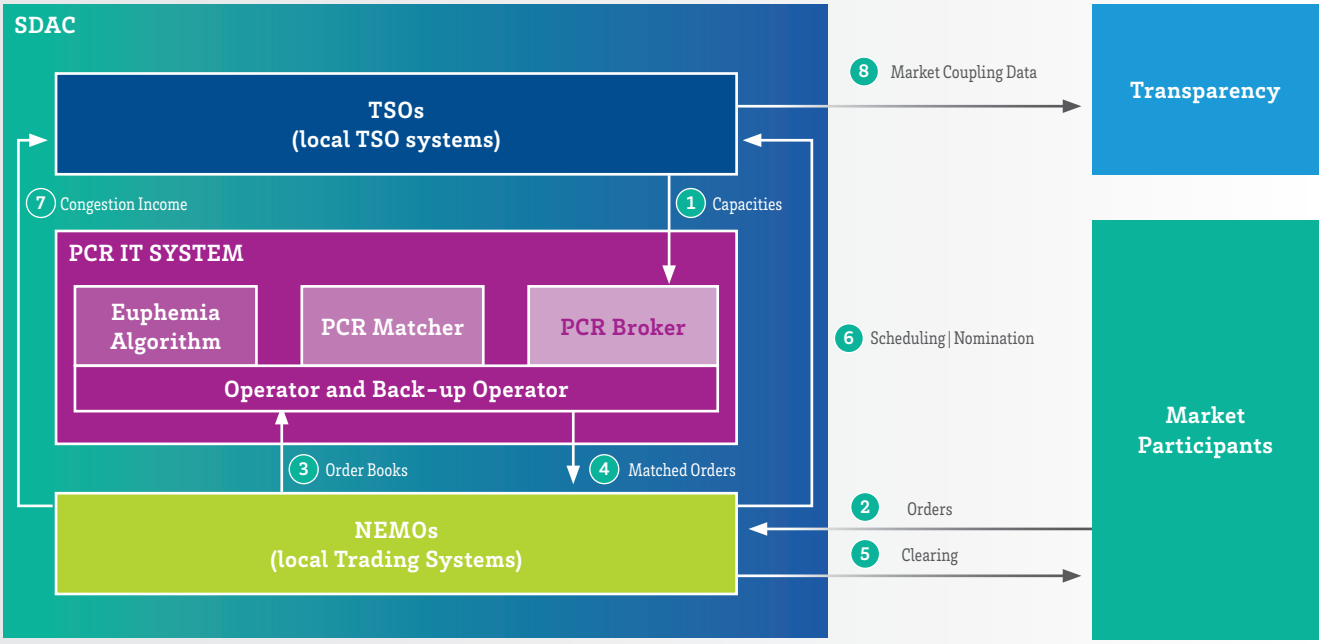

Figure 10 – SDAC technical high-level architecture (simplified)

3.2.2.2 Operations of 4M MC

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

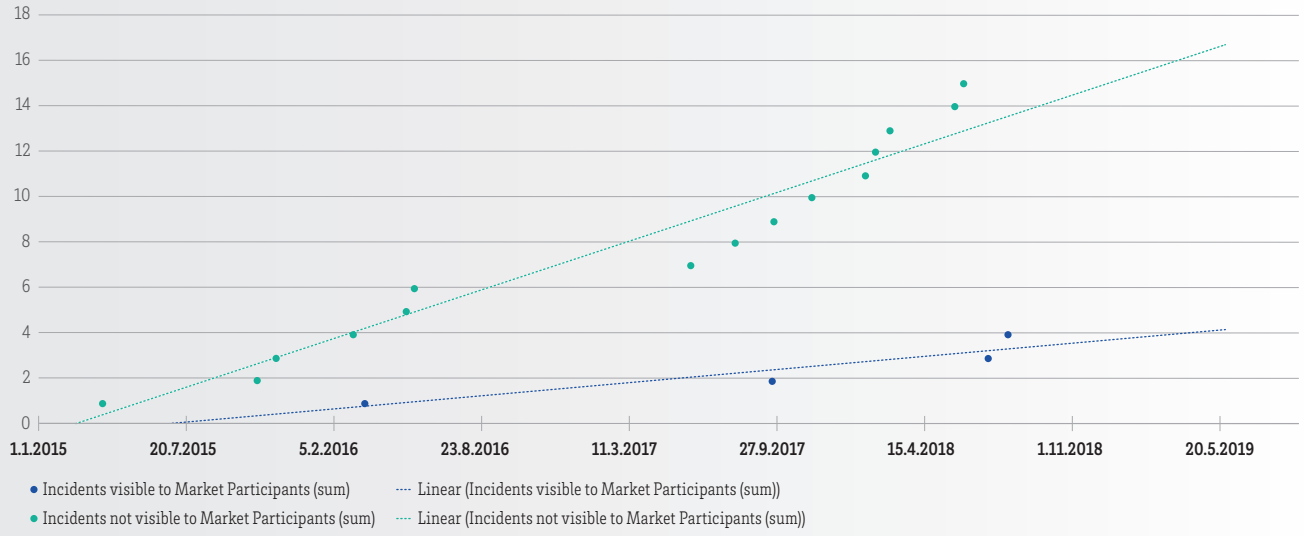

Figure 11 – 4M MC operation incidents between 2015 to 2019 (as of July 2019)[41]

In total, 19 incidents occurred in the 4M MC region in the period from 2015 until the end of May 2019. In the examined period, starting from June 2018 until 31 May 2019, only three incidents occurred during the daily operation of 4M MC. In one case, there was an incident not visible to market participants, as project parties were able to manage it according to the predefined back-up solutions, and market results were published in line with the usual timing. The remaining two incidents were visible to market participants but have been solved with a delay compared to the normal process arrangement, and no decoupling has triggered in any cases.

41 The data shown covers the time period from January 2015 until 31 May 2019. The operational indicators are comparable to the ones applied for MRC operations.

3.2.3 Evolution

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

1) On 1 October 2018 (first delivery date)„ the DE/AT bidding zone split was successfully included.

2) Simultaneously, the SEM (Ireland and Northern Ireland) and GB MRC projects were successfully included.

3) Moreover, on 31 January 2019 (first delivery date), the NEMO link interconnector connecting Belgium and the UK went live.

Table 7 lists all bidding zone borders adhering to the CACM GL that are not fully coupled (as of July 2019). 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 and/or be cancelled in favour of alternatives.

CCR	Bidding zone border	Description	Planned go-live
Core	Germany – Poland	To be coupled under FB MC project	Q4 2020*
	Germany – Czech Republic	To be coupled under FB MC project	
	Poland – Czech Republic	To be coupled under FB MC project	
	Poland – Slovakia	To be coupled under FB MC project	
	Austria – Hungary	To be coupled under FB MC project	
	Austria – Czech Republic	To be coupled under FB MC project	
	Hungary – Croatia	To be coupled under FB MC project	
	Hungary – Romania	To be coupled under FB MC project	
	Hungary – Slovakia	To be coupled under FB MC project	
Interim Coupling	Germany – Poland	To be coupled under Interim Coupling	Q2 2020
	Germany – Czech Republic	To be coupled under Interim Coupling	
	Poland – Czech Republic	To be coupled under Interim Coupling	
	Poland – Slovakia	To be coupled under Interim Coupling	
	Austria – Hungary	To be coupled under Interim Coupling	
	Austria – Czech Republic	To be coupled under Interim Coupling	
SEE	Bulgaria – Greece	No existing roadmap at the time of writing this report	tbd.
	Bulgaria – Romania	No existing roadmap at the time of writing this report	tbd.
GRIT	Greece – Italy	No existing roadmap at the time of writing this report	Q4 2020

* The inclusion of the relevant border could also be managed in a "stepwise" approach (i.e. step 1: Interim Coupling project, step 2: Core FB MC project).

Table 7 – Single day-ahead coupling extension borders (as of July 2019)

The key evolution of single day-ahead coupling in 2020 is the operational „merge" of MRC and 4M MC. The core flow-based market coupling project aims to achieve this major advancement.[42] Essentially, it promotes the development and implementation of a flow-based day-ahead market coupling across the whole core capacity calculation region (Core CCR).[43] In parallel, Austrian, German, Czech, Slovakian, Hungarian, Romanian, and Polish TSOs and NEMOs have – upon request of the relevant NRAs – jointly started the "Interim Coupling project" in 2018. As the project parties met all the preconditions that were defined, the concerned NRAs reconfirmed their support for the project in 2019, therefore the project parties will proceed with the implementation. The main goal of the Interim Coupling is to operationally "merge" the former MRC and 4M market couplings into commonly operated single day-ahead coupling based on the current capacity calculation methodologies. This secures a fully integrated coupling operation that benefits the market before the flow-based day-ahead market coupling goes live in the Core region, as shown in table 7. This interim project, however, will only go live in case NRAs consider the time gap with respect to the enduring core flow-based market coupling project material.[44]

As the full integration of the single day-ahead coupling poses several challenges, e.g. contractual, algorithmic, and operational, the project will investigate no further extensions that are outside of the topology and not supported by the CACM regulation in 2019 and 2020.

42 The Core CCR consists of the bidding zone borders between the following EU Member States' bidding zones: Austria, Belgium, Croatia, the Czech Republic, France, Germany, Hungary, Luxemburg, the Netherlands, Poland, Romania, Slovakia and Slovenia.

43 See also https://www.50hertz.com/Portals/1/Dokumente/Markt/Internationale%20Leitungen/Core_Market_Communication_Kickoff_en.pdf

44 See also https://www.pse.pl/web/pse-eng/-/the-high-level-market-design-of-the-de-at-pl-4m-mc-project-is-finalized-for-implementation

4 FORWARD CAPACITY ALLOCATION

In compliance with the FCA Regulation, all TSOs proposed all NRAs a methodology[45], as cited in 2.2 – table 3 of this report and pursuant to Article 49 of the FCA Regulation[46], a platform for the allocation of long-term transmission rights (i.e. the single allocation platform SAP). The TSOs have appointed a joint allocation office (hereafter referred to as "JAO") as the existing entity to perform the single allocation as a vehicle of cooperation between TSOs and on their behalf. JAO is a joint service company, currently owned by 22 TSOs, that establishes, develops, and operates the services of the single allocation platform for the allocation of long-term transmission rights as of 1 October 2018.

The single allocation platform enables long-term auctions of transmission capacity and is currently serving TSOs from 26 countries. The IT system is scalable border per border, allowing for annual, non-calendar annual, half-yearly, quarterly, monthly, weekly, weekend, daily, and intra-day auctions. It is up to the TSOs and NRAs to decide what auctions are performed on individual borders.

4.1 Governance

In accordance with Article 1 of the approved methodology pursuant to Article 49 of the FCA regulation, all TSOs are obliged to develop and close an agreement labelled as "SAP cooperation Agreement" (hereafter referred to as "**SAP CA**"), as included in Article 2(3)(g) of this methodology (as cited in section 2.2 of this report). The agreement entered retroactively into force on 1 October 2018. Parties operating DC links with the UK are currently part of the SAP CA. The SAP CA foresees the possibility of an exit of these parties in the case of a no-deal Brexit.

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 Sistemen 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 Transelectrica 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.

45 The goal of this methodology was the appointment of a single entity to become the operator regarding functional, governance, liabilities, and cost sharing requirements for the coordination and harmonisation of forward capacity calculation and allocation in the long-term markets at different levels (pan-European CCRs and across bidding zone borders).

46 All TSOs' proposal of 7 April 2017 for the establishment of the 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.

The SAP CA covers the roles, tasks, responsibilities, and liabilities of both the TSOs and the JAO. It also includes the role of the SAP council, the operational procedures, and the SAP fee principles. TSOs that have not allocated their long-term capacity via the joint allocation office moved allocation of 2019 capacity products to the allocation office.

The single allocation platform is steered by the SAP council, in which all SAP TSOs, or all TSOs being SAP CA signatory parties, and the SAP operator will participate, and which is the sole competent body for deciding on matters related to the fulfilment of the SAP tasks in accordance with the FCA regulation. This includes all matters regarding operational procedures, cost sharing, fees, and performance of the SAP. The SAP council met for the first time in November 2018. The governance is illustrated in figure 13.

The SAP operator regularly reports on its performance to the TSOs. Further, the TSOs have the right to mandate an annual audit of the SAP operator.

The TSOs have agreed with the SAP operator that it establishes a user group on behalf of all TSOs to gather feedback and requests on the IT interfaces and the allocation tasks. The user group will serve as a consultation forum for the operator. It will have broad geographical coverage, and its participants will be representatives from associations and individual registered participants with specific knowledge in explicit auctions.

Figure 12 – TSOs forming part of the SAP Cooperation Agreement (as of July 2019)

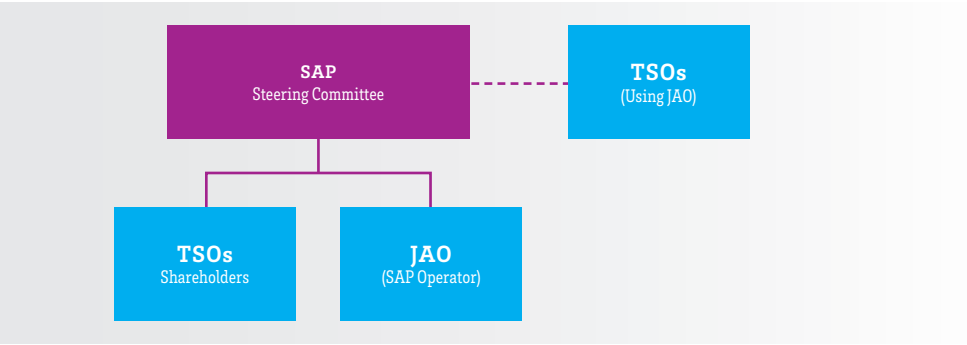

Figure 13 – Governance of SAP with respect to the joint allocation office as an operator

4.2 Operations

Once the NRAs had approved the SAP proposal at the end of 2017 (as cited in section 2.2 – table 3 of this report), all TSOs had 12 months to ensure that the SAP was operational and complied with the requirements. The necessary IT developments were delivered by the JAO on time. The main developments were the adaptation of the auction tool to facilitate the new auction products (Quarterly -Q-, Weekly -W-, non-calendar -M-, etc.) and amendments to the financial system enabling application of the SAP fee principles set out in the SAP cooperation agreement and adding new borders and products for some regions.

The allocation of long-term transmission rights for the following bidding zone borders and countries was moved to the joint allocation office on 1 November 2018:

Bidding zone	Countries	Types of auctions
BG and GR	Bulgaria and Greece	(Y-1) (M-1)
BG and RO	Bulgaria and Romania	(Y-1) (M-1)
CZ and SK	The Czech Republic and Slovakia	(Y-1) (M-1)
EE and LV	Estonia and Latvia	(Y-1) (Q-1) (M-1)
HU and RO	Hungary and Romania	(Y-1) (M-1)
ES and PT	Spain and Portugal	(Y-1) (Q-1) (M-1)

Table 8 – Bidding zone borders and countries moved to JAO on 1 November 2018

During 2018, all parties agreed on the operational procedures and the auction calendar so that all 2019 auctions were prepared in due time. First, long-term auctions were held in October, November, and December 2018 for the market period 2019. These auctions were governed by the harmonised allocation rules.

The allocation platform called JAO e-cat is based on a common IT system with a capacity management module and an auction module. The TSOs provide the auction specifications and available transmission capacity per auctioned product to e-cat. These data are also published on the JAO webpage. The registered market party has a user account to provide, change, and delete bids for open auctions, and once an auction has been performed, it receives its individual auction result. Further, e-cat supports the market party in managing its capacity right portfolio, allowing for following-up the update of capac-

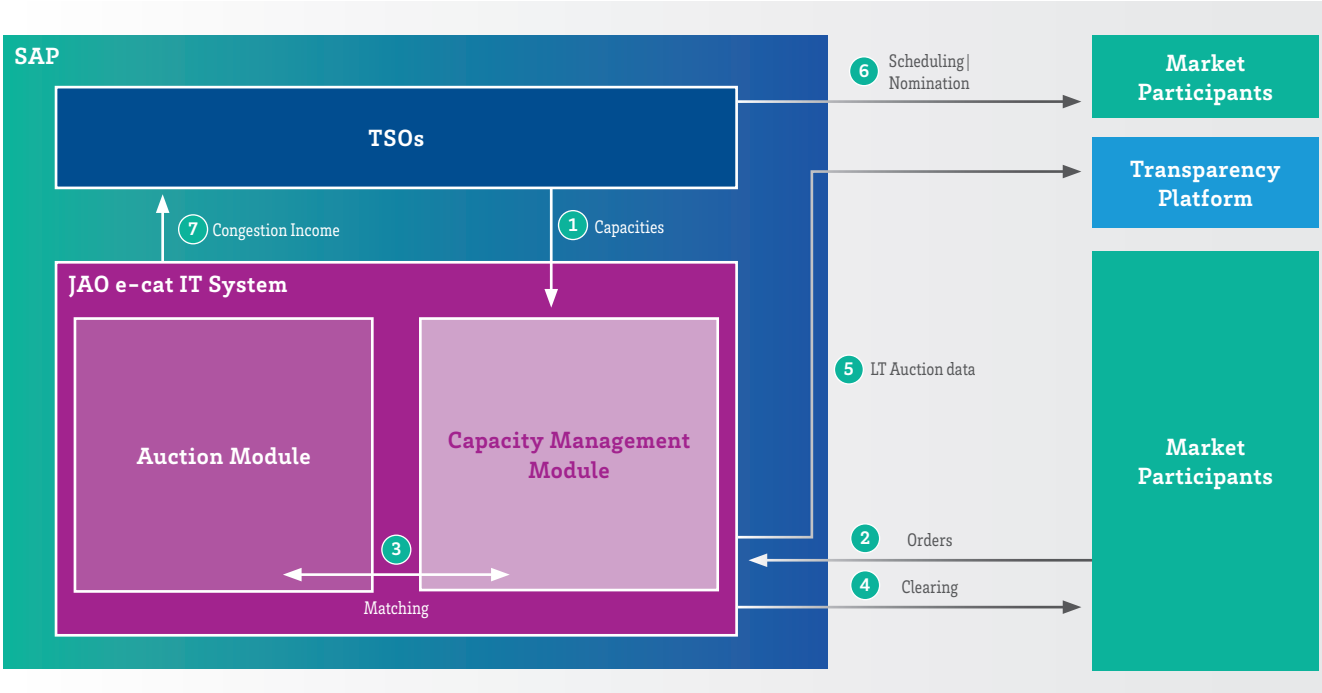

Figure 14 – SAP technical high-level architecture

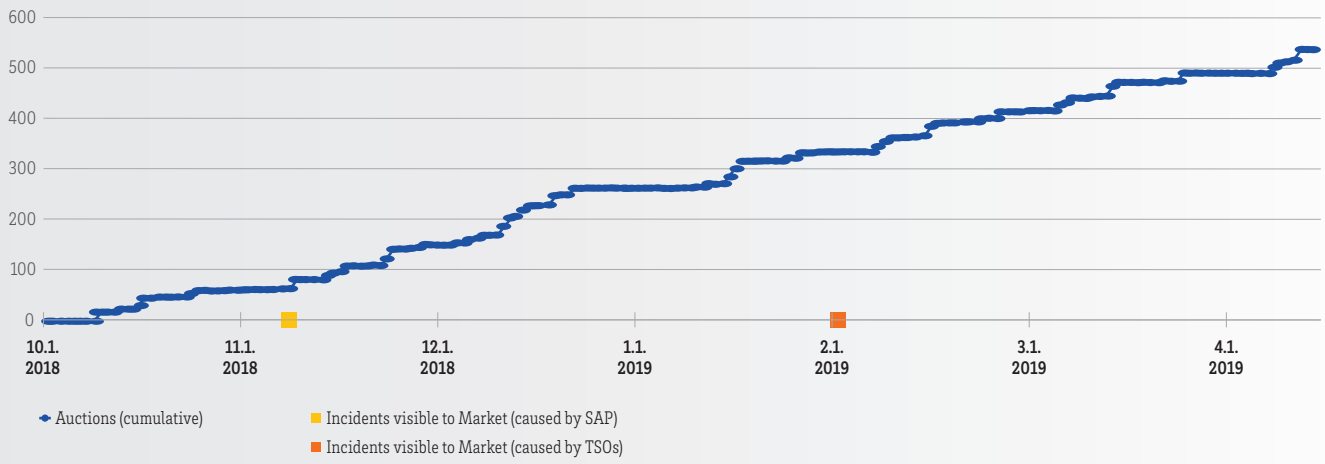

Figure 15 – Auctions and incidents of the single allocation platform (as of June 2019)

ity rights after auction allocation, auction cancellation, and secondary market and capacity curtailment, and enabling the market party to declare transfer and resale notifications. Upon submission of a bid by a registered market party, the system checks whether the maximum payment obligations connected with that bid exceed the credit limit (credit limit verification – interface with the bank). After each auction, payment information is transferred to the SAP booking and invoicing system for invoicing.

During 2018, the operational procedures and the auction calendar were agreed among SAP parties so that all 2019 auctions were prepared in due time.

As of the start of the single allocation platform, there have been no major operational incidents that might have been linked to the establishment of SAP. As of mid-April 2019, 544 auctions had been performed. During this period, two incidents visible to the market occurred:

- One minor incident was caused by SAP, which had to cancel the first round of the yearly joint CEE[47] auction due to incorrectly offered capacity at the border DE(50Hertz)>PL(PSE)+CZ(CEPS).

  › Solution: A second auction round was created, and the correct capacity values were published almost four days prior to auction closing, giving the market participants sufficient time to adjust their bidding strategies.

- The second incident was caused by TSOs submitting erroneous ATC values, leading to an auction cancelling that occurred for the GB-NI seasonal summer half-year 2019 auction.

  › Solution: In line with the fall-back procedure of the Harmonised Allocation Rules, a new auction was created and processed.

In figure 15 the auctions (cumulative), as well as the incidents explained above, are depicted on a daily basis. More than 99.6% of all auctions were conducted without any incidents visible to market participants.

In addition to the monitoring of the incidents and their severity in SAP, various complementary key performance indicators were agreed to be logged by the SAP operator. Two types of indicators are to be distinguished:

1) Indicators (or raw data) regularly provided to stakeholders, such as the ENTSO-E transparency platform or ACER. This includes the offered long-term capacity results.

2) Indicators used for managing the single allocation platform: these indicators were developed during Q1/2019 and will be further assessed on their merit until the end of 2019. They are logged by the SAP operator as of May 2019 and reported on a monthly basis to the TSOs for assessment. The KPIs evaluate, for example, the invoicing process and user interaction and satisfaction.

Currently, the SAP allocates both financial transmission rights and physical transmission rights, as illustrated in

47 Former Centre Eastern Europe borders are as follows: Austria, Czech Republic, Hungary, Germany Poland, Slovakia, and Croatia.

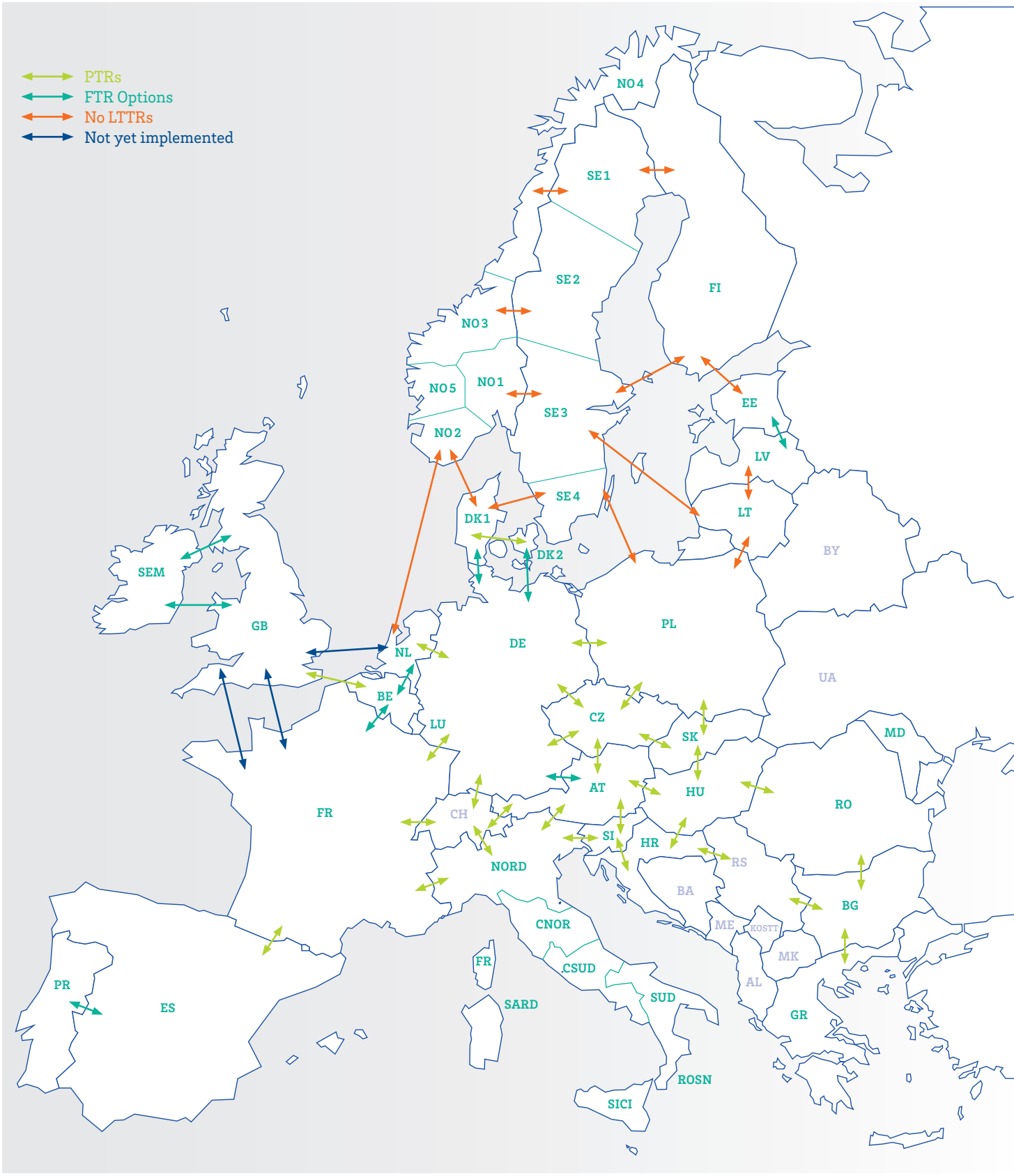

Figure 16 – Current state-of-play of long-term transmission rights (as of July 2019)[48]

48 ElecLink between GB-FR is depicted in figure 15 just for illustration purposes. The cable is expected to be put into operation in Q3/2019. Planned FTR borders are as follows: AT-CZ, AT-HU, CZ-PL, FR-DE, DE-NL, PL-SK, PL-DE, AT-SI

To receive feedback on offered services and identify fields for improvement, the joint allocation office invited over 300 market participants to participate in a survey on customer satisfaction concerning all services offered (wider than SAP) and usability of the auction tool and website during 2018. In total, 105 companies responded to the survey.

The detailed analysis of all received comments and results is ongoing, but the first analysis shows that improvement efforts need to focus on the performance and usability of the website and auction tool. A summary of feedback on key elements can be taken from figure 17.

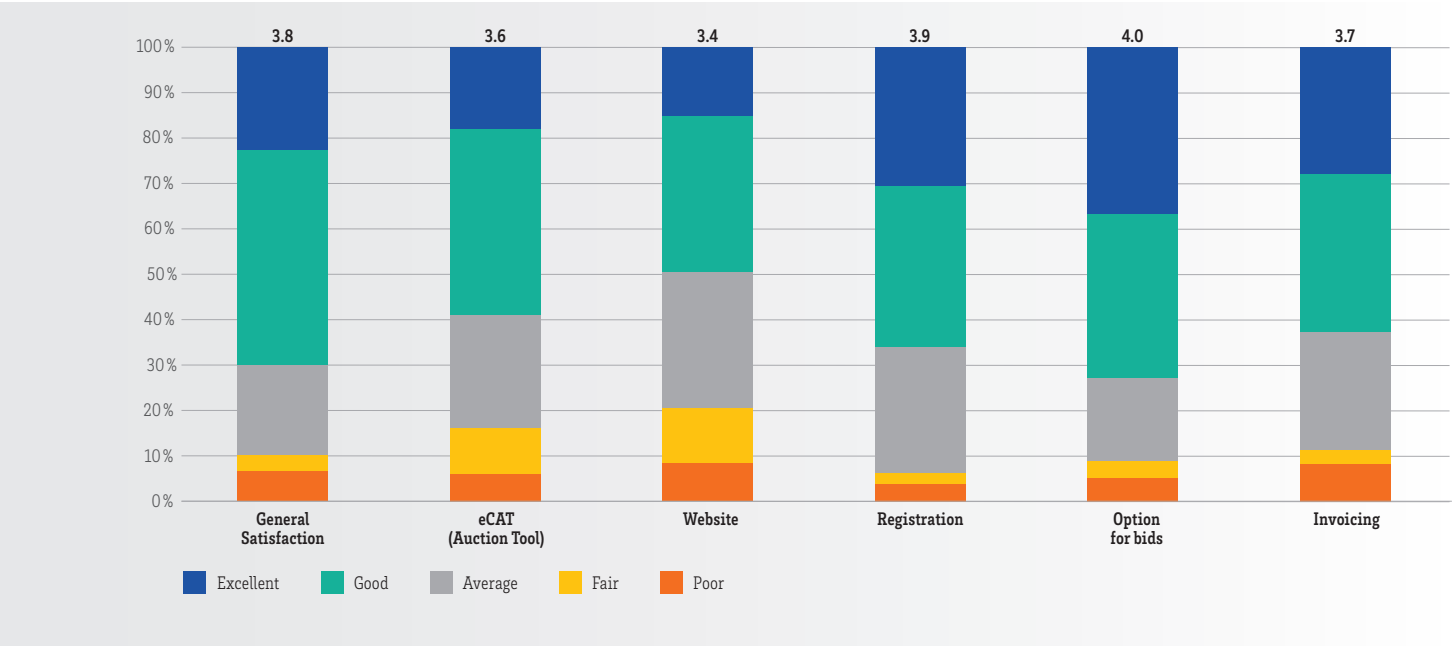

Figure 17 – JAO survey on customers' satisfaction 2018 (average scores out of 1 (i.e., poor) to 5 (i.e., excellent))

4.3 Evolution

The first long-term auction under the signed SAP co-operation agreement was performed at the beginning of October 2018. For 2019, it is expected that SAP will conduct more than 1,000 auctions at 73 bidding zone directional borders, 36 of which are bidirectional borders and one of which is unidirectional. More than 300 registered market participants will participate. At this moment, all long-term capacity offered at EU TSO borders is allocated in the single allocation platform.

At this moment, all long-term capacity offered at alternating current (AC) interconnectors at EU TSO borders is allocated via the single allocation. Though the FCA regulation provides different timeframes for the establishment of SAP for AC interconnectors (by December 2018) and for direct current (DC) interconnectors (by December 2019), SAP was ready to accommodate allocation for DC interconnectors as of the end of 2018, i.e. one year ahead of the legally required deadline. The long-term transmission rights for the DC lines between GB and Northern Ireland and GB and Ireland are already allocated through the single allocation platform. Since May 2019, market parties have had the ability to buy long-term physical transmission rights from Nemo link via the platform (starting with monthly long-term transmission rights for June).

The remaining DC interconnectors, ElecLink, BritNed, and IFA, plan to join the single allocation platform as follows:

- ElecLink foresees this by the end of 2019 and beginning of 2020.
- BritNed expects to start at Q3/2019
- IFA expects to start at the end of Q4/2019

The displayed target times are indicative and do not account for contingencies. Moreover, some of the extensions might partially or fully change and/or be cancelled in favour of alternatives.

Through the platform, TSOs ensure non-discriminatory access to long-term cross-zonal capacity to all market participants at all relevant European borders, at a single place and under the harmonised allocation rules (as cited in section 2.2 of this report). These rules are reviewed biennially to ensure that they comply with the latest requirements of both TSOs and market participants.

5 SUMMARY

The report covers one year, from July 2018 to July 2019. Within this time, the main progresses and challenges of the three market timeframes (ie intraday, day-ahead, and long-term) are included.

Relevant updates on CACM and FCA methodologies that occurred during this time are included (e.g. CCR proposal, intraday capacity pricing, day-ahead and intraday algorithms, and multi-NEMO arrangements). With reference to this, the report elaborates on cross-common initiatives, such as "enduring governance' between SDAC and SIDC.

As a continuation of the previous edition, the report considers the first year of operation after SIDC first wave/first phase went live and covers the readiness for the second wave (namely LIPs 15 and 16) and the current status of each of the borders. Operationally, the SIDC solution performance strongly with very few unplanned non-availabilities.

At the time of writing of the report, all TSOs and all NEMOs are progressing on the common SDAC governance and decision-making through an interim model, in which MRC and 4M MC are included. Operationally, the SDAC solution performance strongly without any full- or partial-decouplings in the first five years of operations.

The SAP went live in October 2018 under the SAP Cooperation Agreement, signed by 27 parties/TSOs, that set the governance. The dedicated section not only illustrates the borders under JAO but also updates on the status of the current LTTRs in Europe. In addition, the strong performance is exhibited through more than 1000 successfulll auctions in 2019 which is also reflected in the results of the JAO customer satisfaction survey.

6 GLOSSARY

4M MC	4M Market Coupling between the Czech Republic, Slovakia, Hungary, Romania
50Hertz	50 Hertz Transmission GmbH
ACER	Agency for the Cooperation of Energy Regulators
AL	Albania
ANIDOA	All NEMOs Intra-Day Operational Agreement
ANDOA	All NEMOs Day-Ahead operational agreement
APG	Austrian Power Grid AG
AS	XBID Accession Stream
AST	AS Augstsprieguma tïkls
AT	Austria
BA	Bosnia and Herzegovina
BE	Belgium
BG	Bulgaria
BZ	Bidding Zone
CA	Cooperation Agreement
CACM	Capacity Allocation and Congestion Management
CC	Capacity Calculation
CCP	Central counterparty
CCR	Capacity Calculation Region
CGES	Crnogorski elektroprenosni sistem AD
CGM	Common Grid Model
CH	Switzerland
CID	Congestion Income Distribution
CEE	Central Eastern Europe
CMM	Capacity Management Module
CNTC	Coordinated Net Transmission Capacity
CWE	Central Western Europe
CZ	Czech Republic
DAOA	Day-Ahead Operational Agreement
DBAG	Deutsche Börse AG
DC	Direct Current
DE	Germany
DK	Denmark
EE	Estonia
Elia	Elia System Operator SA
ESO	Electroenergien Sistemen Operator EAD
EMS	Akcionarsko društvo Elektromreža Srbije
ES	Spain
EU	European Union
FB	Flow-based
FCA	Forward Capacity Allocation
FI	Finland
FTR	Financial Transmission Right
FR	France
GB	Great Britain
GCT	Gate Closure Time
GLDPM	Generation and Load Data Provision Methodology
GOT	Gate Opening Time
GR	Greece
GZIDGOT	Cross-Zonal Intraday Gate Opening Time
HAR	Harmonised Allocation Rules
HOPS	Croatian Transmission System Operator Ltd.

HR	Croatia
HU	Hungary
HVDC	High Voltage Direct Current
IAT	Integration Acceptance Test
IDOA	Intraday Operational Agreement
IDSC	Intraday Steering Committee
IFA	Interconnexion France-Angleterre
IE	Ireland
IGM	Individual Grid Model
IPTO	Independent Power Transmission Operator S.A.
I-SEM	Integrated Single Electricity Market
IT	Italy
JAO	Joint Allocation Office
JSC	Joint Steering Committee
KOSTT	Kosovo Electricity Transmission System and Market Operator
KPI	Key Performance Indicator
LIP	Local Implementation Project
LTTR	Long Term Transmission Rights
LU	Luxembourg
MC	Market Coupling
MAVIR	Magyar Villamosenergia-ipari Átviteli Rendszerirányító Zártkörűen Működő Részvénytársaság
MCO	Market Coupling Operator
ME	Montenegro
MEPSO	Macedonian Transmission System Operator AD
MK	Macedonia
MNA	Multiple NEMOs Arrangement
MRC	Multi Regional Coupling
MSD	Market and System Design
MTU	Market Time Unit
NEMO	Nominated Electricity Market Operator or Power Exchange
NL	Netherlands
NO	Norway
NOS BiH	Nezavisni operator sustava u Bosni i Hercegovini
NTC	Net Transmission Capacity
NRA	National Regulatory Authority
NWE	North-Western Europe
OPSCOM	Operational Committee
OST	OST sh.a – Albanian Transmission System Operator
PCR	Price Coupling of Regions
PL	Poland
PMB	PCR Matcher and Broker IT system
PSE	Polskie Sieci Elektroenergetyczne
PT	Portugal
PTR	Physical Transmission Right
REE	Red Eléctrica de España S.A.U.
REN	Rede Eléctrica Nacional, S.A.
RO	Romania
RS	Serbia
RTE	Réseau de Transport d'Electricité
SAP	Single Allocation Platform
SAP CA	Single Allocation Platform Cooperation Agreement

SDAC	Single Day-Ahead Coupling
SE	Sweden
SEM	Single Electricity Market (covering the Republic of Ireland and Northern Ireland)
SI	Slovenia
SIDC	Single Intraday Coupling
SEE	South-East Europe
SEPS	Slovenská elektrizačná prenosová sústava, a.s.
SK	Slovakia
SM	Shipping Module
SOB	Shared Order Book
SONI	System Operator for Northern Ireland Ltd
SWE	South-Western Europe
TCDA	TSO Cooperation Operational Agreement
TCID	TSO Cooperation Agreement for Single Intraday Coupling
TCOA	TSO Cooperation Agreement for Day-ahead Coupling
Terna	Terna - Rete Elettrica Nazionale SpA
TSO	Transmission System Operator
QA & RM	Quality Assurance & Release Management
XBID	Cross-Border Intraday
XK	Kosovo

The terms used in this document have the meaning of the definitions included in Article 2 of the CACM regulation. In addition, as this document also reports on the progress of the forward capacity allocation the terms used in this report follow the definitions included in Article 2 of the FCA regulation.

ABOUT ENTSO-E

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

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

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