ENTSO-E

REPORT ON CAPACITY CALCULATION AND ALLOCATION 2019

European Network of
Transmission System Operators
for Electricity

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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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1 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 work to establish the internal energy market and ensure its functioning. With our work, we support the ambitious European energy and climate agenda.

The Network Codes harmonise how cross-border markets operate in Europe to increase competition and the integration of renewables. Our projects are thus the cornerstone of a European single market for electricity.

This report describes the development of capacity calculation in our ten capacity calculation regions across all market time horizons: Nordic, Hansa, Core, Italy North, Greece-Italy, South West Europe, Ireland and UK, Channel, Baltic and South East Europe.

The state of our projects at a glance:

- Nine out of ten CACM methodologies were approved.
- Most of the regions have nominated coordinated capacity calculators.
- At the time of this report there are different statuses in the development of long-term capacity calculation methodologies:
  - **Nordic:** Not approved yet
  - **Hansa:** Public consultation
  - **Core:** Submission to national regulatory authorities underway
  - **Italy North:** Approval pending
  - **Greece-Italy:** Approval pending
  - **South West Europe:** Approval pending
  - **Ireland and UK:** Approval Pending
  - **Channel:** Submission to national regulatory authorities underway
  - **Baltic:** Approval pending
  - **South East Europe:** Methodology drafted
- The regions are developing a common grid model, based on individual grid models.
- This report uses key performance indicators to test and evaluate process and data quality in the transition from test to productive operation.
- All KPIs are improving constantly.
- The common grid model will be fully operational by the end of 2021.

2 INTRODUCTION

ENTSO-E is required to draft a report on capacity calculation and allocation (hereafter referred to as the "report") and to submit it to ACER, the Agency for the Cooperation of Energy regulators, in line with Articles 82(2)(b) and 31(1) of Commission Regulation (EU) 2015/1222 of 24 July 2015, establishing a guideline on capacity allocation and congestion management (hereafter the "CACM regulation"), and Articles 26 and 63(1)(c) of Commission Regulation (EU) 2016/1719 of 26 September 2016, establishing a guideline on forward capacity allocation (hereafter the "FCA regulation").

To fulfil the requirements above, ENTSO-E has committed, under the CACM Monitoring Plan and FCA Monitoring Plan submitted to ACER in May 2018, to provide a joint report on intraday (hereafter referred "**ID**"), day-ahead (hereafter referred "**DA**") and long-term (hereafter referred "**LT**") capacity calculation and allocation. This report covers the period from 2017 until the end of 2018.

At the time of this report, most of the capacity calculation (hereafter referred to as "**CC**") methodologies under the CACM regulation were approved, whereas methodologies under the FCA regulation are still draft proposals which are subject to approval. In light of this, this report is based on the status of the CC methodologies' approval processes and, if applicable, their implementation in the capacity calculation regions (hereafter referred to as "**CCRs**").

Capacity calculation regions were created in order to be able to take cross-zonal flows into account with regard to capacity calculation and allocation for all market timeframes. The regions are as follows:

- **Nordic:** comprising Denmark, Sweden and Finland
- **Hansa:** comprising Denmark, Germany, the Netherlands, Poland, parts of Sweden (SE4) and, prospectively, Norway
- **Core:** comprising Austria, BeNeLux, Czech Republic, Poland, Slovakia, Hungary, Slovenia, Romania, Croatia, France and Germany
- **Italy North:** comprising Austria, France, Northern Italy and Slovenia
- **Greece – Italy (GRIT):** comprising Italy and Greece
- **South West Europe (SWE):** comprising France, Portugal and Spain
- **Ireland and United Kingdom (IU)**
- **Channel:** comprising Belgium, France, the Netherlands and the United Kingdom
- **Baltic:** comprising the Baltic states, Finland, Poland and parts of Sweden (SE4)
- **South East Europe (SEE):** comprising Bulgaria, Romania and Greece

The regions with their exact member states and bidding zones are introduced in chapter 4.2.

Regarding the quality and statistical indicators of the information used for capacity calculation as outlined in the CACM and FCA regulations, this report provides additional information based on previous reports.

The report is organised into the following four chapters:

- Chapter 3 introduces the legal basis of this report and stipulates its relevance for the following descriptions.
- Chapter 4 describes the quality indicators and recounts the progress made to date with respect to the capacity calculation methodologies in all CCRs.
- Chapter 5 recounts the progress on the pan-European Common Grid Model (hereafter the "**CGM**") process and puts forward quality indicators to be provided once the CGM process is approved and implemented.
- Chapter 6 contains a concise summary of the previous chapters.

3 LEGAL REFERENCES AND REQUIREMENTS

This report ensures the fulfilment of ENTSO-E reporting obligations as outlined in Articles 31(2) and 82(2)(b) of the CACM regulation and Articles 26(2) and 63(1)(c) of the FCA regulation. Moreover, capacity calculation statistical and quality indicators agreed upon by all TSOs after consultation with ACER[1] are incorporated into this report, in section 4.1.

The requirements for ENTSO-E reporting on short-term capacity calculation and allocation are described in Article 31(3) of the CACM Regulation as follows:

"For each bidding zone, bidding zone border and capacity calculation region, the report on capacity calculation and allocation shall contain at least:

(a) the capacity calculation approach used;

(b) statistical indicators on reliability margins;

(c) statistical indicators of cross-zonal capacity, including allocation constraints where appropriate for each capacity calculation timeframe;

(d) quality indicators for the information used for the capacity calculation;

(e) where appropriate, proposed measures to improve capacity calculation;

(f) for regions where the coordinated net transmission capacity approach is applied, an analysis of whether the conditions specified in Article 20(7) are still fulfilled;

(g) indicators for assessing and following in the longer term the efficiency of single day-ahead and intraday coupling, including the merging of capacity calculation regions in accordance with Article 15(3) where relevant;

(h) recommendations for further development of single day-ahead and intraday coupling, including further harmonisation of methodologies, processes and governance arrangements."

1 Statistical and quality indicators of the CACM were submitted in April 2017. Statistical and quality indicators of the FCA were submitted in May 2018.

The requirements for ENTSO-E reporting on long-term capacity calculation and allocation are described in Article 26(3) of the FCA regulation:

"1 No later than two years after the entry into force of this Regulation, ENTSO for Electricity shall draft a report on long-term capacity calculation and allocation and submit it to the Agency.

2 If the Agency [ACER] requests it, in every second subsequent year, ENTSO for Electricity shall draft a report on long-term capacity calculation and allocation. If applicable, this report shall be submitted to the Agency together with the biennial report on the capacity calculation and allocation according to Article 31 of Regulation (EU) 2015/1222.

3 For each bidding zone, bidding zone border and capacity calculation region, the report on capacity calculation and allocation shall contain at least:

4 (a) the capacity calculation approach used;

(b) statistical indicators on reliability margins;

(c) statistical indicators of cross-zonal capacity, where appropriate for each capacity calculation timeframe;

(d) quality indicators for the information used for the capacity calculation;

(e) where appropriate, proposed measures to improve capacity calculation;

(f) recommendations for further development of the forward capacity calculation, including further harmonisation of methodologies, processes and governance arrangements.

5 After consulting the Agency, all TSOs shall jointly agree on the statistical and quality indicators for the report. The Agency may require the amendment of those indicators, prior to the agreement by the TSOs or during their application.

6 The Agency shall decide whether to publish all or part of the biennial report."

On 9 January 2019, ACER requested ENTSO-E to deliver the CACM report on capacity calculation and allocation no later than nine months after the date of the request, namely on 9 October 2019. Following the most recent monitoring plans, submitted in May 2018 to ACER, future reports will be submitted together with a similar report under CACM an FCA regulations when requested by ACER.

According to Articles 20(2) and 10(1) of the CACM and FCA Regulations respectively, transmission system operators (hereafter "**TSOs**") in each capacity calculation region shall submit a proposal for a common coordinated capacity calculation methodology for each region.

This report, covering the period from 2017 to 2018, provides high-level monitoring of the capacity calculation and allocation under the CACM and FCA regulations. In addition, it reflects the progress made concerning the capacity calculation and allocation in the CCRs which have already been approved by relevant national regulatory authorities (hereafter "**NRAs**") in some regions and by ACER decision in others.

4 CAPACITY CALCULATION STATUS IN CAPACITY CALCULATION REGIONS

This chapter describes the quality and statistical indicators defined by all TSOs in the context of capacity calculation to be used for this report, based on the CACM and FCA regulations. Both proposals were submitted by TSOs[2] to ACER.

Both proposals contain a detailed description of indicators to be provided by the relevant CCR[3] once the capacity calculation methodologies are approved by the relevant NRAs and implemented within the prescribed timeline in each CCR.

4.1 Capacity calculation statistical and quality indicators

The capacity calculation region could use either the coordinated net transmission capacity (hereafter referred to as "**CNTC**") or the flow-based approach (hereafter referred to as "**FB**"). Based on this decision, a pre-selection of the indicators that will be used by the CCRs with either approach will be further explained and listed below (refer to tables 2 and 4).

An overview of the capacity calculation approach to be implemented in the regions in line with the approved or proposed capacity calculation methodology (hereafter referred to as "**CCM**") is provided below.

	Nordic	Hansa	Core	Italy North	GRIT	SWE	IU	Channel	Baltic	SEE
CNTC	–	Yes*	–	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FB	Yes	–	Yes	–	–	–	–	–	–	–

* The Hansa CCR capacity calculation methodology is cNTC-based. However, once the neighbouring CCRs Nordic and Core have implemented flow-based capacity calculation flows in Hansa CCR are considered via an advanced hybrid coupling approach (i. e. Hybrid Coupling stands for the combined use of flow-based and ATC constraints in one single allocation mechanism. The impact of a DC line in CCR Hansa on the AC grid of a neighbouring CCR is taken into account in the flow-based capacity calculation of that CCR.).

Table 1 – Short-term capacity calculation approach in each capacity calculation region

In this context, the following paragraphs introduce the characteristics of these two capacity calculation approaches:

(a) For the CNTC approach, the indicators apply per bidding zone border (hereafter referred to as "**BZB**"), direction and observation period[4] within day-ahead, intraday and long-term timeframes.

Values used are the average and median values, x/y % quantiles (recommended 5/95 or 10/90) of the reliability margins (hereafter referred to as "**RM**"). Set for each market time unit (hereafter referred to as "**MTU**").

The granularity applied for this approach corresponds to the observation period.[5]

(b) For the FB approach, the indicators are calculated per critical branch/critical outage (hereafter referred to as "**CBCO**").

2 In April 2017 the statistical and quality indicators proposal required by articles 31(3)(b), 31(3)(c), 31(3)(d) and (4) of the CACM regulation was submitted to ACER. In May 2018 the statistical and quality indicators proposal required by articles 26(3)(b), 26(3)(c) and 26(3)(d) and (4) of the FCA regulation was submitted to ACER.

3 NEMOs need to support TSOs in making available the underlying data for the indicators.

4 Meaning the length of time (e. g. annually or monthly) for which the statistical analysis is performed. This is decided at the CCR level.

5 Meaning the individual moment in time (e. g. annual or monthly) for which the statistical analysis is performed. This is decided at CCR level.

Values used are the average and median absolute values, x/y % quantiles (recommended intervals 5/95 or 10/90) of the flow RM of each particular CBCO considered into single FB capacity calculation and allocation.

The granularity applied for this approach is yearly.

In general, the selection of one of these approaches is highly influenced by factors such as the infrastructures deployed in every capacity calculation region, for example, the meshing degree of the transmission grid, or the presence or absence of DC connections. These factors will dramatically influence which approach to follow, and hence the quality and statistical indicators to be reported by each region.

4.1.1 Indicators for short-term capacity calculation

Under the CACM regulation, there are quality and statistical indicators which consider both capacity calculation approaches: 4.1(a) and 4.1(b).

The all-TSO proposal for statistical and quality indicators according to Article 31(4) of the CACM Regulation was submitted to ACER for review in April 2017. As of this writing, neither this proposal nor the CACM Capacity Calculation report submitted in August 2017 has been commented on or amended. Therefore, these statistical and quality indicators are de facto adopted by all TSOs.

The following considerations have been taken into account when defining these statistical indicators:

- The description of the statistical indicators on RM, in accordance with Article 31(3)(b) of the CACM Regulation.
- The statistical indicators of cross-zonal capacity, including allocation constraints, where appropriate for each capacity calculation timeframe, in accordance with Article 31(3)(c) of the CACM Regulation.
- Recommendations that must be provided in accordance with Articles 31(3)(e) and 31(3)(f) of the CACM Regulation. These can only be provided after a certain time of operation of relevant coordinated CCMs.

A description of the CC approach used (or proposed for NRA approval) in the application of Article 20 of the CACM Regulation is provided for each CCR in chapter 4.2. The indicators are listed below:

a) **Ramping constraints for a single direct current (hereafter referred to as 'DC') interconnector (hereafter referred to as 'IC') or a set of DC ICs to count the number of occurrences of the constraint are limited to one per year and per DC IC or set of DC ICs.** This implies a reporting of the list of DC ICs or sets of DC ICs where the constraint is active (defined) and its defining characteristics are expressed in yearly averages (how many MW/MTUs) per DC IC or set of DC ICs.

   Clarification on 4.1.1(a) quality and statistical indicator: A ramping limit can constrain the hourly variation of the flows through an interconnector or set of interconnectors. This limitation confines the flow to an 'allowed band' when moving from one hour to the next. The ramping limit constrains the flow that can pass through the interconnector or set of interconnectors in hour h depending on the flow that has passed in the previous hour h-1. The ramping limits may be different for each period and flow direction.

b) **BZ net position ramping.** Accounts for the number of occurrences of the constraint being a limiting one per year and per BZ.

   Clarification on 4.1.1(b) quality and statistical indicator: This implies a reporting of the list of BZs where the constraint is active (defined) and its defining characteristics are expressed in yearly averages per BZB.

c) **Losses for DC ICs.** The list of DC ICs where the losses functionality is active, with the NRA-approved percentage of losses per year and per DC IC. This percentage will be multiplied by the yearly actual flows in order to report the yearly losses per DC IC.

   Clarification on 4.1.1(c) quality and statistical indicator: 'Losses functionality' covers the losses internalised in the MC algorithm so that this indicator works with net flows; this constraint is specifically considered for DC interconnectors/cables.

d) **Minimum stable flow constraint at a single DC IC/set of DC ICs.** Accounts for the number of occurrences of the constraint being a limiting one per year and per triple category (DC IC, set of DC ICs and BZ basis).

   Clarification on 4.1.1(d) quality and statistical indicator: This implies a reporting of the list of the BZs where the constraint is active (defined), and its defining characteristics are expressed in yearly averages per single DC IC, set of DC ICs or the net position BZ level.

e) **DC flow tariff constraint.** Accounts for the number of occurrences of the constraint being a limiting one per year and per BZB.

Clarification on 4.1.1(e) quality and statistical indicator: This implies a reporting of the list of BZ borders where the constraint is active (defined).

The flow tariff constraint is due to the specifications of merchant interconnectors. This constraint shall ensure that there is no power-flow over the DC IC until a defined minimum price differential is reached. The flow tariff is for market coupling optimisation, included as a loss with regard to the congestion rent. This will be seen in the results as a threshold for the price between the connected bidding areas:

› (i) If the difference between the two corresponding market clearing prices is less than the tariff, then the flow will be zero.

› (ii) If there is flow, the price difference will be exactly the flow tariff, unless there is congestion. Once the price difference exceeds the tariff, the congestion rent becomes positive.

f) **Bilateral intuitiveness constraint:** Accounts for the number of occurrences of the constraint being a limiting one per year and per BZ border.

Clarification on 4.1.1(f) quality and statistical indicator: This implies a reporting of the list of BZ borders where the constraint is active (defined).

FB market coupling can lead to non-intuitive situations, e. g. energy going from high priced areas to low priced areas. This is because some non-intuitive exchanges 'free up' capacity, allowing even larger exchanges between other markets, which has a positive effect on overall economic surplus. The market coupling algorithm integrates a mechanism to suppress these non-intuitive exchanges. This mechanism seeks 'flows' between areas which match the net positions.

g) **Curtailment distribution.** Accounts for the number of occurrences of curtailment per BZ border and the total curtailed megawatt hours (MWh) that year per BZ border.

h) **BZ net position volume.** Accounts for the number of occurrences of the constraint acting as a limiting factor. This implies a reporting of the list of BZs, where the constraint is active (defined) and the statistical information (e. g. minimum, maximum and average values) of import and export is limited per year and per BZ. This constraint will allow the definition of a positive and negative bound to the net position for each bidding zone, i. e. maximum import and/or export of the BZ as determined by the TSOs.

The table below encapsulates the intended to use of intraday (ID) and day-ahead (DA) indicators by the CCRs once the CCMs are implemented. The baseline for this 'merged' table are the separate intraday and day-ahead tables provided in the 2017 CC Report. Further details on the current state of implementing the indicators are provided in the relevant CCR chapters.

CCR/ Indicator	Nordic		Hansa		Core		Italy North		Greece–Italy		SWE		IU		Channel		Baltic		SEE	
	DA	ID	DA	ID	DA	ID	DA	ID	DA	ID	DA	ID	DA	ID	DA	ID	DA	ID	DA	ID
4.1.(a)	No	Yes	Yes		No		Yes		Yes		Yes		Yes		Yes		Yes		Yes	
4.1.(b)	Yes	No	No		Yes		No		N.A.		N.A.		N.A.		N.A.		N.A.		N.A.	
4.1.1 (a)	Yes		Yes		Yes		Yes		N.A.		N.A.		Yes		Yes		Yes		N.A.	
4.1.1 (b)	No		No		No		N.A.		N.A.		N.A.		Yes		N.A.		No		N.A.	
4.1.1 (c)	No		No		No		N.A.		N.A.		N.A.		Yes		Yes		No		N.A.	
4.1.1 (d)	No		No		No		N.A.		N.A.		N.A.		N.A.		N.A.		N.A.		N.A.	
4.1.1 (e)	No		No		No		N.A.		N.A.		N.A.		N.A.		N.A.		No		N.A.	
4.1.1 (f)	No		No		N.A.		N.A.		N.A.		N.A.		N.A.		N.A.		No		N.A.	
4.1.1 (g)	No		No		N.A.		N.A.		N.A.		Yes		Yes	Yes*	Yes	No	No		N.A.	
4.1.1 (h)	No		No		Yes		Yes		N.A.		No		Yes	Yes*	Yes	No	Yes		N.A.	

N.A. = Not possible to be monitored by the CCR; No = Not monitored and not reported by the CCR ; Yes = Monitored and reported by the CCR

* Due to the interim intraday solution at this stage.

Table 2 – Indicators for short-term capacity calculation in each CCR

4.1.2 Indicators for long-term capacity calculation

The all-TSO proposal for statistical and quality indicators pursuant to Article 26(4) of the FCA Regulation was submitted to ACER for a first review on 30 May 2018. At the time of this writing, neither this proposal nor the FCA Capacity Calculation report submitted in August 2018 have been amended. Therefore, the following statistical and quality indicators are de facto adopted by all TSOs.

As mentioned above, at the time of drafting this report the NRAs' regional approval process is still ongoing for all proposals for regional long-term CCMs. An overview of the CC approach planned for each CCR in line with the current status CCM is provided below:

	Nordic	Hansa	Core	Italy North	GRIT	SWE	IU	Channel	Baltic	SEE
CNTC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FB	–	–	–	–	–	–	–	–	–	–

Table 3 – Long-term capacity calculation approach in each CCR

In accordance with Article 26(3)(c) of the FCA Regulation, the following considerations have been taken into account when defining these statistical and quality indicators:

- Include the allocation constraints where appropriate for each capacity calculation's long-term timeframe.
- Assess the level of cross-zonal capacity available for each MTU during the observation period,[6] without taking into account unplanned/unscheduled outages.

The granularity applied is defined by the observation period.

Values used are the average and median values and x/y % quantiles (recommended 5/95 or 10/90) of net transmission capacity (hereafter referred to as "**NTC**") and available transmission capacity (hereafter referred to as "**ATC**") values for each MTU.

A description of the CC approach used (or proposed for NRA approval) in the application of Article 10 of the FCA Regulation is provided for each CCR in section 4.2.

a) **Statistical indicators on the interim parameters of CNTC.** If remedial actions according to Article 14 of the FCA Regulation are taken into account in the long-term CC methodology, the following statistical indicators on the interim parameters of coordinated NTC shall apply:

› (i) Values used are the average and median values and x/y % quantiles (recommended interval 5/95 or 10/90) of maximum calculated exchange between two bidding zones on either side of the BZB without consideration of remedial actions applied according to Article 14 of the FCA Regulation. **Granularity applied:** Observation period[7]

› (ii) Values used are the average and median values and x/y% quantiles (recommended interval 5/95 or 10/90) of adjusted maximum power exchange using remedial actions according to Article 14 of the FCA Regulation taken into account in the CC methodology according to Article 10 of the FCA Regulation. **Granularity applied:** Observation period[8]

b) **Indicators for allocation constraints.** Accounts for the allocation constraints in the LT timeframes that are being provided for the allocation by the respective TSOs as a part of CC performed in a coordinated manner (at least at the CCR level) using the CNTC approach.

Clarification on 4.1.2(ii) quality and statistical indicator:
At the time of this writing, the CC methodologies developed pursuant to the FCA Regulation and based on the CNTC approach show common allocation constraints referring to the losses for DC ICs.

6/7/8 Defined as the period of time (e.g., annually or monthly) of time in which statistical analysis is performed. This is decided at the CCR level.

Thus, the statistical and quality indicators identified for the long-term timeframe consider the list of DC ICs in which the losses functionality is active (defined), with the NRA-approved percentual value of the losses per year and per DC IC. This percentage will be multiplied by the actual yearly flows in order to report the yearly losses per DC IC.

c) **Quality indicators for the information used for capacity calculation.** Assesses the quality of input data for individual grid models and the common grid model (hereafter referred to respectively as "**IGMs**" and "**CGM**") taking into account statistical parameters such as mean value, median and standard deviation.

Clarification on 4.1.2(iii) quality and statistical indicator:
This indicator assesses the RM and represents the security limits and the uncertainties between the different Capacity Calculation timeframes (DA, ID and LT). Therefore, they shall be allowed to quantitatively assess the quality and level of the RM in the given time period:

- (i) In the CNTC approach, the indicators apply per BZB, direction and observation period within DA, ID and long-term timeframes. **Granularity applied:** Observation period[9]

  Values used are the average and median values and x/y % quantiles (recommended intervals 5/95 or 10/90) of the RM set for each MTU.

- (ii) For FB approach, the indicators are calculated per CBCO and comprise the average and median absolute values and x/y% quantiles (recommended intervals 5/95 or 10/90) of the flow reliability margin of each particular CBCO considered into a single FB capacity calculation and allocation. **Granularity applied:** Annually

At the time of writing, the table below depicts the statistical and quality indicators to be reported by each CCR once the relevant FCA CCM is implemented. As most FCA CCMs are not currently approved, the selection of indicators per CCRs may be adapted in the future.

CCR Indicator	Nordic	Hansa	Core	Italy North	Greece–Italy	SWE	IU	Channel	Baltic	SEE
4.1.2 (a)(i)	TBD	TBD	TBD	TBD	N.A.	N.A.	TBD	TBD	TBD	TBD
4.1.2 (a)(ii)	TBD	TBD	TBD	TBD	N.A.	Yes	TBD	TBD	TBD	TBD
4.1.2 (b)	TBD	TBD	TBD	Yes	N.A.	N.A.	TBD	TBD	TBD	TBD
4.1.2 (c)(i)	TBD	TBD	TBD	TBD	N.A.	Yes	TBD	TBD	TBD	TBD
4.1.2 (c)(ii)	TBD	TBD	TBD	TBD	N.A.	N.A.	N.A.	N.A.	TBD	TBD

N.A. = Not possible to be monitored by the CCR; No = Not monitored and not reported by the CCR ; Yes = Monitored and reported by the CCR
TBD = No decision has been taken by the CCR

Table 4 – Indicators for long-term capacity calculation by CCR

9 Defined as the period of time (e.g., annually or monthly) of time in which statistical analysis is performed. This is decided at the CCR level.

4.2 Capacity Calculation Region

Capacity Calculation Region is a concept that stems from the need to properly take into account the cross-zonal flows for capacity calculation and allocation for all market timeframes. This organisation ensures that coordinated capacity calculation can be performed properly and in a reliable way to ensure optimal capacity is made available to the European market.

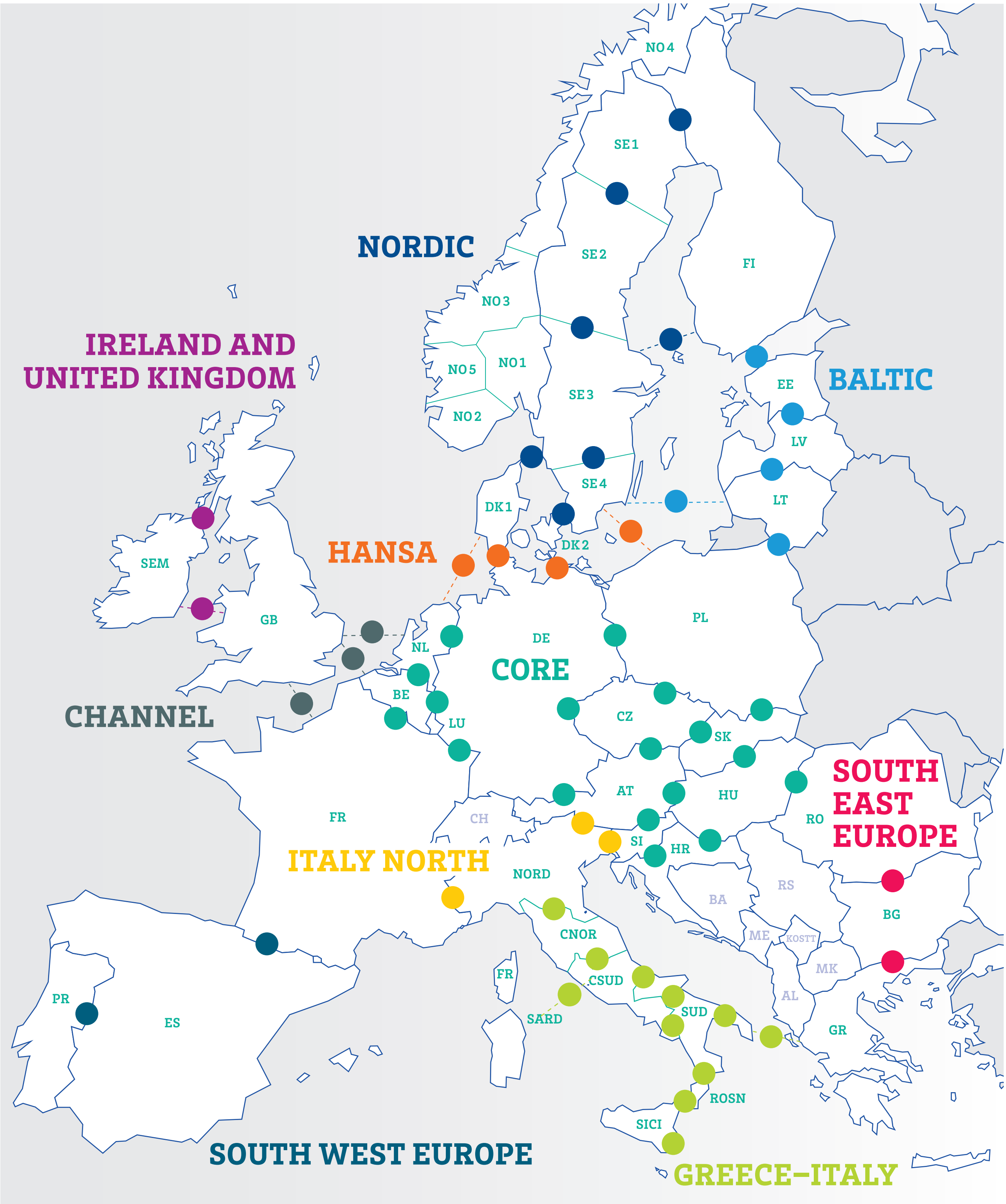


Figure 1 – Capacity Calculation Regions (as of the end of 2018)

The table below shows the delineation of the regions at the end of 2018 (i. e. not including the second CCR amendment). This is the geographical basis for reporting in the dedicated CCR chapters in this report.

CCR	CACM CCM status	Baltic RCC	Coreso	Nordic RCC	SCC	SEE CCC	TSCNET
Baltic	Approved in August 2018 *Baltic CCR ACER decision*	Approved by TSOs: 05.06.2019 & offered by RSC: 02.05.2019					
Channel	Approved in November 2018 *Channel CCR NRAs approval*		Nominated by TSOs: formal letter pending approval, not before 08.07.2019 & 'acknowledged' by RSC: to be determined, not before 08.07.2019				Nominated by TSOs: formal letter pending approval, not before 08.07.2019 & 'acknowledged' by RSC: to be determined, not before 08.07.2019
Core	Approved in February 2019 *Core CCR ACER decision*		Nominated by TSOs: 15.04.2019 & 'acknowledged' by RSC: 24.04.2019)				Nominated by TSOs: 15.04.2019 & 'acknowledged' by RSC: 29.04.2019
Greece-Italy (GRIT)	Approved in May 2018 *GRIT CCR NRAs approval*		TBC		TBC	TBC	TBC
Hansa	Approved in April 2018 *Hansa CCR ACER decision*			Nominated by TSOs: 15.04.2019 & "acknowledged" by RSC: 03.05.2019			Nominated by TSOs: 15.04.2019 & "acknowledged" by RSC: 03.05.2019
Italy North	Request for Amendment received in May 2019 *Italy North NRAs RfA*		TBC				TBC
Ireland and United Kingdom	Approved in July 2018 *IU CCR NRAs approval*		Nominated by TSOs: formal letter pending approval, not before 31.12.2019. To be determined, not before 31.12.2019				
Nordic	Approval in July 2018 *Nordic CCR NRAs approval*			Nominated by TSOs: 01.11.2018, 'acknowledgement' by RSC has not yet been received			
South East Europe						Nominated by TSOs: 12.07.2019 & 'acknowledged' by interim CCC: 12.07.2019 *	
South West Europe	Approved on 24 October 2018 *SWE CCR NRAs approval*		Nominated by TSOs: 19.06.2019 & 'acknowledged' by RSC: 20.06.2019				

* On 12 July ESO, IPTO and Transelectrica signed an MoU which e. g., foresees that ESO will provide capacity calculation services and will be temporarily nominated as Capacity Calculator for SEE CCR, until the RSC is incorporated as a separate company.
(More information at https://www.entsoe.eu/news/2019/07/17/south-east-europe-tsos-agree-on-a-mou-for-establishing-a-regional-coordination-centre/)

Table 5 – Central Capacity Calculators per CCRs

At the time of writing, many CCRs have nominated a Coordinated Capacity Calculator (hereinafter referred to as "**CCC**") in line with the relevant regulations and timelines. An overview of the nomination status in the relevant CCRs is depicted in the above.

4.2.1 Nordic

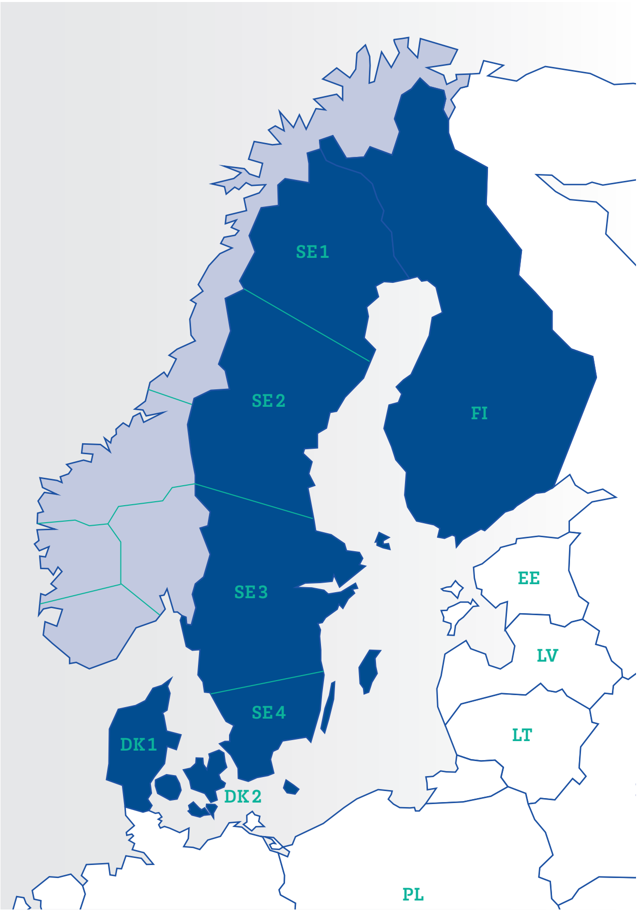


Figure 2 – Nordic CCR

The TSOs in the Nordic CCR are Energinet Elsystemansvar A/S (DK), Svenska Kraftnät (SE), and Fingrid Oyj (FI).

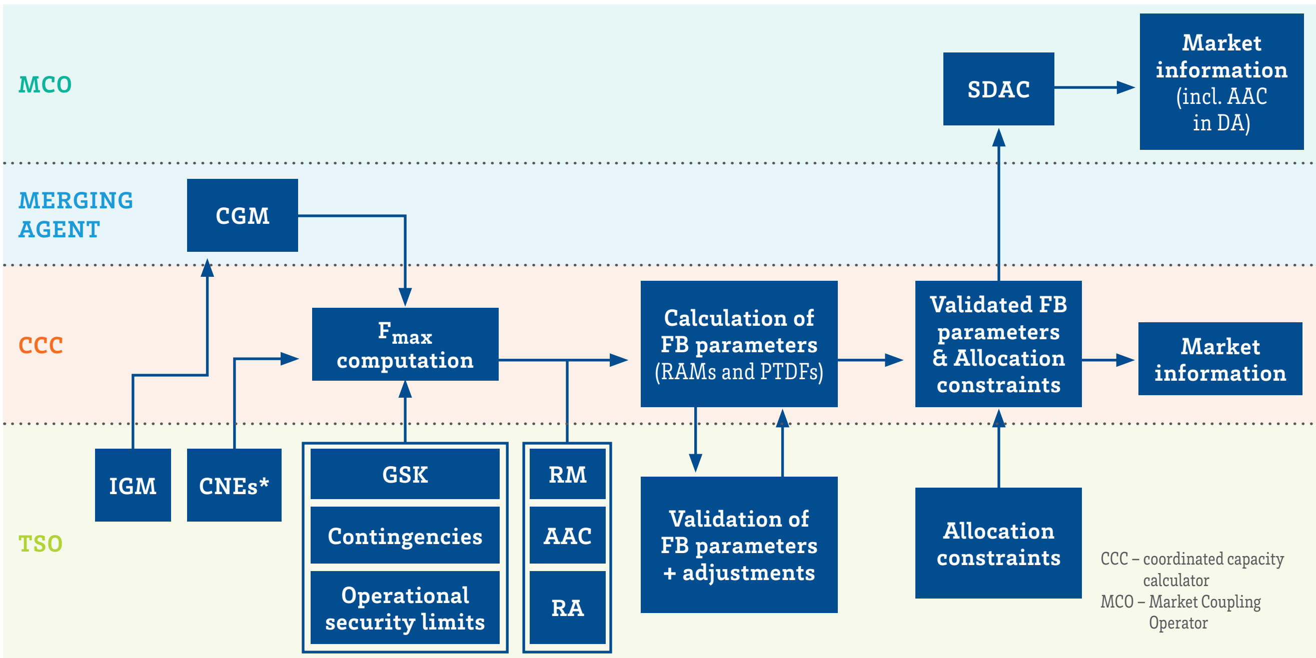
This CCR includes the following BZBs: Finland – Sweden 1 (FI – SE1), Finland – Sweden 3 (FI – SE3), Sweden 1 – Sweden 2 (SE1 – SE2), Sweden 2 – Sweden 3 (SE2 – SE3), Sweden 3 – Sweden 4 (SE3 – SE4), Sweden 4 – Denmark 2 (SE4 – DK2) and Sweden 3 – Denmark 1 (SE3 – DK1).

Statnett SF is also a member of the Nordic CC methodology project but is not part of the Nordic CCR as defined in the decision of ACER No 06/2016 of 17 November 2017 on the electricity transmission system operator's proposal for the determination of CCRs.

4.2.1.1 Capacity calculation and allocation for the short-term

The Nordic capacity calculation methodology[10] for the day-ahead and intraday timeframes was approved by Nordic NRAs on 16 July 2018. For the day-ahead time-frame, the Nordic TSOs implement a flow-based capacity calculation approach.

For the intraday timeframe, as a long-term solution, the Nordic TSOs intend to implement a flow-based approach, as soon as the intraday market platform is technically able to utilise flow-based capacities. As an interim solution, the Nordic TSOs propose to implement an approach using coordinated net transmission capacity.



*CNEs to be defined at least on weekly basis applying relevant historical CGMs

Figure 3 – Roles of the entities involved, and input and output data, in the capacity calculation process for the day-ahead time-frame. MCO means Market Coupling Operator, and the merging agent delivers the CGM.

10 https://nordic-rsc.net/wp-content/uploads/2018/10/legal.pdf

A so-called stakeholder information platform is hosted by the Nordic RSC and provides (amongst other things) access to flow-based parameters and market simulation results, and a draft version of a stakeholder information tool to get a grip on the flow-based parameters.

The high-level capacity calculation process for the day-ahead timeframe is shown in Figure 3. The figure identifies the roles of the entities involved and the input and output data in the capacity calculation process. This capacity calculation process shall be applied for the intraday timeframe when the FB approach has been implemented.

Closed milestones	
Quarter	**Description**
Q2 2017	The Nordic CCR ran a public consultation on the CCM.*
Q3 2017	The Nordic CCR ran a second public consultation on the CCM.**
Q3 2017	The Nordic CCR submitted the CCM proposal to all regulatory authorities of the Nordic CCR.
Q1 2018	All regulatory authorities of the Nordic CCR requested an amendment for the CCM proposal.
Q2 2018	The Nordic CCR amended the CCM proposal and submitted it for NRA approval.
Q3 2018	NRA approval of the CCR Nordic CCM proposal.
Q4 2018	2nd NRA request for amendment.***

* https://consultations.entsoe.eu/markets/capacity-calculation-methodology-proposal-for-the/

** https://consultations.entsoe.eu/markets/capacity-calculation-methodology-for-the-nordic-cc/

*** https://nordic-rsc.net/wp-content/uploads/2019/01/Nordic-CCM-RfA.pdf

Table 6 – Nordic CCR: closed milestones for short-term capacity calculation and allocation

Planned milestones	
Quarter	**Description**
Q3 2018 - Q4 2021	Nordic CCM implementation.
Q3 2019	Re-submission of the Nordic CCM proposal.
Q3 2020	Start of public parallel run.
Q3 2021	Go-live criteria are met.
Q3 2021	The Nordic day-ahead CCM and intermediate intraday CCM go-live.
TBD	Target intraday CCM go-live (contingent on Cross-Border Market Intraday [XBID] Market Project schedule).

Table 7 – Nordic CCR: planned milestones for short-term capacity calculation and allocation

Given the projected timeline for the implementation of the capacity calculation methodology, it is expected that the indicators applicable to the Nordic CCR will correspond to those applicable today (i. e. as presented in the table in section 4.1.1).

The present NTC-based capacity calculation method used on interconnectors within the Nordic CCR means that only a limited subset of the indicators listed in section 4.1.1 are applicable today. Once the enduring CCM is implemented, a reassessment of the applicability of the indicators listed in section 4.1.1 can take place.

At the time of this writing, many indicators are only applicable to the DC interconnectors DK2 – SE3 and DK1 – DK2. Those are:

Indicators			
Performance indicator	**Day-ahead**	**Intraday**	**Additional information**
4.1(a) – CNTC approach	No	Yes	**Indicator applicable:** CCR Nordic propose to use flow-based in day-ahead and CNTC in intraday.
4.1(b) – FB approach	Yes	No	**Indicator applicable** for day-ahead a not for intraday.
4.1.1(a) – Ramping constraints for single direct current	Yes	Yes	**Indicator applicable** only for DC interconnectors DK2 – SE3 and DK1 – DK2: However, this is part of the market algorithm.
4.1.1(b) – BZ net position ramping	No	No	**Indicator not applicable:** There are no ramping limitations currently on a bidding zone level. Single limitations are not reported to the TSOs.
4.1.1(c) – Losses for DC ICs	No	No	**Indicator not applicable:** No losses functionality is implemented on DC interconnectors DK2 – SE3 and DK1 – DK2
4.1.1(d) – Minimum stable flow constraint	No	No	**Indicator not applicable:** There are no minimum stable flow constraints at a single DC IC/set of DC ICs currently applied.
4.1.1(e) – DC flow tariff constraint	No	No	**Indicator not applicable:** There are no day-ahead and intraday DC flow tariff constraints currently applied.
4.1.1(f) – Bilateral intuitiveness constraint	No	No	**Indicator not applicable** but may need to be reassessed once the flow-based approach is implemented
4.1.1(g) – Curtailment distribution	No	No	**Indicator not applicable:** Curtailment distribution is not used – only firm capacity. Countertrade is used to ensure firmness.
4.1.1(h) – BZ net position volume	No	No	**Indicator not applicable:** There is no day-ahead and intraday BZ net position volume. Part of the market algorithm. Single limitations are not reported to TSOs in the existing system.

Table 8 – Nordic CCR: detailed indicators for short-term capacity calculation and allocation

4.2.1.2 Capacity calculation and allocation for the long-term

At the time of this writing, the FCA CC methodology for Nordic CCR is not yet approved bwy the NRAs. Hence, there are no specific timeframes for the milestones related to the development of the FCA CC methodology. The Nordic CCR TSOs have proposed to implement a CNTC approach.

Closed milestones	
Quarter	**Description**
Q3 2017	The Nordic CCR ran a public consultation on the regional design of long-term transmission rights.*
Q2 2018	A public consultation was launched after the request for amendments was received concerning more. than one NEMO in one bidding zone in accordance with Article 45 and 57.**
Q4 2018	The Nordic CCR ran a public consultation on the long-term CCM Article 6.***
Q1 2019	The Nordic CCR LTTR CCM proposal was submitted to NRAs.****

* https://nordic-rsc.net/wp-content/uploads/2019/01/FCA-Capacity-calculation-methodology-legal-proposal-Vf.pdf

** https://consultations.entsoe.eu/markets/capacity-calculation-region-nordic-s-proposal-for/

*** https://consultations.entsoe.eu/markets/nordic-tsos-request-for-amendments-in-accordance-w/ **** https://consultations.entsoe.eu/markets/lt_ccm_nordic_ccr/

Table 9 – Nordic CCR: closed milestones for long-term capacity calculation and allocation

Planned milestone	
Quarter	**Description**
Q3 2019	NRA decision on the CCR Nordic LTTR CCM proposal.

Table 10 – Nordic CCR: planned milestone for long-term capacity calculation and allocation

4.2.2 Hansa

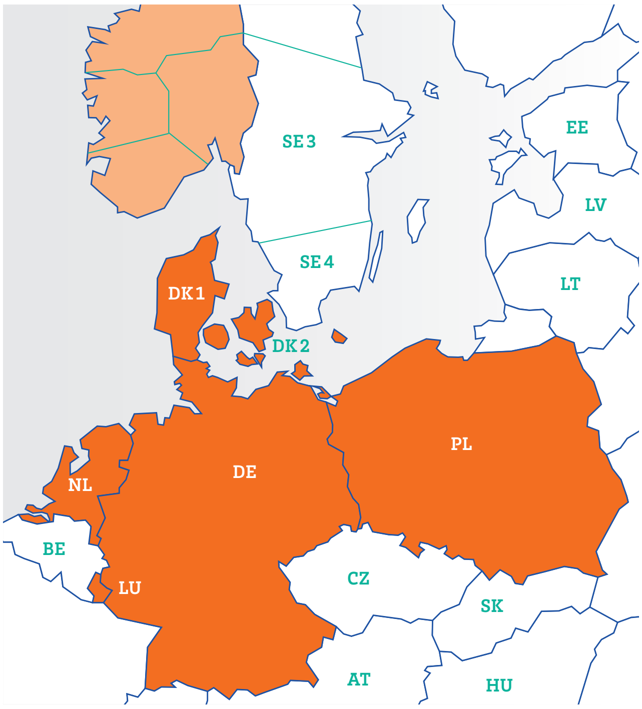


Figure 4 – Hansa CCR

The TSOs currently in the Hansa CCR are: Energinet Elsystemansvar A/S (DK), Svenska Kraftnät (SE), PSE Polskie Sieci Elektroenergetyczne S.A (PL), TenneT TSO GmbH (DE), TenneT TSO V.B. (NL) and 50Hertz Transmission GmbH (DE).

This CCR includes the following Bidding Zone Borders: Denmark – Germany/Luxembourg (DK2 – DE/LU), Denmark – Germany/Luxembourg (DK1 – DE/LU), Sweden – Poland (SE4 – PL), Denmark – The Netherlands (DK1 – NL). It is expected that the BZBs NO2 – NL (TenneT TSO B.V. and Statnett SF) is added to Hansa CCR once Norway ratifies the CACM Regulation. At the time of this writing, the owner of Baltic Cable (SE4 – DE/LU) is not a certified TSO and is therefore not part of the Hansa CCR.

The COBRAcable will be operational in Q3 2019, enabling a connection between the Netherlands and Denmark. This HVDC submarine power cable allows the participation of the Netherlands in the Hansa CCR.

Norway is not yet formally part of the Hansa CCR, but actively participates in the project.

4.2.2.1 Capacity calculation and allocation for the short-term

Closed milestones	
Quarter	**Description**
Q3 2017	The Hansa CCR ran a public consultation on the CCM.*
Q3 2017	The Hansa CCR submitted the CCM proposal for NRA approval.**
Q1 2018	NRAs submitted Requests for Amendments to the CCM proposal.***
Q3 2018	TSOs submitted Requests for Amendments to the CCM proposal.****
Q4 2018	NRAs approved Requests for Amendments to the CCM proposal.*****
Q4 2018	Hansa CCR Coordinated redispatch and countertrading methodology for CCM was approved.******
Q1 2019	ACERs amendment of the determination of CCRs, COBRAcable included.*******
Q2 2019	Appointment of Coordinated Capacity Calculators

* https://consultations.entsoe.eu/markets/capacity-calculation-region-hansa/

** https://docstore.entsoe.eu/Documents/nc-tasks/EBGL/CACM_A20.2_20180915_CCM%20Hansa%20proposal.pdf

*** https://docstore.entsoe.eu/Documents/nc-tasks/EBGL/CACM_A20.2_20180719_CCM%20Hansa_RfA.pdf?Web=0

**** See steps described here: https://www.acer.europa.eu/en/Electricity/MARKET-CODES/CAPACITY-ALLOCATION-AND-CONGESTION-MANAGEMENT/IMPLEMENTATION/Pages/CAPACITY-CALCULATION.aspx

***** https://energinet.dk/-/media/B1B94C910A5F464FAE3EAED11A90B730.pdf

****** https://consultations.entsoe.eu/markets/coordinated-redispatching-and-countertrading-metho/

******* See introduction of this section (4.1.2)

Table 11 – Hansa CCR: closed milestones for short-term capacity calculation and allocation

Planned milestones	
Quarter	**Description**
Q1 2020	Implementation of CCM.
Q3 2020	Implementation of flow-based capacity calculation with advanced hybrid coupling (AHC) in Nordic CCR.
Q2/3 2020	Analysis of the optimal determination of CCRs.
Q2 2021	Implementation of intraday market coupling with flow-based constraints.

Table 12 – Hansa CCR: planned milestones for short-term capacity calculation and allocation

The CCM for the Hansa CCR is, due to the scope of the Hansa CCR, interlinked with the CCMs being developed in the Nordic CCR and the Core CCR. These conditions should be taken into account when reading the following description.

Since the Hansa CCR has the unique feature of all bidding zones being currently connected by radial lines, the assessment of cross-border capacity can be split into three separate parts, which allows the TSOs to look at the impact of cross-border trade independently on each part of the grid. The methodology for the Hansa CCR is, therefore, a CNTC methodology for both day-ahead and intraday. The CCM in the Hansa CCR is to take advantage of the flow-based methodologies with an Advanced Hybrid Coupling (AHC) approach developed in the Nordic CCR and the Core CCR in order to represent the limitations in the meshed AC grids, while the actual interconnector capacities are addressed individually within the Hansa CCR. While the implementation of AHC is foreseen for the Nordic CCR from the beginning of the Nordic flow-based capacity calculation, it is planned to be applied in the Core CCR in an additional step after the initial go-live.

This method ensures that the capacity calculation in the Hansa CCR is as efficient as possible from a market point of view in all timeframes. The methodology is easy to implement, and from an operational and security of supply perspective it is coordinated with adjacent regions. Moreover, the proposed methodology is sustainable throughout the expected future changes in CCR configurations.

Due to the interdependencies with other CCRs, the CCM for the Hansa CCR will be implemented step-by-step until the target solution is reached.

The steps include:

- Appointment of a CCC
- Implementation of the CGM
- Implementation of flow-based capacity calculation with AHC in the Nordic CCR,
- Implementation of flow-based capacity calculation with AHC in the Core CCR,
- Implementation of intraday market coupling with flow-based constraints.

Indicators' applicability at the time of this writing are:

Indicators			
Performance indicator	**Day-ahead**	**Intraday**	**Additional information**
4.1(a) – CNTC approach	Yes	Yes	**Indicator applicable:** For the AC border in the Hansa CCR (DK1-DE/LU), the transmission reliability margin will be reported. No RM available for DC lines.
4.1(b) – FB approach	No	No	**Indicator not applicable:** CNTC approved by NRAs as applicable for the Hansa CCR.
4.1.1(a) – Ramping constraints for single direct current	Yes	Yes	**Indicator applicable:** Ramping constraints and the level at which it limits the market will be reported to the market.
4.1.1(b) – BZ net position ramping	No	No	**Indicator not applicable:** This constraint is not applied in any BZ of this CCR.
4.1.1(c) – Losses for DC ICs	No	No	**Indicator not applicable:** This constraint is not applied at any IC of this CCR.
4.1.1(d) – Minimum stable flow constraint	No	No	**Indicator not applicable:** This constraint is not applied at any IC of this CCR.
4.1.1(e) – DC flow tariff constraint	No	No	**Indicator not applicable:** This constraint is not applied at any HVDC IC of this CCR.

Indicators			
Performance indicator	**Day-ahead**	**Intraday**	**Additional information**
4.1.1(f) – Bilateral intuitiveness constraint	No	No	**Indicator not applicable:** This constraint is not applied as FB is not implemented in this CCR.
4.1.1(g) – Curtailment distribution	No	No	**Indicator not applicable:** Curtailment distribution is not expected to be applied on the borders of the region.
4.1.1(h) – BZ net position volume	Yes	Yes	**Indicator applicable:** Can be reported for some of the BZs to which the Hansa CCR BZ borders are connected, as not all BZ are applying these allocation constraints.

Table 13 – Hansa CCR: detail indicators for short-term capacity calculation and allocation

4.2.2.2 Capacity calculation and allocation for the long-term

At present, the Hansa CCR TSOs are ready to send the FCA LTTR CCM into public consultation. The Hansa CCR proposes to implement a CNTC. At the time of this writing, there is no specific timeframe for the completed implementation of the target model for the Hansa CCR as it relates to the development of external projects.

Currently, there are LTTRs on the borders of Denmark – Germany/Luxembourg (DK2-DE/LU), Denmark – Germany/Luxembourg (DK1-DE/LU), Denmark – Denmark (DK1 – DK2), and LTTRs will be added to border Denmark – The Netherlands (DK1-NL).

Closed milestones	
Quarter	**Description**
Q1 2018	Regional design of LTTR as approved.*
Q2 2019	The Hansa CCR ran a first public consultation on the LTTR CCM** and splitting rules.***

* https://energinet.dk/-/media/73F424D436DA488CAA8B972C9955E416.pdf

** https://consultations.entsoe.eu/markets/fca_ccm_hansa_ccr/

*** https://consultations.entsoe.eu/markets/fca_art-16_hansa_ccr/

Table 14 – Hansa CCR: closed milestones for long-term capacity calculation and allocation

Planned milestones	
Quarter	**Description**
Q2 2019	Submission of Hansa CCR LTTR CCM proposal and splitting rules.
Q4 2019	Approval of Hansa CCR LTTR CCM proposal and splitting rules.

Table 15 – Hansa CCR: planned milestones for long-term capacity calculation and allocation

At the time of this writing the Hansa CCR long-term CCM is not yet submitted for regulatory approval.

4.2.3 Core

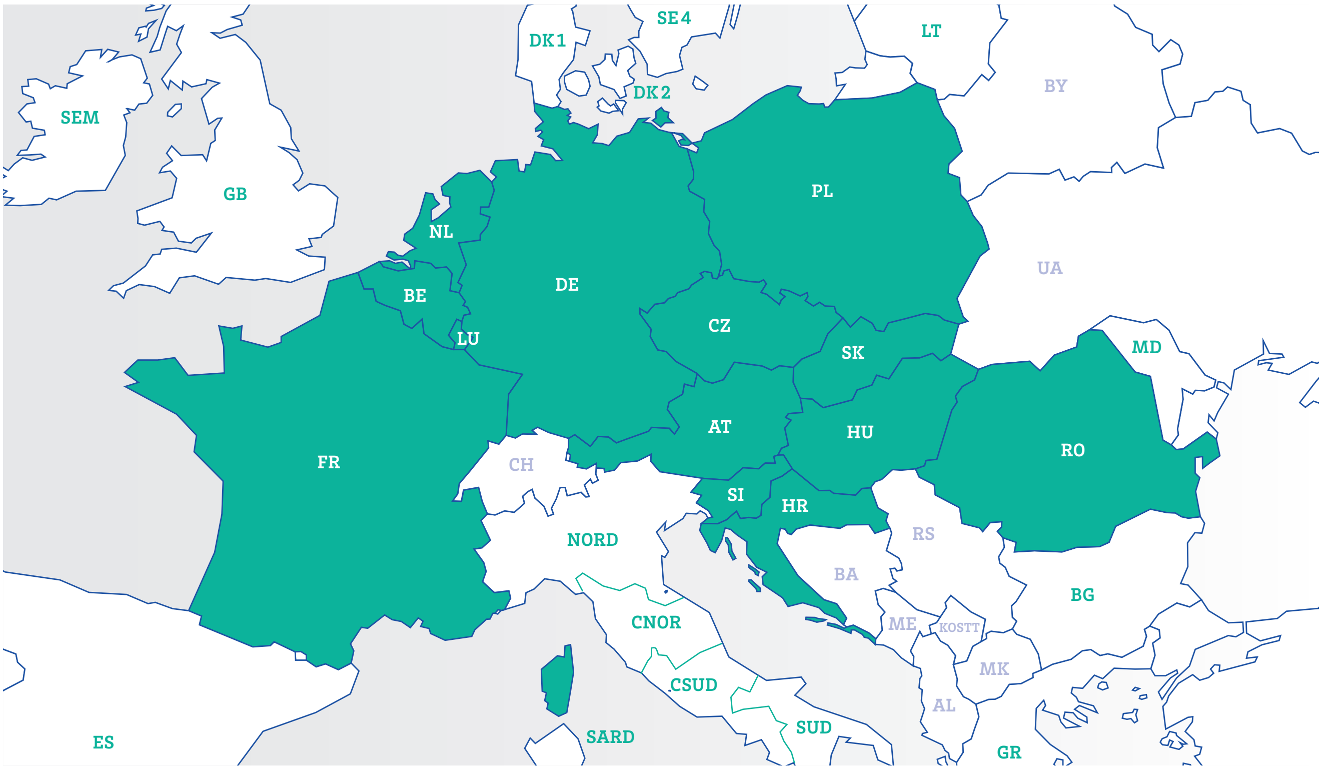


Figure 5 – Core CCR

The 16 TSOs currently in the Core CCR are 50Hertz Transmission GmbH, Amprion GmbH, Austrian Power Grid AG, ČEPS a.s., Creos Luxembourg S.A., Croatian Transmission System Operator Ltd., Eles, D.O.O., Sistemski Operater Prenosnega Elektroenergetskega Omrežja, Elia System Operator NV/SA, MAVIR Hungarian Independent Transmission Operator Company Ltd., PSE - Polskie Sieci Elektroenergetyczne S.A., C.N. Transelectrica S.A., Réseau de Transport d'Électricité, Slovenská Elektrizačná Prenosová Sústava, a. s., TenneT TSO B.V., TenneT TSO GmbH and TransnetBW GmbH.

The Core CCR includes the following BZBs: France-Belgium (FR – BE), Belgium-Netherlands (BE – NL), France-Germany/Luxembourg (FR – DE/LU), Netherlands – Germany/Luxembourg (NL – DE/LU), Belgium – Germany/Luxembourg (BE – DE/LU) [11], Germany/Luxembourg-Poland (DE/LU – PL), Germany/Luxembourg – Czech Republic (DE/LU – CZ), Austria– Czech Republic (AT – CZ), Austria-Hungary (AT – HU), Austria-Slovenia (AT – SI), Czech Republic–Slovakia (CZ – SK), Czech Republic-Poland (CZ – PL), Hungary-Slovakia (HU – SK), Poland-Slovakia (PL – SK), Croatia-Slovenia (HR – SI), Croatia- Hungary (HR – HU), Romania- Hungary (RO – HU), Hungary – Slovenia (HU – SI)[12] and Germany/Luxembourg – Austria (DE/LU-AT).

Capacity calculation regions play an important role in further developing and integrating European electricity markets. At this level, procedures concerning cross-border trade and operation of interlinked transmission systems are being set up in line with the requirements of the European Network Codes and Guidelines for energy markets (CACM, FCA) and operations (SO GL). These commission regulations commit TSOs inter alia to develop a common cross-border flow-based capacity calculation methodology both for day-ahead and intraday market. TSOs will also design and implement principles for capacity calculation for long-term timeframes and methodologies for coordinated re-dispatching and countertrading and its subsequent cost-sharing.

TSOs are assisted by an external project manager who is in charge of the day-to-day management and the coordination of the work of different working platforms. TSOs in the Core CCR have set up a special consulting group – **Core Consultative Group** (Core CCG) with the aim to inform the concerned market participants and involve them in discussions about the implementation of CCR deliverables within the Core CCR.

11 Please note that this border is expected to be in operation in 2020.
12 Please note that this border is expected to be in operation in 2022.

4.2.3.1 Capacity calculation for the short-term

Closed milestone	
Quarter	**Description**
Q1 2019	ACER decision on the day-ahead flow-based capacity calculation and intraday flow-based CCM methodologies.*

* https://docstore.entsoe.eu/Documents/Network%20codes%20documents/Implementation/ccr/methodologies/core/cacm-deliverables/da-and-id-ccms-art-20ff/ACER%20Decision%2002-2019%20on%20CORE%20CCM.pdf

Table 16 – Core CCR: closed milestone for short-term Capacity Calculation

Planned milestones	
Quarter	**Description**
Q4 2019	Start of the external parallel run.
Q4 2020	Go-live day-ahead flow-based capacity calculation.*
Q4 2021	Go-live of the intraday flow-based capacity calculation (for 22:00 D-1).
Q3 2022	Submission of the amended day-ahead CCM methodology to the NRAs.
Q4 2022	Go-live of the intraday flow-based capacity calculation (for 10:00 D).

* April 2019 press release: flow-based Market Coupling to be implemented in the Core Capacity Calculation Region by Q4 2020

Table 17 – Core CCR: planned milestones for short-term capacity calculation

The implementation of the Core day-ahead CCM is in progress. The ACER decision on the Core day-ahead and ID CCM methodologies impacts this implementation process. In addition, the internal parallel run – internal TSO testing of the day-ahead CCM submitted by Core TSOs to NRAs in June 2018 – needs to be aligned with the ACER methodology. Indicators' applicability at the time of this writing are:

Indicators			
Performance indicator	**Day-ahead**	**Intraday**	**Additional information**
4.1(a) – CNTC approach	No	No	**Indicator not applicable:** Not applicable in flow-based capacity calculation.
4.1(b) – FB approach	Yes	Yes	**Indicator applicable:** The region proposes to use flow-based capacity calculation in day-ahead and intraday.
4.1.1(a) – Ramping constraints for single direct current	Yes	Yes	**Indicator applicable:** Several DC cables are related to Core CCR.
4.1.1(b) – BZ net position ramping	No	No	**Indicator not applicable:** There is currently no BZ NP ramping constraint considered in the current configuration of the region.
4.1.1(c) – Losses for DC ICs	No	No	**Indicator not applicable:** There are currently no losses considered in the current configuration of the region.
4.1.1(d) – Minimum stable flow constraint	No	No	**Indicator not applicable:** There is no minimum stable flow constraint considered in the current configuration of the region.
4.1.1(e) – DC flow tariff constraint	No	No	**Indicator not applicable:** There is currently no DC flow tariff constraint considered in the current configuration of the region.
4.1.1(f) – Bilateral intuitiveness constraint	TBD	TBD	**Indicator under assessment:** Still to be determined for day-ahead in the Core market coupling project, together with Core NEMOs. Still to be determined for flow-based intraday, during the FB intraday market-coupling development.
4.1.1(g) – Curtailment distribution	Yes	TBD	**Indicator partially applicable:** Still to be determined for flow-based intraday, during the FB ID market-coupling development.
4.1.1(h) – BZ net position volume	Yes	Yes	**Indicator applicable:** Due to allocation constraints, TSOs can apply constraints on BZ net position volume.

Table 18 – Core CCR: detailed indicators for short-term Capacity Calculation

4.2.3.2 Capacity calculation and allocation for the long-term

Currently the 'Robust Experimentations'[13] are in progress, resulting in decisions on treatment of several variables in the Core long-term CCM. The Proposal and the Explanatory Note on the long-term CCM are taking shape. Discussions with other CCRs on interactions have been increased. The table below provides the overview of the current timeline for implementation in the Core CCR:

Planned milestones	
Quarter	**Description**
Q3 2019	Finalisation of the first version of the long-term CC methodology.
Q3 – Q4 2019	Public consultation; relevant NRAs' shadow opinion.
Q4 2019	Submission of the Core CCR long-term CC methodology to the NRAs.
Q1 2020	Relevant NRAs' approval of the Core CCR long-term CC methodology.

Table 19 – Core CCR: planned milestones for long-term Capacity Calculation[14]

The decision on which indicator shall apply for long-term CC methodology is still to be taken in the Core CCR, because this specific topic has not been discussed yet.

13 Offline computations performed by Core TSOs to test the impact of some parameters foreseen in the methodology.

14 The legal deadline for the submission of the LT CCM is 21st August 2019.

4.2.4 Italy North

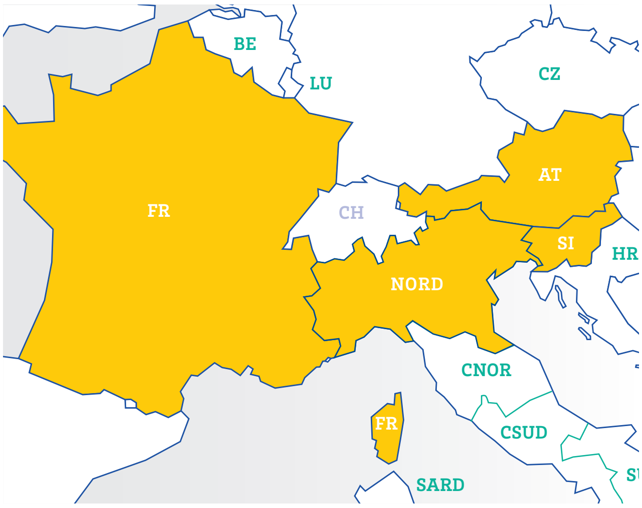


Figure 6 – Italy North CCR

The TSOs participating in the capacity calculation process within the Italy North CCR are Austrian Power Grid AG (AT), ELES, Ltd., Electricity Transmission System Operator (SI), RTE Réseau de Transport d'Electricité (FR), TERNA Rete Elettrica Nazionale S.p.A (IT) and Swissgrid ag (CH).

The Italy North CCR comprises the BZBs: Italy NORD – France (NORD – FR), Italy NORD – Austria (NORD – AT), and Italy NORD – Slovenia (NORD – SI).

In addition to the above-mentioned borders (constituting the Italy North CCR based on the ACER decision), the bidding zone border Italy North – Switzerland (NORD – CH), TERNA Rete Elettrica Nazionale S.p.A. and Swissgrid is included in the capacity calculation of the Italy North Region.

4.2.4.1 Capacity calculation and allocation for the short-term

According to the CACM Regulation, the long-term objective for the Italy North region is to implement a flow-based capacity calculation methodology. In the meantime, the TSOs of the region have developed and implemented methodologies based on the CNTC approach.

Day-ahead market timeframe:

A coordinated capacity calculation process is already in operation in the region; it was implemented voluntarily. Since 1 February 2016, individual values for cross-zonal capacity for each day-ahead market time unit are being calculated using the coordinated capacity calculation methodology starting at day D-2.

In June 2018, the TSOs of the region submitted a common methodology proposal to the NRAs designed to complement the existing capacity calculation process in D-2. Following an amendment request from the NRAs, the TSOs submitted an amended proposal in March 2019.

The deadline to implement the changes in the capacity calculation process is 12 months after the approval of the NRAs, except for some elements in the proposal such as the handling of cases of export situations from Italy.

Intraday market timeframe:

In June 2018, the TSOs of the region submitted a common methodology proposal to the NRAs for a coordinated capacity calculation methodology for the intraday timeframe. Following an amendment request from the NRAs, the TSOs submitted an amended proposal in March 2019.

TSOs are currently working on implementing an intraday coordinated capacity calculation methodology that covers the market time units covered by auction (16 h-24 h). This first step is expected to be implemented sometime in Q3 or Q4 2019. As soon as the intraday coupling model developed in accordance with Articles 55 and 63 of the CACM regulation is implemented in the Italy North region, the individual values for cross-zonal capacity will be computed for all 24 hours of the day.

Closed milestones

Quarter	Description
Q1 2017	Implementation phase for the capacity calculation covering all 24 intraday hours based on the allocation design for CACM Regulation compliance.
Q2 2017	Implementation phase and internal parallel run for the capacity calculation covering hours 16 h – 24 h for auction.

Table 20 – Italy North CCR: closed milestones for short-term capacity calculation and allocation

Planned milestones	
Quarter	**Description**
Q3 2019	External parallel run for the capacity calculation covering hours 16 h – 24 h for auction.
Q4 2019	Go-live for the capacity calculation covering hours 16 h – 24 h for auction.
Q4 2019	CACM proposal deadline for NRAs' approval.
Q2 2020	Design phase for the capacity calculation covering all 24 intraday hours based on the allocation design for CACM Regulation compliance.*
Q3 2020	Internal parallel run for the capacity calculation covering all 24 intraday hours based on the allocation design for CACM Regulation compliance.
Q3 2020	External parallel run for the capacity calculation covering all 24 intraday hours based on the allocation design for CACM Regulation compliance.
Q4 2020	Go-live for the capacity calculation covering all intraday 24 hours based on the allocation design for CACM Regulation compliance.

* https://consultations.entsoe.eu/markets/italy-north-tso-proposal-da-ccm/ and https://consultations.entsoe.eu/markets/italy-north-tso-proposal-id-ccm/

Table 21 – Italy North CCR: planned milestones for short-term capacity calculation and allocation

As an interim solution, the Italy North TSOs propose to:

- Develop the current coordinated net transmission capacity approach for the day-ahead market timeframe (see milestones provided in the table above).
- As a first step, implement the coordinated net transmission capacity approach for the intraday market timeframe (capacity calculation covering hours 16 h – 24 h for auction).
- As a second step, perform capacity calculation covering all 24 intraday hours based on the allocation design for CACM Regulation compliance.

Indicators' applicability at the time of this writing are:

Indicators			
Performance indicator	**Day-ahead**	**Intraday**	**Additional information**
4.1(a) – CNTC approach	Yes	Yes	**Indicator applicable:** The current capacity calculation approach is CNTC with the goal of moving to flow-based according to the provisions of CACM.
4.1(b) – FB approach	No	No	**Indicator not applicable:** The flow-based approach is not yet implemented.
4.1.1(a) – Ramping constraints for single direct current	Yes	Yes	**Indicator not applicable:** Not relevant as no DC links are currently operating in the region.
4.1.1(b) – BZ net position ramping	No	No	**Indicator not applicable:** There is no BZ net position ramping constraint in the current configuration of the region.
4.1.1(c) – Losses for DC ICs	No	No	**Indicator not applicable:** Not relevant as no DC links are currently operating in the region.
4.1.1(d) – Minimum stable flow constraint	No	No	**Indicator not applicable:** Not relevant as no DC links are currently operating in the region.
4.1.1(e) – DC flow tariff constraint	No	No	**Indicator not applicable:** Not relevant as no DC links are currently operating in the region.
4.1.1(f) – Bilateral intuitiveness constraint	No	No	**Indicator not applicable:** Not relevant as the CNTC approach is applied in the region.
4.1.1(g) – Curtailment distribution	No	No	**Indicator not applicable:** There is no curtailment distribution applied within this region.
4.1.1(h) – BZ net position volume	Yes	Yes	**Indicator not applicable:** There is no constraint applied to the BZ net position volume.

Table 22 – Italy North CCR: detailed indicators for short-term capacity calculation and allocation

4.2.4.2 Capacity calculation and allocation for the long-term

According to the provisions set forth in the FCA Regulation Article 10(2), the approach used in the common capacity calculation methodology shall be either a coordinated net transmission capacity approach or a flow-based approach. The table below summarises the key developments and the associated deadlines with regard to the long-term capacity calculation:

Closed milestones	
Quarter	**Description**
Q2 2019	Approval of CACM methodologies based on NTC approach by Italy North NRAs.
Q3 2019	Finalisation of FCA consultation documents based on chosen approach.

Table 23 – Italy North CCR: closed milestones for long-term capacity calculation and allocation

Planned milestones	
Quarter	**Description**
Q3 2019	Approval of CACM methodologies based on NTC approach by Italy North NRAs.
Q4 2019/Q1 2020	Finalisation of FCA consultation documents based on chosen approach. Consultation of FCA methodologies based on the chosen approach (duration of 1 month).
Q1 2020	No later than six months after the approval of the common coordinated capacity calculation methodology referred to in Article 9(7) of Regulation (EU) 2015/1222, all TSOs in each capacity calculation region shall submit a proposal for a common capacity calculation methodology for long-term timeframes within the respective region. The amended day-ahead and intraday methodologies based on the NTC approach will be submitted to NRAs in the beginning of Q3 2019. As NRAs have two months to approve these amended methodologies and taking into account the deadline above for submitting FCA methodologies, the FCA approval package should be submitted to NRAs in Q1 2020.

Table 24 – Italy North CCR: planned milestones for long-term capacity calculation and allocation

All the deadlines above can be shifted depending on the approval of CACM methodologies by NRAs. Indicators' applicability at the time of this writing are:

Indicators	
Performance indicator	**Additional information**
4.1.2 (a)(i) – Statistical indicators on the interim parameters of CNTC without consideration of remedial actions	No decision has been taken within the Italy North region on the use of remedial actions, hence no statement can be made about the measuring or reporting of this indicator.
4.1.2 (a)(ii) – Statistical indicators on the interim parameters of CNTC using remedial actions	
4.1.2 (b) – Indicators for allocation constraints	If allocation constraints are to be applied in the capacity calculation process, Italy North TSOs plan to monitor and report the application of these constraints.
4.1.2 (c)(i) – Quality indicators for the information used for the capacity calculation if applying a CNTC approach	No decision has been taken within the Italy North region on the approach to be used for capacity calculation in the long-term timeframe, hence no statement can be made about the measuring or reporting of this indicator.
4.1.2 (c)(ii) – Quality indicators for the information used for the capacity calculation if applying a FB approach	No decision has been taken within the Italy North region on the approach to be used for capacity calculation in the long-term timeframe, hence no statement can be made about the measuring or reporting of this indicator.

Table 25 – Italy North CCR: detailed indicators for long-term capacity calculation and allocation

4.2.5 Greece – Italy

Figure 7 – Greece – Italy CCR

The TSOs currently in Greece-Italy (GRIT) CCR are: Terna - Rete Elettrica Nazionale S.p.A. (IT) and Independent Power Transmission Operator S.A (GR).

This CCR until the end of 2018 included the following BZBs: Italy BRNN – Greece (BRNN– GR), and within Italy: (NORD – CNOR), (CNOR – CSUD), (SARD – CSUD), (CSUD – SUD), (SUD – BRNN), (SUD – FOGN), (SUD – ROSN), (ROSN – SICI) and (SICI – PRGP).

Starting from 2019, the BZBs within the GRIT CCR are: Italy SUD – Greece (SUD– GR), and within Italy: (NORD – CNOR), (CNOR – CSUD), (CNOR – SARD), (SARD – CSUD), (CSUD – SUD), (SUD – ROSN) and (ROSN – SICI).[15]

4.2.5.1 Capacity calculation and allocation for the short-term[16]

Closed milestones

Quarter	Description
Q3 2017	Submission of the GRIT DA CC methodology to the NRAs.
Q1 2018	Request for amendment of the CACM CC methodology for day-ahead and intraday timeframes received by the GRIT NRAs.
Q2 2018	The GRIT TSOs re-submitted the amended CACM CC methodology proposal for day-ahead and intraday timeframes.
Q3 2018	The GRIT NRAs approved the CACM day-ahead and intraday CC methodology.*
Q4 2018	Consultation of FCA LT CC methodology based on CNTC approach (duration of 1 month).
Q1 2019	Submission to GRIT NRAs of the long-term CC methodology.

*https://consultations.entsoe.eu/markets/fca_art_10_ccr_grit/

Table 26 – Greece-Italy CCR: closed milestones for short-term capacity calculation and allocation

Planned milestones

Quarter/Year	Description
Q3 2019	CCC will be nominated.
2020	Day-ahead and intraday capacity calculation parallel run and implementation.

Table 27 – Greece-Italy CCR: planned milestones for short-term capacity calculation and allocation

Indicators' applicability at the time of this writing are:

15 In line with the ACER decision on 1 April 2019, paragraph 11.
16 https://consultations.entsoe.eu/markets/capacity-calculation-methodology-proposal-grit-ccr/

Indicator			
Performance indicator	**Day-ahead**	**Intraday**	**Additional information**
4.1(a) – CNTC approach	Yes	Yes	**Indicator applicable:** CCR GRIT presently uses the CNTC approach.

Table 28 – Greece-Italy CCR: detailed indicator for short-term capacity calculation and allocation

4.2.5.2 Capacity calculation and allocation for long-term

The methodology for long-term capacity calculation is based on the CNTC statistical approach. It was sent to NRAs in January 2019 for approval The methodology is expected to be implemented during 2020.

Closed milestones	
Quarter	**Description**
Q4 2018 – Q1 2019	Consultation of FCA on long-term CC methodology based on CNTC approach (duration of 1 month).
Q1 2019	Submission to GRIT NRAs of the long-term CC methodology.

Table 29 – Greece-Italy CCR: closed milestones for long-term capacity calculation and allocation

4.2.6 South West Europe

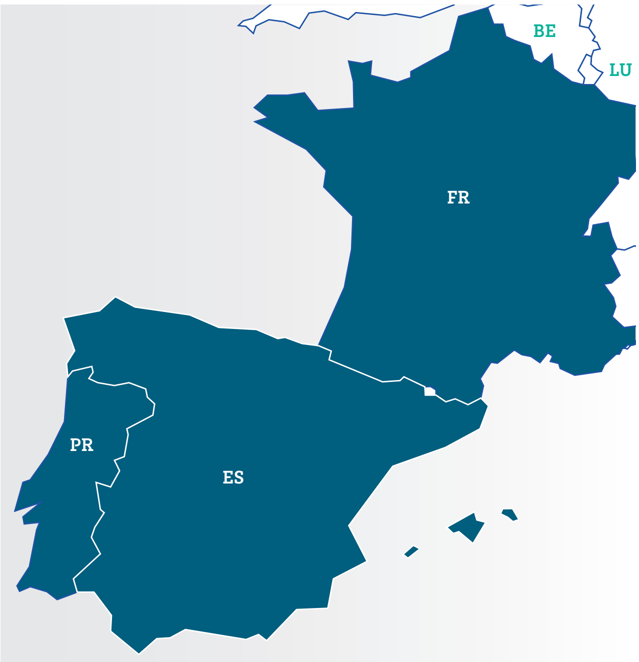


Figure 8 – South West Europe CCR

The TSOs currently in the South West Europe CCR (SWE CCR) are RTE Réseau de Transport d'Électricité (FR), Red Eléctrica de España S.A.U (ES) and Rede Eléctrica Nacional, S.A (PT).

This CCR includes the following BZBs: Portugal – Spain (PT – ES) and Spain – France (ES – FR).

4.2.6.1 Capacity calculation and allocation for the short-term

Closed milestones

Quarter	Description
Q1 2017	Began public consultation on day-ahead and intraday CCM.*
Q1 2017	Finished public consultation on day-ahead and intraday CCM.
Q4 2017	Submitted day-ahead and intraday CCM (first version) to SWE NRAs.
Q3 2018	Submitted day-ahead and intraday CCM (final version) to SWE NRAs.
Q4 2018	Day-ahead and intraday CCM approved by SWE NRAs.

* https://consultations.entsoe.eu/markets/capacity-calculation-methodology-proposal-for-swe/

Table 30 – South West Europe CCR: closed milestones for short-term capacity calculation and allocation

Planned milestones

Quarter/Semester	Description
S2 2019	Begin day-ahead capacity calculation external parallel run.
S1 2020	Day-ahead capacity calculation implementation.
S2 2021	Intraday capacity calculation implementation.

Table 31 – South West Europe CCR: planned milestones for short-term capacity calculation and allocation

The approved methodology provides that day-ahead CC will be implemented no later than the first semester of 2019 as a first step. A parallel run is planned in order to guarantee the robustness of the tools and process. As a second step, the methodology provides that intraday CC will be implemented no later than the second semester of 2020 with the same CC approach and principles that the day-ahead CC has. Indicators' applicability at the time of this writing are:

Indicators			
Performance indicator	**Day-ahead**	**Intraday**	**Additional information**
4.1(a) – CNTC approach	Yes	Yes	**Indicator applicable:** CCM provides the use of CNTC approach.*
4.1(b) – FB approach	No	No	**Indicator not applicable:** CCM provides the use of CNTC approach
4.1.1(a) – Ramping constraints for single direct current	No	No	**Indicator not applicable:** No ramping constraints will be applied.
4.1.1(b) – BZ net position ramping	No	No	**Indicator not applicable:** No ramping constraints will be applied.
4.1.1(c) – Losses for DC ICs	No	No	**Indicator not applicable:** No DC line in the SWE region.
4.1.1(d) – Minimum stable flow constraint	No	No	**Indicator not applicable:** No minimum stable flow in the SWE region.
4.1.1(e) – DC flow tariff constraint	No	No	**Indicator not applicable:** No DC flow tariff constraint in the SWE region.
4.1.1(f) – Bilateral intuitiveness constraint	No	No	**Indicator not applicable:** No intuitiveness constraint in the SWE region.
4.1.1(g) – Curtailment distribution	Yes	Yes	**Indicator applicable:** Curtailment of capacity will be published (waiting for the go-live).
4.1.1(h) – BZ net position volume	No	No	**Indicator not applicable:** No BZ net position constraint in the SWE region.

*The RM should cover 95% of the cases

Table 32 – South West Europe CCR: detailed indicators for short-term capacity calculation and allocation

4.2.6.2 Capacity calculation and allocation for the long-term

At the time of this writing, the regional proposal is under the approval process of the SWE NRAs. The document proposes coverage for all long-term capacity allocations in SWE. This means that long-term capacity values will be provided for annual, quarterly (only for ES-PT) and monthly allocations.

Closed milestones	
Quarter	**Description**
Q4 2018	Long-term CCM drafting kick-off.
Q2 2019	CCM proposal set under public consultation.
Q2 2019	Long-term CCM submitted to NRAs.

Table 33 – South West Europe CCR: closed milestones for long-term capacity calculation and allocation

Planned milestones	
Quarter	**Description**
Q3 2019	Experimentation phase 1: test TSOs' inputs.
Q4 2019	Expected SWE long-term CCM approval by SWE NRAs.
Q3 2020	Experimentation phase 2: test capacity calculation tool.
Q4 2020	Experimentation phase 3: test process.
Q1 2021	Experimentation phase 4: robust phase.
Q2 2021	Go-live.

Table 34 – South West Europe CCR: planned milestones for long-term capacity calculation and allocation

As the methodology is neither approved nor implemented at the time of this writing, no indicators are applicable.[17] However, this region can proceed with applicable indicators once the CNTC is the chosen approach. The RM will cover 95% of the cases, according to RM methodology included in the SWE proposal for long-term CCM.

Indicators	
Performance indicator	**Additional information**
4.1.2 (a)(i) – Statistical indicators on the interim parameters of CNTC without consideration of remedial actions	**Indicator not applicable:** According to the current SWE long-term CC methodology proposal, no calculation will be done without remedial actions.
4.1.2 (a)(ii) – Statistical indicators on the interim parameters of CNTC using remedial actions	**Indicator applicable:** According to the current SWE long-term CC methodology proposal, calculations will be done using remedial actions.
4.1.2 (b) – Indicators for allocation constraints	**Indicator not applicable:** According to the current SWE long-term CC methodology proposal, this indicator is not applicable, as no allocation constraint will be considered.
4.1.2 (c)(i) – Quality indicators for the information used for the capacity calculation if applying a CNTC approach	**Indicator applicable:** According to the current SWE long-term CC methodology proposal, this indicator applies as the proposed approach.
4.1.2 (c)(ii) – Quality indicators for the information used for the capacity calculation if applying a FB approach	**Indicator not applicable:** According to the current SWE long-term CC methodology proposal, a flow-based capacity calculation approach will not be used in the region.

Table 35 – South West Europe CCR: detailed indicators for long-term capacity calculation and allocation

In addition to the ENTSO-E Transparency Platform, data on PT-ES and FR-ES interconnections management has also been publicly available in a coordinated manner on the IESOE Platform website (https://www.iesoe.eu/iesoe/) since December 2012.

17 All the defined statistical indicators on reliability margins will be calculated and provided.

4.2.7 Ireland and United Kingdom

Figure 9 – Ireland and United Kingdom CCR

The TSOs currently in the Ireland and United Kingdom CCR (IU) are National Grid Electricity Transmission plc (GB), System Operator for Northern Ireland Ltd (NI), EirGrid plc (IE) and Moyle Interconnector (NI).

The IU CCR consists of the SEM-Great Britain BZB with HVDC interconnections. This CCR also includes the following BZBs: Great Britain – Integrated Single Electricity Market in Ireland and North Ireland (GB – SEM) and Northern Ireland – Scotland (MIL: Moyle Interconnector Limited).

IU TSOs propose to use a CNTC methodology across all timescales.

4.2.7.1 Capacity calculation and allocation for the short-term

The CNTC approach is considered appropriate given that the region is not connected to the heavily meshed grid in continental Europe and effectively comprises a number of HVDC interconnectors. A justification for applying the CNTC approach over the flow-based approach was provided to the NRAs for approval at the same time as the proposal for the capacity calculation methodology.

The capacity calculation process was expected to go-live in Q4 2018 for day-ahead and in 2020 for intraday but this deadline is not achievable given the delays to the Common Grid Model.

Closed milestones

Quarter	Description
Q4 2016	CCM fallback procedure submitted for NRAs' approval.
Q2 2017	CCM fallback procedure approved by NRAs.
Q3 2017	IU CACM CCM for day-ahead and intraday submitted to NRAs.
Q2 2018	CCM approved by NRAs.
Q2 2018	IU CACM CCM for day-ahead and intraday re-submitted to NRAs.
Q3 2018	IU CACM CCM for day-ahead and intraday approved by NRAs.

Table 36 – Ireland and United Kingdom CCR: closed milestones for short-term capacity calculation and allocation

The IU region consists of HVDC interconnectors that can be operated independently. As such, because the IU region only contains a single bidding zone border, the TSOs propose to use a CNTC method for both the day-ahead and intraday timescales.

A detailed, coordinated calculation will be performed at both the day-ahead and intraday timescales based on a similar approach to the detailed calculation approach outlined in the Channel region.

Indicators' applicability at the time of this writing are:

Indicators			
Performance indicator	**Day-ahead**	**Intraday**	**Additional information**
4.1(a) – CNTC approach	Yes	Yes	**Indicator applicable:** IU CCR proposes using CNTC for day-ahead and intraday.
4.1(b) – FB approach	No	No	**Indicator not applicable:** IU CCR proposes not using FB for day-ahead and intraday.
4.1.1(a) – Ramping constraints for single direct current	Yes	Yes	**Indicator applicable:** A system ramp rate limit of 10 MW/minute is used to set the maximum rate of change of flow on the inter-connectors. This ramp rate limit is set at a level that reflects the reliable and secure ramping capability of the all-island system.
4.1.1(b) – BZ net position ramping	Yes	Yes	**Indicator applicable:** The Euphemia step change limit for the in-terconnectors should be 300 MWh/h. This limit will be provided to NEMOs as an allocation constraint for the single day-ahead and intraday market coupling processes until such time as the relevant NRAs determine that a different step change limit should be used.
4.1.1(c) – Losses for DC ICs	Yes	Yes	**Indicator applicable:** A single loss factor for each interconnector shall be provided to the NEMOs as an allocation constraint for the single day-ahead and intraday market coupling processes.
4.1.1(d) – Minimum stable flow constraint	No	No	**Indicator not applicable:** No ramping limitations on bidding zone level
4.1.1(e) – DC flow tariff constraint	No	No	**Indicator not applicable:** There are no day-ahead and intraday DC flow tariff constraints currently applied.
4.1.1(f) – Bilateral intuitiveness constraint	No	No	**Indicator not applicable:** There are no day-ahead and intraday bilateral intuitiveness constraints currently applied within this region.
4.1.1(g) – Curtailment distribution	Yes	Yes*	**Indicator applicable:** Day-ahead and intraday curtailment can occur in accordance with CACM.
4.1.1(h) – BZ net position volume	Yes	Yes**	**Indicator not applicable:** There is no day-ahead and intraday con-straint to the BZ net position volume currently applied at the region.

* Due to the interim intraday solution at this stage

** All TSOs introduced a request for amendment in accordance with Article 9(13) of Regulation 2015/1222 to include this border in the Channel CCR.

Table 37 – Ireland and United Kingdom CCR: detailed indicators for short-term capacity calculation and allocation

4.2.7.2 Capacity calculation and allocation for the long-term

Closed milestones	
Quarter	**Description**
Q2 2017	IU Regional Design of long term transmission rights submitted to NRAs.
Q4 2017	IU Regional Design of long term transmission rights approved by NRAs.
Q1 2019	IU FCA long-term CC methodology submitted to NRAs.
Q1 2019	IU FCA splitting methodology submitted to NRAs.

Table 38 – Ireland and United Kingdom CCR: closed milestones for long-term capacity calculation and allocation

Planned milestone	
Quarter	**Description**
Q3 2019	IU FCA CC long-term and splitting methodologies approved by NRAs.

Table 39 – Ireland and United Kingdom CCR: planned milestone for long-term capacity calculation and allocation

Indicators' applicability at the time of this writing are:

Indicators	
Performance indicator	**Additional information**
4.1.2 (a)(i) – Statistical indicators on the interim parameters of CNTC without consideration of remedial actions	To be confirmed following the finalisation of the LT CCM.
4.1.2 (a)(ii) – Statistical indicators on the interim parameters of CNTC using remedial actions	
4.1.2 (b) – Indicators for allocation constraints	To be confirmed following the finalisation of the LT CCM.
4.1.2 (c)(i) – Quality indicators for the information used for the capacity calculation if applying a CNTC approach	To be confirmed following the finalisation of the LT CCM.
4.1.2 (c)(ii) – Quality indicators for the information used for the capacity calculation if applying a FB approach	**Indicator not applicable:** Not relevant as the IU CCR will use a CNTC approach.

Table 40 – IU CCR: detailed indicators for long-term capacity calculation and allocation

4.2.8 Channel

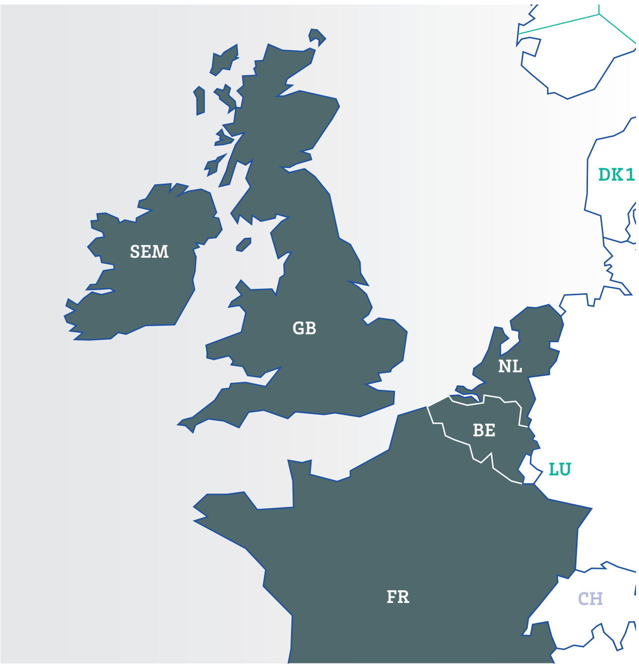


Figure 10 – Channel CCR

The TSOs currently in the Channel CCR are National Grid Electricity System Operator Limited (GB), Réseau de Transport d'Électricité (FR), National Grid Interconnectors Limited (NGIC), ElecLink Limited, BritNed Development Limited (BritNed), TenneT TSO B.V (NL)., Elia System Operator NV/SA (BE), and Nemo Link Limited (Nemo Link).

The Channel CCR consists of the following bidding zone borders: France – Great Britain (FR – GB), Netherlands – Great Britain (NL – GB) and Belgium – Great Britain (BE – GB).

4.2.8.1 Capacity calculation and allocation for the short-term

The TSOs of the Channel Region are committed to investigate the AHC model as a potential target model. Such a study can only be performed once such a solution was supported in the Core region. The results of the study will be discussed with all relevant stakeholders.

A CNTC approach is considered more in line with the operational experience on the GB side of the border. The feasibility of implementing a flow-based approach should be further investigated to ensure that the approach takes into account all operational security issues experienced in GB. The GB system faces, due to its nature, different issues that are not yet observed within Central West Europe (CWE) such as risks of low inertia and Rate of Change of Frequency (ROCOF).

The capacity calculation process is expected to go live in Q3 2019, however this deadline is likely to be impacted by the delays in the Common Grid Model central project.

At the time of writing this Report, the TSOs of the Channel CCR have received the approvals from the relevant NRAs for the updated proposal of the CACM CC methodology for day-ahead and intraday timeframes, in response to the request for amendment of the initial proposal submitted on 18th September 2017. TSOs will to use a CNTC methodology across all timescales.

Closed milestones

Quarter	Description
Q2 2017	IU Regional Design of long term transmission rights submitted to NRAs.
Q4 2017	IU Regional Design of long term transmission rights approved by NRAs.
Q1 2019	IU FCA long-term CC methodology submitted to NRAs.
Q1 2019	IU FCA splitting methodology submitted to NRAs.

Table 41 – Channel CCR: closed milestones for short-term capacity calculation and allocation

The Channel CCR consists of radial HVDC interconnectors between GB and the continent. The CCM under elaboration is based on a coordinated net transfer capacity approach. Indicators' applicability at the time of this writing are:

Indicators			
Performance indicator	**Day-ahead**	**Intraday**	**Additional information**
4.1(a) – CNTC approach	Yes	Yes	**Indicator applicable:** Channel CCR proposes to use CNTC in day-ahead and intraday.
4.1(b) – FB approach	No	No	**Indicator not applicable:** Not relevant as the Channel CCR will use a CNTC approach.
4.1.1(a) – Ramping constraints for single direct current	Yes	Yes	**Indicator applicable:** In the methodology, TSOs within the Channel CCR define ramping limitations, which shall be provided to the NEMOs as an allocation constraint for the single day-ahead and intraday market-coupling processes.
4.1.1(b) – BZ net position ramping	No	No	**Indicator not applicable:** There are no ramping limitations currently on the bidding-zone level.
4.1.1(c) – Losses for DC ICs	Yes	Yes	**Indicator applicable:** There are DC losses defined for each DC IC currently applied at the day-ahead stage.
4.1.1(d) – Minimum stable flow constraint	No	No	**Indicator not applicable:** There are no day-ahead and intraday MSFs applied.
4.1.1(e) – DC flow tariff constraint	No	No	**Indicator not applicable:** There are no day-ahead and intraday DC flow tariff constraints currently applied.
4.1.1(f) – Bilateral intuitiveness constraint	No	No	**Indicator not applicable:** Bilateral intuitiveness constraint follows from ATC market coupling.
4.1.1(g) – Curtailment distribution	Yes	No	**Indicator applicable:** This has nothing to do with curtailment of long-term day-ahead capacity, but rather curtailment of PTO orders. Hence, indicator is applicable.
4.1.1(h) – BZ net position volume	Yes	No	**Indicator applicable:** For Belgium (max import constraint).

Table 42 – Channel CCR: detail indicators for short-term capacity calculation and allocation

4.2.8.2 Capacity calculation and allocation for the long-term

The long-term CC methodology, at the time of this writing, has not been approved by the relevant NRAs nor presented for stakeholders in public consultation.

The Channel FCA CC methodologies need to define cross-zonal capacities and allocation constraints for the different HVDC interconnectors between Great Britain and the continent.

The CC for the BE – FR and BE – NL BZBs is to take place in the Core CCR. The British and Continental European grids belong to different synchronous areas (i. e., they have different frequencies). All BZBs in the Channel Region consist of controllable HVDC interconnectors. From a technical point of view, each of the HVDC interconnectors in the Channel Region can be controlled independently.

Planned milestone	
Quarter	**Description**
Q2 2019	Deadline for submission of long-term CC methodology to NRAs.

Table 43 – Channel CCR: closed milestone for long-term capacity calculation and allocation

Indicators' applicability at the time of this writing are:

Indicators	
Performance indicator	**Additional information**
4.1.2 (a)(i) – Statistical indicators on the interim parameters of CNTC without consideration of remedial actions	To be confirmed following the finalisation of the LT CCM.
4.1.2 (a)(ii) – Statistical indicators on the interim parameters of CNTC using remedial actions	
4.1.2 (b) – Indicators for allocation constraints	To be confirmed following the finalisation of the LT CCM.
4.1.2 (c)(i) – Quality indicators for the information used for the capacity calculation if applying a CNTC approach	To be confirmed following the finalisation of the LT CCM.
4.1.2 (c)(ii) – Quality indicators for the information used for the capacity calculation if applying a FB approach	**Indicator not applicable:** Not relevant as the Channel CCR will use a CNTC approach.

Table 44 – Channel CCR: detailed indicators for long-term capacity calculation and allocation

4.2.9 Baltic

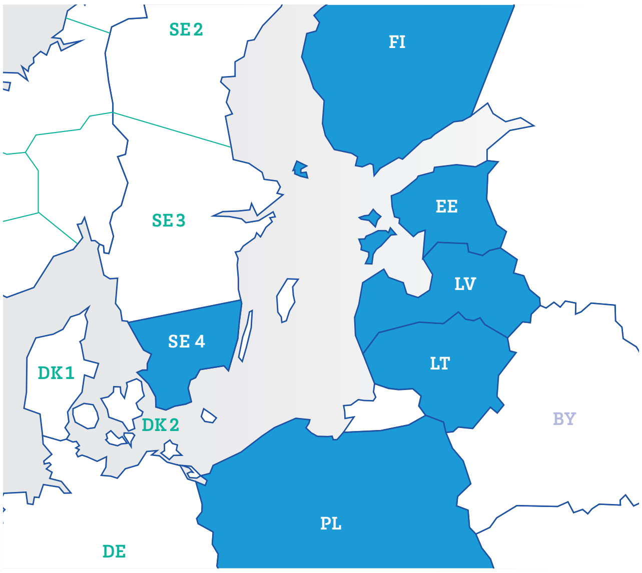


Figure 11 – Baltic CCR

This CCR includes the following BZBs: Finland – Estonia (FI – EE), Estonia – Latvia (EE – LV), Latvia – Lithuania (LT – LV), Lithuania – Poland (LT – PL), and Sweden – Lithuania (SE4 – LT).

The TSOs that are currently in the Baltic CCR are Elering AS (EE), Litgrid (LT), AS Augstsprieguma tīkls (LV), Fingrid Oyj (FI), Svenska kraftnät (SE) and PSE - Polskie Sieci Elektroenergetyczne S.A (PL).

4.2.9.1 Capacity calculation and allocation for the short-term

Baltic CCR TSOs jointly developed the proposal for the CCM pursuant to Articles 9(1), 9(7)(a) and 20(2) of the CACM Regulation and submitted it to all Baltic CCR national regulatory authorities for approval. The methodology stipulates that the cross-zonal capacities within the Baltic CCR shall be calculated using the CNTC approach. On 20 July 2018 Baltic CCR TSOs received a copy of the letter from the Baltic CCR NRAs to ACER. In this letter, Baltic CCR NRAs asked ACER for a three-month extension of their decision-making time for the CACM CCM proposal, until 23 October 2018. On 31 August 2018 ACER issued its decision and provided Baltic CCR NRAs with the extension requested.

On 17 September 2018, Baltic CCR NRAs organised a meeting among representatives of Baltic CCR countries, including TSOs, energy ministries of the CCR and third-party countries involved. After that meeting, the expert group made amendments and the Baltic CCR Steering Committee unilaterally approved the amendments to the Baltic CCR CCM proposal.

The amendments to the Baltic CCR CCM proposal concern only the Baltic countries' internal AC interconnections.

At the time of this writing, the TSOs of the Baltic CCR have received the approval of the relevant NRAs and have started preparing for the implementation of the Baltic CCR CCM (CNTC). Preconditions for the implementation of the Baltic CCR CCM (CNTC) are:

- The implementation of coordinated re-dispatching and countertrading methodology according to Article 35 of the CACM Regulation;
- The implementation of the re-dispatching and countertrading cost-sharing methodology within the Baltic CCR required by Article 74 of the CACM Regulation;
- Baltic NRA's approval and implementation of the document specifying the terms and conditions of this methodology on cross-zonal capacity calculation, provision and allocation with third-party countries for borders between the Baltic states and third-party countries.

The expected deadline to implement the Baltic CCR CCM is the end of 2019.

The timescale of the CCM for day-ahead and intraday timeframes within the Baltic CCR is given in the table below:

Closed milestones

Quarter	Description
Q3 2017	Submission of the Baltic CCR CNTC calculation methodology to the relevant NRAs for approval and publication of the summary and analysis from the public consultations regarding Baltic CNTC methodology.
Q1 2018	Approval of the fallback procedure by relevant NRAs in the Baltic CCR.*
Q4 2018	Publication of the Baltic CCR CNTC calculation methodology (CCM).
Q2 2019	Approval and implementation by the Baltic NRAs of the document specifying terms, conditions and methodology of cross-zonal capacity calculation, provision and allocation across borders of Baltic states and third-party countries

* 6 January 2018 – Baltic CCR fallback procedures in accordance with CACM Regulation

Table 45 – Baltic CCR: closed milestones for short-term capacity calculation and allocation

Planned milestones	
Quarter	**Description**
Q3 2019	Implementation of the coordinated re-dispatching and countertrading methodology according to Article 35 of the CACM Regulation.
Q3 2019	Implementation of the re-dispatching and countertrading cost-sharing methodology within the Baltic CCR required by Article 74 of the CACM Regulation.
Q3 2019	Expected deadline for implementation of the Baltic CCR CNTC CCM.

Table 46 – Baltic CCR: planned milestones for short-term capacity calculation and allocation

All the deadlines above can be shifted depending on the approval of the CACM methodologies by the relevant NRAs. Indicators' applicability at the time of this writing are:

Indicators			
Performance indicator	**Day-ahead**	**Intraday**	**Additional information**
4.1(a) – CNTC approach	Yes	Yes	**Indicator applicable:** In Baltic CCR CCM indicator is not defined.
4.1(b) – FB approach	No	No	**Indicator not applicable:** The Baltic CCR will be based on the CNTC approach.
4.1.1(a) – Ramping constraints for single direct current	Yes	Yes	**Indicator applicable:** For the following DC interconnections: Lithuania – Poland, Lithuania – Sweden, Estonia – Finland.
4.1.1(b) – BZ net position ramping	No	No	**Indicator not applicable:** This indicator does not apply and is not defined in the Baltic CCR CCM.
4.1.1(c) – Losses for DC ICs	No	No	**Indicator not applicable:** This indicator does not apply and is not defined in the Baltic CCR CCM.
4.1.1(d) – Minimum stable flow constraint	No	No	**Indicator not applicable**
4.1.1(e) – DC flow tariff constraint	No	No	**Indicator not applicable:** This indicator does not apply and is not defined in the Baltic CCR CCM.
4.1.1(f) – Bilateral intuitiveness constraint	No	No	**Indicator not applicable:** In the Baltic CCR CCM this indicator is not defined, as the CNTC approach applies.
4.1.1(g) – Curtailment distribution	No	No	**Indicator not applicable:** In the Baltic CCR CCM this indicator is not defined.
4.1.1(h) – BZ net position volume	Yes	Yes	**Indicator applicable:** This constraint can be applied by PSE for capacity calculations on the Lithuania – Poland interconnection.

Table 47 – Baltic CCR: detailed indicators for short-term capacity calculation and allocation

4.2.9.2. Capacity calculation and allocation for the long-term

The FCA Guideline obliges TSOs on a bidding zone border to issue long-term transmission rights unless the competent regulatory authorities of the bidding zone border have adopted coordinated decisions not to issue long-term transmission rights on the bidding zone border.

Based on the assessments of the functioning of the wholesale electricity markets, relevant NRAs agreed the following:

- The Finnish and Estonian NRAs agree not to request the respective TSO to issue long-term transmission rights or to make other cross-zonal hedging products available on the FI-EE bidding zone border;

- The Lithuanian, Latvian, Swedish and Polish regulators bilaterally agreed that on Lithuanian – Latvian (LT-LV), Lithuanian – Sweden (LT-SE4) and Lithuanian – Polish (LT-PL) bidding zone borders long-term transmission rights shall not be issued, but they shall make sure that other long-term cross-zonal hedging products are made available to support the functioning of the wholesale electricity markets within the above-mentioned bidding zone borders;

- The Latvian and Estonian NRAs agree not to request the respective TSOs to issue long-term transmission rights or to make other cross-zonal hedging products available on the LV-EE bidding zone border;

- All he respective Latvian parties, based on the Baltic CCR and the relevant NRAs decided that the cross-zonal risk-hedging opportunities of the Latvian – Estonian (LV-EE) border towards the Latvian bidding zone is issuing Financial Transmission Rights Options.

Taking into account the above-mentioned cross-zonal risk-hedging opportunities of the Latvian – Estonian (LV-EE) bidding zone border, the long-term transmission rights and financial transmission rights options (FTR-option) are issued only on the LV-EE bidding zone border toward Latvia.

Based on FCA, the single-allocation platform is responsible for facilitating the allocation of long-term transmission rights at the European level.

At the time of this writing, the TSOs of the Baltic CCR are working on the preparation of the LT CC methodology, based on the CNTC approach.

Closed milestones	
Quarter	**Description**
Q2 2018	Submission of the Baltic CCR TSOs' common proposal for RD of LTTR to Baltic CCR NRAs for approval (Elering and AST based on FCA NC in its Article 31).
Q4 2018	First draft of the Baltic CCR common capacity calculation methodology for the long-term timeframe.
Q4 2018	First draft of the Baltic CCR common methodology for splitting long-term cross-zonal capacity submitted to the Baltic CCR TSO Steering Committee for feedback.
Q2 2019	Approval of the Baltic CCR long-term CCM by the Baltic CCR TSO Steering Committee and launch of public consultation.
Q2 2019	Approval of the Baltic CCR splitting long-term cross-zonal capacity methodology by the Baltic CCR TSO Steering Committee and launch of public consultation.

Table 48 – Baltic CCR: closed milestones for long-term capacity calculation and allocation

Planned milestones	
Quarter	**Description**
Q3 2019	Review of the feedback received from public consultations and approval of the Baltic CCR long-term CCM by Baltic CCR TSO Steering Committee for submission to Baltic CCR NRAs.
Q3 2019	Review of the feedback received from public consultations and approval of the Baltic CCR splitting long-term cross-zonal capacity methodology by the Baltic CCR TSO Steering Committee for submission to Baltic CCR NRAs.
Q3 2019	Submission of Baltic CCR long-term CCM and splitting long-term cross-zonal capacity methodology to Baltic CCR NRAs.
Q3 2019	Submission of LTTR methodology for splitting cross-zonal capacity to the relevant NRA.
Q4 2019	Publication of Baltic CCR long-term CCM and splitting long-term cross-zonal capacity methodology.
Q1 2020	Publication of Baltic CCR long-term CCM and splitting long-term cross-zonal capacity methodology.
Q4 2019/Q1 2020	Expected timeframe for implementation of the Baltic CCR long-term CCM and splitting long-term cross-zonal capacity methodology.

Table 49 – Baltic CCR: planned milestones for long-term capacity calculation and allocation

All the deadlines above can be shifted depending on the second approval of the CACM and FCA methodologies by the relevant NRAs.

As the drafting of the long-term CCM for the Baltic CCR is ongoing at present, no indication of the future use of long-term indicators can be provided by the Baltic CCR TSOs at this time.

4.2.10 South East Europe

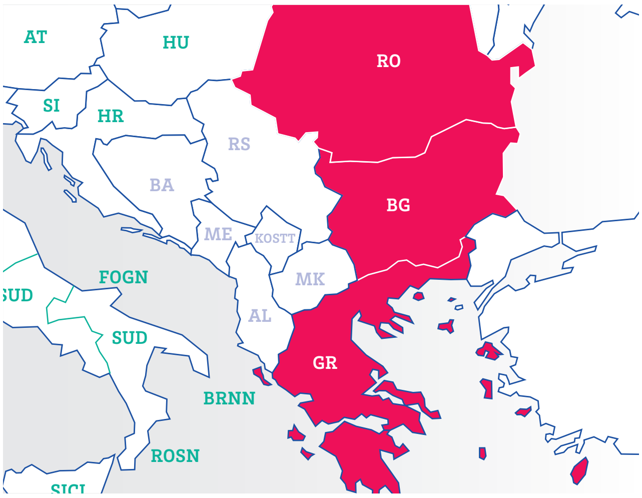


Figure 12 – South East Europe CCR

The TSOs that currently constitute the South East Europe CCR (hereafter referred to as SEE CCR) are ESO - Electroenergien Sistemen Operator EAD (BG), Independent Power Transmission Operator S.A (GR). and C.N. Transelectrica S.A (RO).

This CCR includes the following Bidding Zone Borders: Greece – Bulgaria (GR – BG), Bulgaria – Romania (BG – RO).

4.2.10.1 Capacity calculation and allocation for the short-term

At the time of this writing, the CACM CCM proposal, is based on the CNTC, and it is approved by NRAs from the SEE CCR.

Closed milestones

Quarter	Description
Q1 2018	CACM CCM submitted to SEE CCR NRAs.
Q3 2018	Bilateral meeting between ESO EAD (the Bulgarian TSO) and Transelectrica (the Romanian TSO). Discussion, among other subjects, surrounded day-ahead market coupling.
Q3 2018	Request for Amendment of CACM CCM by the SEE CCR NRAs.
Q4 2018	Amendment no. 1 of CACM CCM submitted to SEE CCR NRAs.
Q4 2018	Second request for amendment of CACM CCM by the SEE CCR NRAs.
Q1 2019	Amendment no. 2 of CCM submitted to SEE CCR NRAs.
Q2 2019	CACM CCM for day-ahead and intraday timeframes approved by NRAs from the SEE CCR.*

* https://consultations.entsoe.eu/markets/see-ccr-tsos-proposal-of-ccm/

Table 50 – South East Europe CCR: closed milestones for short-term capacity calculation and allocation

Planned milestones

Quarter/Semester	Description
Q3 2019	Capacity calculator nominated.
S1 2020	Start day-ahead capacity calculation external parallel run.
S2 2020	Day-ahead capacity calculation implementation.
S2 2020	Start intraday capacity calculation external parallel run.
S2 2020	Intraday capacity calculation implementation.

Table 51 – South East Europe CCR: planned milestones for short-term capacity calculation and allocation

Given that at the time of this writing, day-ahead and intraday capacity calculation processes are not implemented in the SEE region, it is expected that the corresponding information for the applicable indicators will be provided in the future.

Indicators			
Performance indicator	**Day-ahead**	**Intraday**	**Additional information**
4.1(a) – CNTC approach	Yes	Yes	**Indicator applicable:** CNTC approach is the chosen approach by the SEE CCR.
4.1(b) – FB approach	No	No	**Indicator not applicable:** The statistical indicator is not relevant to the approved CMM pursuant to CACM for this region.
4.1.1(a) – Ramping constraints for single direct current	No	No	**Indicator not applicable:** The statistical indicator is not relevant to the approved CMM pursuant to CACM for this region.
4.1.1(b) – BZ net position ramping	No	No	**Indicator not applicable:** The statistical indicator is not relevant to the approved CMM pursuant to CACM for this region. It is agreed that the TSOs of the SEE region shall not apply allocation constraints in the capacity calculation.
4.1.1(c) – Losses for DC ICs	No	No	**Indicator not applicable:** The statistical indicator is not relevant to the approved CMM pursuant to CACM for this region. It is agreed that the TSOs of the SEE region shall not apply allocation constraints in the capacity calculation.
4.1.1(d) – Minimum stable flow constraint	No	No	**Indicator not applicable:** The statistical indicator is not relevant to the approved CMM pursuant to CACM for this region. It is agreed that the TSOs of the SEE region shall not apply allocation constraints in the capacity calculation.
4.1.1(e) – DC flow tariff constraint	No	No	**Indicator not applicable:** The statistical indicator is not relevant to the approved CMM pursuant to CACM for this region. It is agreed that the TSOs of the SEE region shall not apply allocation constraints in the capacity calculation.
4.1.1(f) – Bilateral intuitiveness constraint	No	No	**Indicator not applicable:** The statistical indicator is not relevant to the approved CMM pursuant to CACM for this region. It is agreed that the TSOs of the SEE region shall not apply allocation constraints in the capacity calculation.
4.1.1(g) – Curtailment distribution	No	No	**Indicator not applicable:** Allocated capacity in day-ahead and intraday timeframes is considered firm, and its firmness is ensured through countertrade measures if necessary. Curtailments could only occur in the case of force majeure or an Emergency Situation, in accordance with Article 72 of the CACM Regulation.
4.1.1(h) – BZ net position volume	No	No	**Indicator not applicable:** The statistical indicator is not relevant to the approved CMM pursuant to CACM for this region. It is agreed that the TSOs of the SEE region shall not apply allocation constraints in the capacity calculation.

Table 52 – South East Europe CCR: detailed indicators for short-term capacity calculation and allocation

4.2.10.2 Capacity calculation and allocation for the long-term

At the time of this writing, the long-term capacity calculation methodology, pursuant to Article 10 of the FCA Regulation is in the drafting phase.

Closed milestones	
Quarter	**Description**
Q2 2019	Start of the development of the long-term CCM.
Q4 2019	Submission of the long-term CCM to SEE CCR NRAs.

Table 53 – South East Europe CCR: closed milestones for long-term capacity calculation and allocation

As the drafting of the long-term CCM for the SEE CCR is ongoing at present, no indication of the future use of long-term indicators can be provided at this time by the SEE CCR TSOs.

5 COMMON GRID MODEL

This chapter describes the quality and statistical indicators for the Common Grid Model (CGM). It contains a description of indicators to be provided by the Common Grid Model Programme, which are used for short- and long-term capacity calculations once all relevant methodologies are approved and implemented.

Moreover, this chapter recounts the progress made in organising, implementing and testing the Common Grid Model for the purposes of short- and long-term capacity calculation.

5.1 CGM statistical and quality indicators

The CGM process, regardless of whether it is applied in the context of short- or long-term capacity calculation has the following steps:

1. Common Grid Model Alignment (**CGMA**)
2. Input stage: contribution of Individual Grid Models (**IGMs**) by TSOs
3. Output stage: provision of the CGM via the merging of the IGMs to create the CGM
4. Physical Communication Network
5. ENTSO-E Connectivity Layer
6. Merging into the Common Grid Model

For the sake of clarity this report also covers step 1 (CGMA) even though this step is only to a lesser extent relevant for capacity calculation. Therefore, the focus is on the creation of the IGM and CGM based on the topology as depicted below.

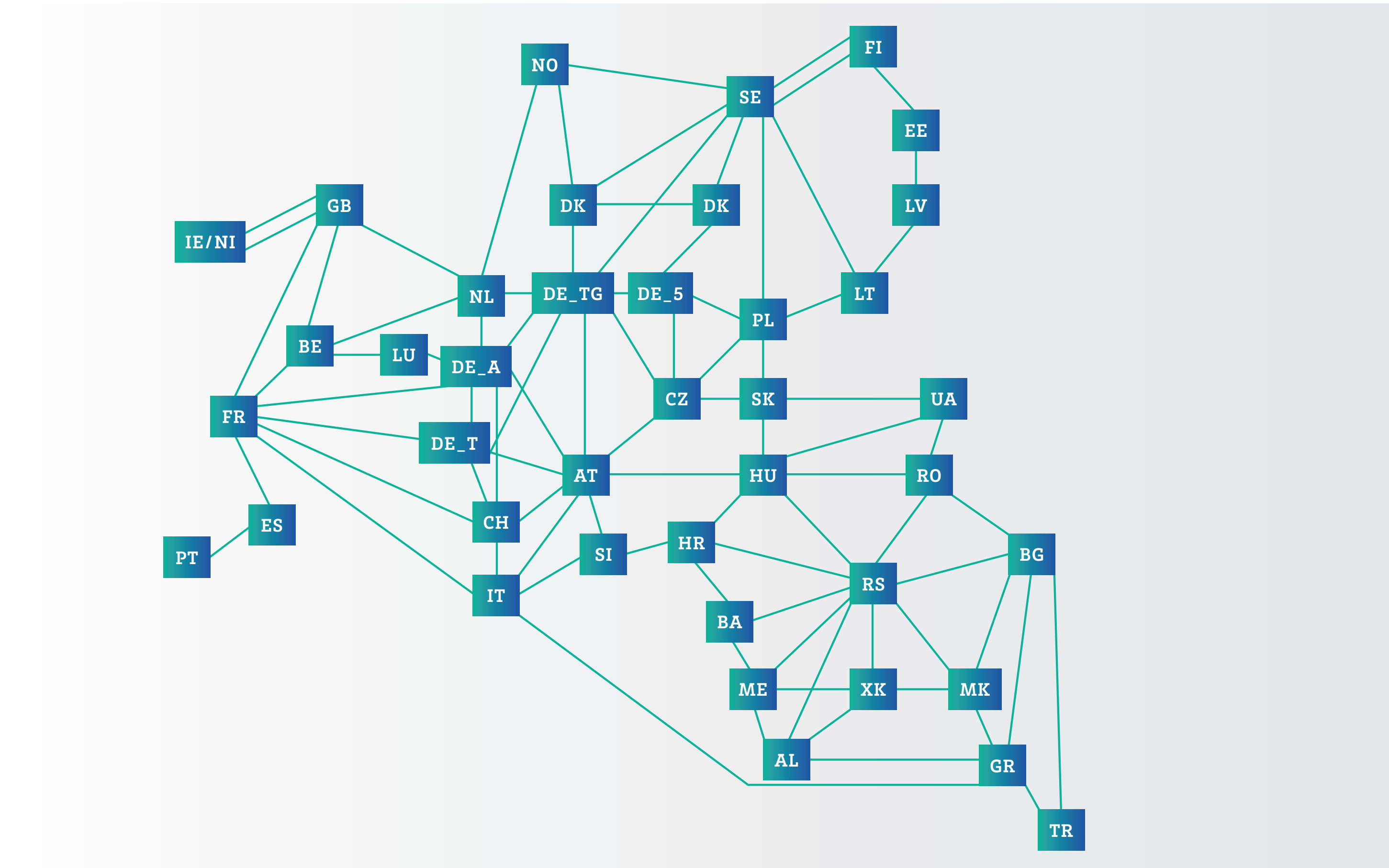


Figure 13 – IGM/CGM overall topology

5.1.1 CGM short-term indicators

According to Article 31(3)(d) of the CACM Regulation, the report shall contain quality indicators for the information used in the capacity calculation. Since capacity calculation for the day-ahead and intraday timeframes as defined in Article 14 of the CACM Regulation is to be based on the Common Grid Model (CGM), these quality indicators should be defined with respect to the CGM and CGM-building process. The process of defining quality indicators is described in the Common Grid Model Methodology in accordance with Article 17 of the CACM Regulation and approved by the NRAs on 11 May 2017 (hereafter referred to as the "**CGMM-v1-plus**") as follows:

a) Article 24(4) of the CGMM-v1-plus: 'All TSOs shall jointly define quality indicators that make it possible to assess all stages of the CGM process including, in particular, the CGM alignment process described in Article 19. They shall monitor these quality indicators and publish the indicators and the results of the monitoring as part of the data to be provided pursuant to Article 31(3) of Regulation 2015/1222.'

b) Article 25(3)(d) of the CGMM-v1-plus: 'By six months after the approval of the present methodology all TSOs shall organise the process of merging the individual grid models by completing the following tasks: […] all TSOs shall jointly define the quality criteria and quality indicators referred to in Article 24.'

c) Article 25(5) of the CGMM-v1-plus: 'By thirteen months after the approval of the present methodology or 14 January 2018, whichever is later, all TSOs shall jointly ensure that the CGM process is operational and available for use by coordinated capacity calculators.'

The following enduring indicators related to IGMs and CGMs were defined:

1. A summary of IGMs refused (with the reason for the rejection also reported): An IGM may be refused for any number of reasons. If the refusal of IGMs and the reasons for the refusal are monitored, this makes it possible to identify and correct systematic problems.

2. A summary of IGMs substituted (which signifies that an IGM of sufficient quality was not available in time): When an IGM is refused, the TSO concerned can always resubmit a corrected file before the deadline. However, if no IGM of acceptable quality is available by the deadline, a substitute IGM will be used. The substitution of IGMs is to be avoided if possible, as a substitute IGM is unlikely to have the same accuracy as an up-to-date model prepared for the specific time-stamp. Therefore, the substitution of IGMs should be monitored. If such substitutions are significantly more frequent for certain TSOs or certain time-stamps, this information can serve as a trigger for an in-depth analysis of the underlying problems.

3. A summary of the delivery times of IGMs and CGMs (including an assessment of whether the delivery was on time – i. e., respected the TSOs' deadlines – or was not): in order for the results of the capacity calculation to be available in a timely manner, a set of deadlines were defined for the completion of certain steps in the CGM process. The delivery of IGMs according to schedule is, of course, one very important such step. If the deadline for this step is not respected, this may result in delays in subsequent steps in the process, so IGM and CGM delivery times should be monitored.

As of 31 December 2018, the indicators described above are still valid and have not been modified. These indicators are available per TSO and timeframe in line with the topology in figure 13.

The indicators related to the CGMA which were depicted in the last report (see also table 54) have been de-scoped for future monitoring purposes, primarily because most of the insight gained from these indicators is factually available via the IGM- and CGM-related indicators. Moreover, CGMA-related indicators are only available for one-time horizons (i. e. two days-ahead).

Up to the operational phase of all operational planning data environment (hereafter referred to as "**OPDE**") applications, the key performance indicators for CGMA are primarily used to gradually increase process and data quality in the transition phase from test to productive operation. Moreover, they are used to provide adequate information in the event of test-related questions from TSOs and RSCs. In addition, they will be used in later live operation for quality assurance, continuous improvement of algorithms and applications and as part of user support in case of problems and queries. For the alignment agents of RSCs, it is also possible to use the KPIs, of which only a small section is shown in this report, to independently analyse other aspects that would otherwise require considerable effort to acquire raw data.

No.	Indicator	D-1*	D
1	Timely submission of pre- and post-coupling data (PPD) according to the deadlines set out in the CGMA Methodology (i. e., CGMAM V2 B_010_080; 'in time and general quality').	Yes	N.A.
2	Completeness of data submitted (i. e., CGMA IT Spec A_030_030; 'full semantics check of PPD file').	Yes	N.A.
3	Conformity with parameter restrictions/requirements defined in the CGMA Methodology – 'simplified' ... (i. e., CGMAM V2 B_010_010; 'Min. FR NP requirement to ensure conversion).	Yes	N.A.
4	Substitutions and parameter adjustments required – 'simplified'... (i. e., CGMAM V2 B_010_020; 'Min. FR NP adjustment (gap) to ensure conversion').	Yes	N.A.
5	CGMA algorithm computation time (i. e., CGMAM V2 B_040_060; 'final computation time').	Yes	N.A.
6	Timely preparation of CGMA output data (balanced net positions and balanced flows on DC lines) by alignment agents (i. e. CGMAM V2 B_070_010; 'final CGMA results').	Yes	N.A.
1a	IGMs refused with the reason for rejection also reported.	Yes	Yes
2a	IGMs substituted, which signifies that an IGM of sufficient quality or the fact that the IGM was not available in time).	Yes	Yes
3a	A summary of the times at which the IGMs are delivered, including an assessment of whether or not the delivery was on time, i. e., respected the TSOs' deadlines.	Yes	Yes
4a	A summary of the times at which the CGMs are delivered, including an assessment of whether or not the delivery was on time, i. e., respected the TSOs' deadlines.	Yes	Yes

* The CGMA relevant indicators factually consider only the D-2 time horizon. However, for the purpose of D-1 capacity calculation CGMA 'baseline' scenarios will be used.

Table 54 – Overview of indicator availability for day-ahead and intraday capacity calculation in 2017 – 2018

During the period covered by the present report, the IGM- and CGM-building process was being run on a trial basis, the central element of which is so-called interoperability tests (hereafter the "**IOP**") coordinated by the CGM Programme.[18] These trial runs serve to identify remaining software bugs and other shortcomings and their successful resolutions, drawing on an iterative elimination of problems identified, and are an essential prerequisite for the smooth operation of the capacity calculation processes that rely on the CGM. Given the trial mode, data on the above-mentioned quality indicators could not yet be collected in a comprehensive manner; however, there are plans to collect and assess all of the relevant data systematically as soon as the overall CGM process is operational.

In respect to the CGMA process, Indicators 1 to 5 have been collected in 2018 in line with the dates of the IOPs. Indicator 6 (see table 54) was modified in the course of testing to check whether the CGMA results were transmitted to all connected TSOs (via their ENTSO-E Data Exchange "EDX" toolboxes), since the results are not transmitted from the alignment agents to the TSOs, but directly from the CGMA application.

In order to have at least one complete picture, figures for all CGMA-related indicators are provided in this report.[19] In line with the table above the target date for CGMA is D-2 when no market schedules are available as a base case for the creation of D-1 IGMs and CGMs.[20]

The data displayed in all figures below cover EU TSOs adhering to the CACM Guideline and the Norwegian TSO (a total of 31 TSOs). Although TSOs outside of EU+[21] are participating to the CGMA process (e. g., Swissgrid, EMS), data for these TSOs have not yet been tracked systematically for several operational reasons such as contractual issues and the connection to ICG/CGM infrastructure.

18 The interoperability tests are, at present, run monthly. For the sake of completeness, the energy delivery days used as the target dates were 16.05.2018 ((IOP 1), 13.06.2018 (IOP 2), 18.07.2018 (IOP 3), 29.08.2018 (IOP 4), 19.09.2018 (IOP 5), 17.10.2018 (IOP 6), 14.11.2018 (IOP 7) and 05.12.2018 (IOP 8).

19 No data is provided for CGM Indicator 6 as this CGMA-relevant indicator.

20 see also: https://docstore.entsoe.eu/Documents/Network%20codes%20documents/Implementation/cacm/cgmm/Common_Grid_Model_Alignment_Methodology.pdf

21 We define the "EU+" area as the 28 EU member states + Norway.

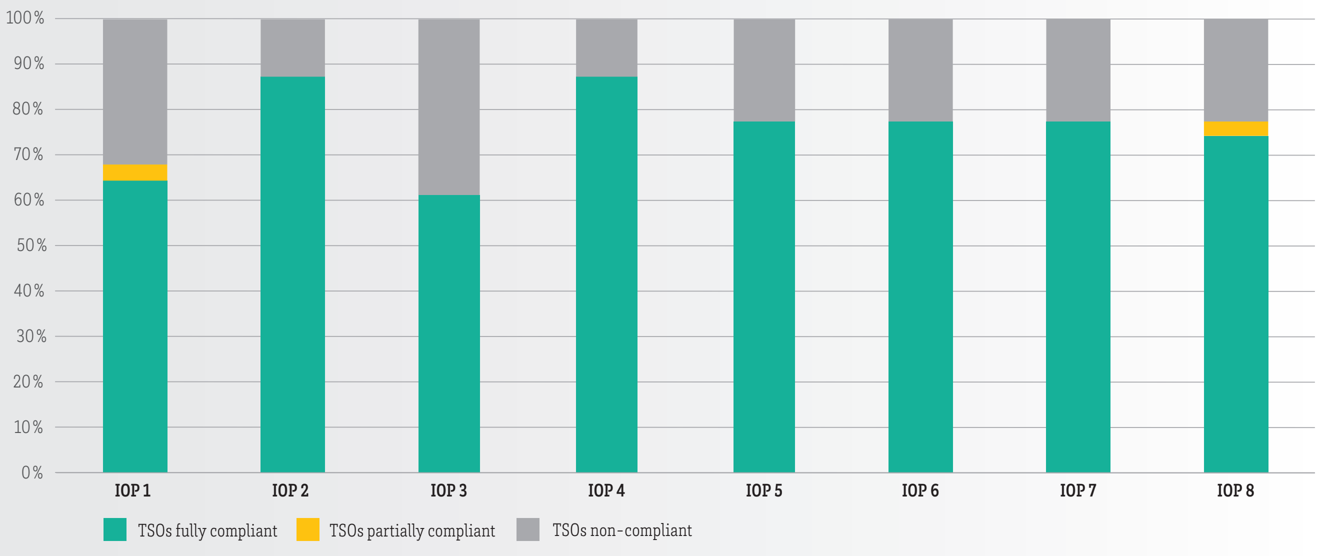


Figure 14 – Timely submission of PPDs according to the deadlines set out in the CGMA Methodology (CGM Indicator 1)

In figure 14 data are shown for all IOP dates in 2018. TSOs which provided the input data for the CGMA process (i. e., PPDs) within the D-2 deadline of the CGMA Methodology (i. e., 16.30h D-2) and for which the PPDs provided have successfully met initial quality requirements (answered with an acceptance acknowledgement message) are marked in green (i. e., TSOs fully compliant). TSOs which have provided PPDs on time but not in appropriate quality (answered with a rejection acknowledgement message) are marked in yellow (i. e., TSOs partially compliant). All other TSOs are marked in grey (i. e., TSOs non-compliant) meaning they did not send their PPDs on time or at all.[22]

Over the period from IOP1 to IOP8 in 2018, a positive trend can be observed for Indicator 1. Essentially, TSOs are increasingly able to meet the CGMA deadline and fewer TSOs are non-compliant in the reporting period. The occurrence of TSOs whose PPDs were sent on time but rejected is often the case when TSOs (in particular with HVDC connections) participate in an IOP for the very first time and have not performed any further tests beforehand. Once existing errors were explained and corrected, data were normally delivered without further problems.

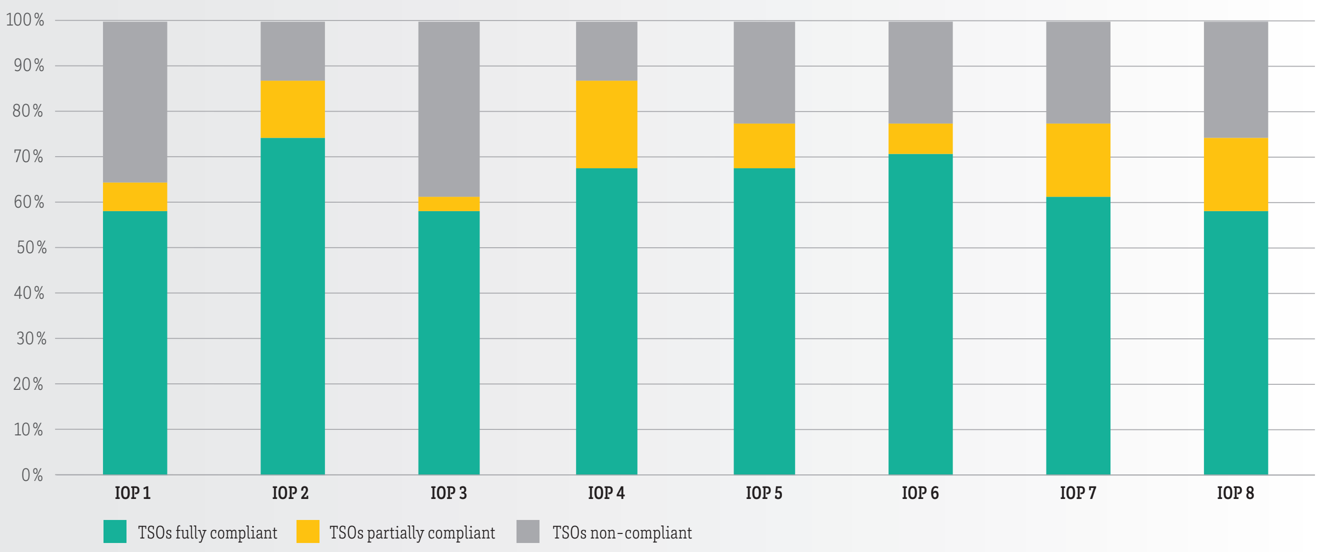


Figure 15 – Completeness of CGMA PPDs submitted (CGM Indicator 2)

In figure 15 data are shown for all IOP dates in 2018. TSOs which successfully provided PPDs in line with all requirements of the CGMA quality gate are marked in green (i. e., TSOs fully compliant). TSOs which have pro-

22 Based on the CGMA Methodology the Indicator 1 is comprised of the data set „B_010_080" and "A_030_030".

vided PPDs which did not meet all quality requirements (i. e., did not pass the CGMA quality gate and had to be at least partially corrected/substituted) are marked in blue (i. e., TSOs partially compliant). All other TSOs are marked in grey (i. e., TSOs non-compliant).[23] For the sake of clarity, the indicator shown only provides insight into AC-grid relevant data as the provision of DC-grid relevant data, which was not tested in 2018.

Over the period from IOP1 to IOP8 in 2018, a positive trend can be observed for Indicator 2. Essentially, TSOs are increasingly able to pass all quality requirements while fewer TSOs are non-compliant in the reporting period or fail to provide any data. Typical errors in the provision of PPDs are violated capacity restrictions (compared to the values in the master data), incorrect signs or conflicting values. Since the CGMA Quality Gate tries to resolve most of these problems on its own, a large part of the PPDs with such errors is accepted after correction and the sender receives detailed descriptions of the adjustments made in the acknowledgement message. This ensures that as many TSO data as possible are used and that as few PPDs as possible need to be completely rejected.

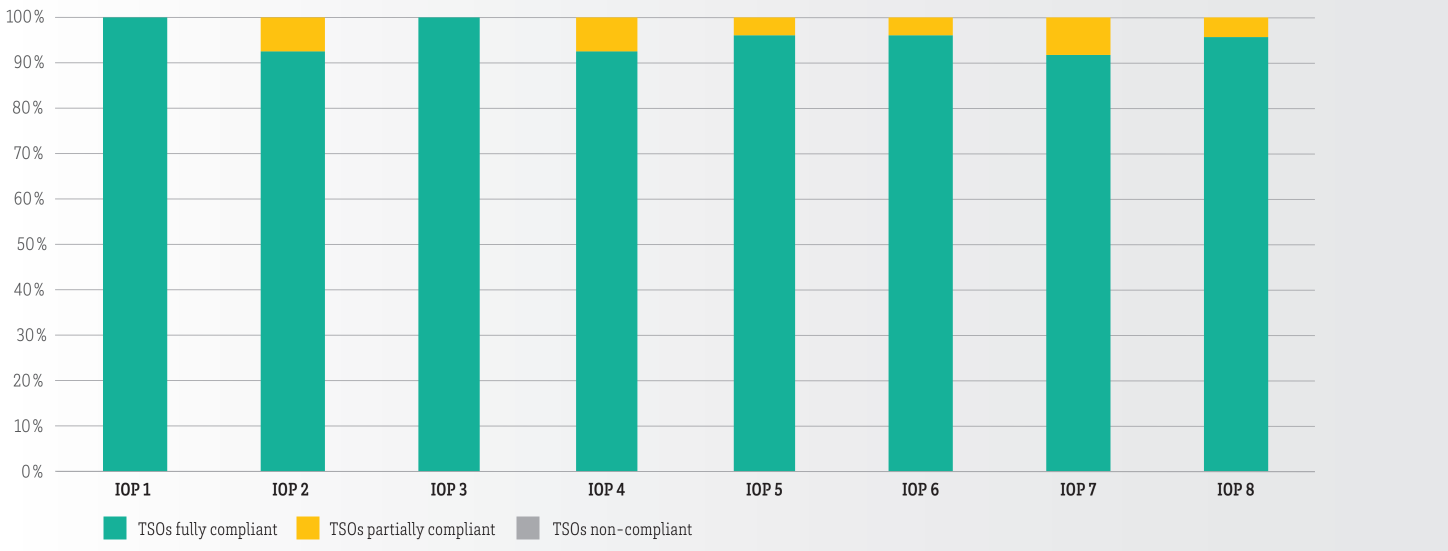


Figure 16 – Conformity with parameter restrictions/requirements defined in the CGMA Methodology (CGM Indicator 3)

In figure 16 data are shown for all IOP dates in 2018. TSOs which successfully provided PPDs in line with all parameter restrictions and requirements defined in the CGMA Methodology (e. g., AC min. feasibility range) are marked in green (i. e., TSOs fully compliant). TSOs which have provided PPDs that did not meet all parameter restrictions/requirements are marked in blue (i. e., TSOs partially compliant). For this indicator, only those TSOs whose PPDs were accepted (either fully or with adjustments/replacements) were considered in the total quantity.[24]

Over the period from IOP1 to IOP8 in 2018, the overall positive trend that most TSOs adhere to the CGMA Methodology parameter restrictions/requirements can be observed for Indicator 3. In fact, the partial compliances primarily stem from either a misinterpretation of the mathematical requirements or were done deliberately for the sake of testing. For some TSOs, for example, values for determining the minimum FR that deviated from the master data in the CGMA were apparently used, with the result that the values were occasionally undercut and corrected. Here, too, the general observation is that once the fundamental problem had been resolved, correct data were usually provided in subsequent IOPs.

23 Based on the CGMA Methodology, Indicator 2 is comprised of the data set 'A_030_030' (i. e., AC-grid relevant data) and 'B_010_030' (i. e., DC-grid relevant data).

24 Based on the CGMA Methodology the Indicator 3 is comprised of the datasets 'B_010_010' (i. e. min. FR requirements), 'B_010_045' (i. e. maximum flow restrictions on DC lines) and 'B_010_055' (i. e. consistency requirements).

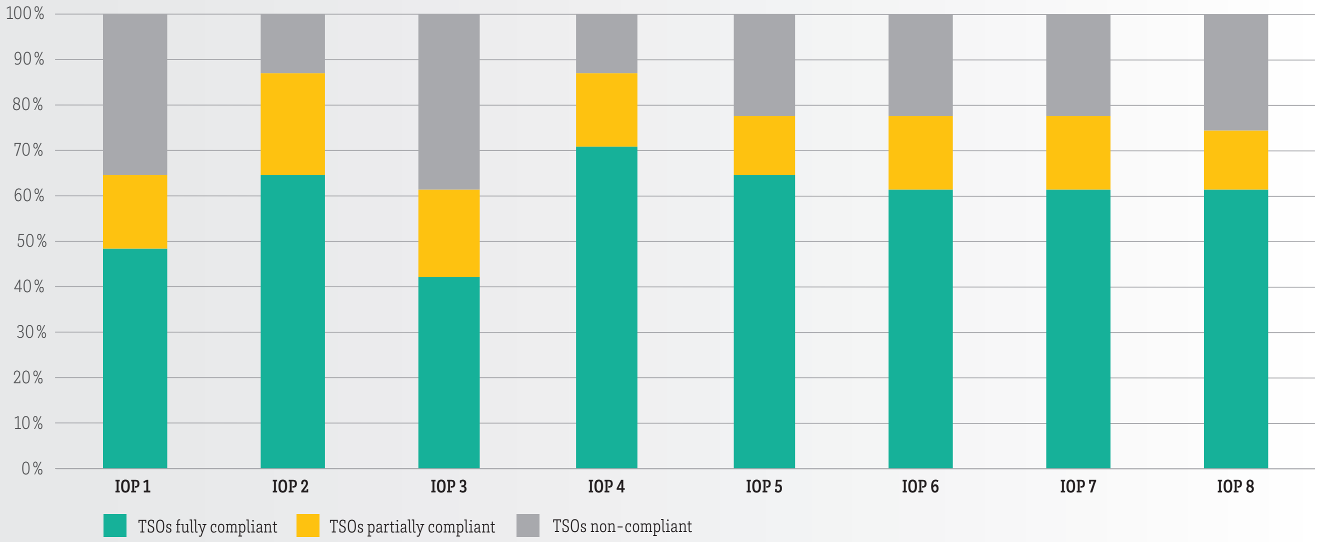


Figure 17 – CGMA substitutions and parameter adjustments (CGM Indicator 4)

In figure 17 data are shown for all IOP dates in 2018. TSOs which successfully provided PPDs without substitutions/adjustments as described in the CGMA Methodology (e.g., AC min. feasibility range) are marked in green (i.e., TSOs fully compliant). TSOs which have provided PPDs to which substitutions/adjustments were applied (e.g., AC min. feasibility range was automatically adjusted by the CGMA platform) are marked in yellow (i.e., TSOs partially compliant). All other TSOs are marked in grey (i.e., TSOs non-compliant).[25]

Over the period from IOP1 to IOP8 in 2018, an overall positive trend can be observed for Indicator 4. In particular, the relatively small group of TSOs which provided insufficient PPDs has decreased significantly over the reporting period.

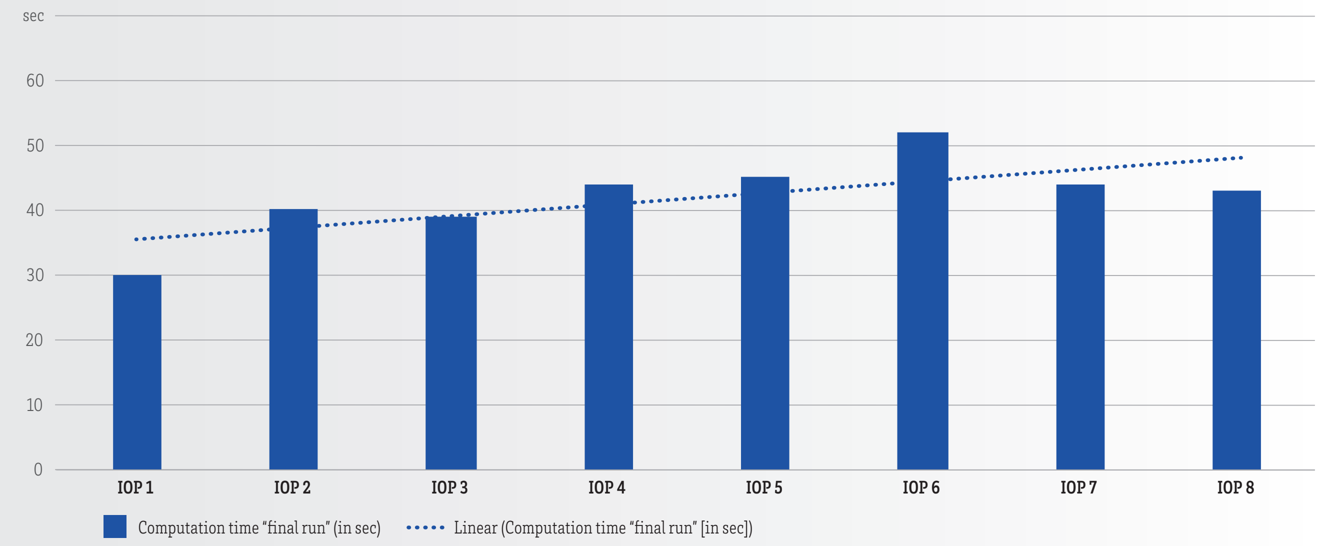


Figure 18 – CGMA algorithm computation time (CGM Indicator 5)

In figure 18 data are shown for all IOP dates in 2018. The purple bars show the final computation time of the CGMA platform automatically executed between 17:05h and 17:10h D-2 (i.e., the CGMA Methodology sets the maximum computation time to 5 minutes). Moreover, a trendline is provided, taking into account all computation times from IOP1 to IOP8.[26]

Over the period from IOP1 to IOP8 in 2018, the CGMA final computation time increased from 30 seconds in IOP1 to a

25 Based on the CGMA Methodology the Indicator 3 is comprised of the datasets "B_010_020" (i.e., modification of min. FR requirements) and 'B_010_035' (i.e., modification of DC line data).

26 Based on the CGMA Methodology the Indicator 3 is comprised of the dataset "B_040_060" (i.e., CGMA algorithm computation time in seconds).

maximum of 52 seconds in IOP6. This increase generally reflects the increase of TSOs providing PPDs to the CGMA platform. However, any logged computation time is well below the maximum of 300 seconds (i. e., five minutes), in line with the CGMA Methodology. Typically, the calculation time increases with each additional participant in an IOP, since otherwise missing values in many places are replaced with default values of 0.

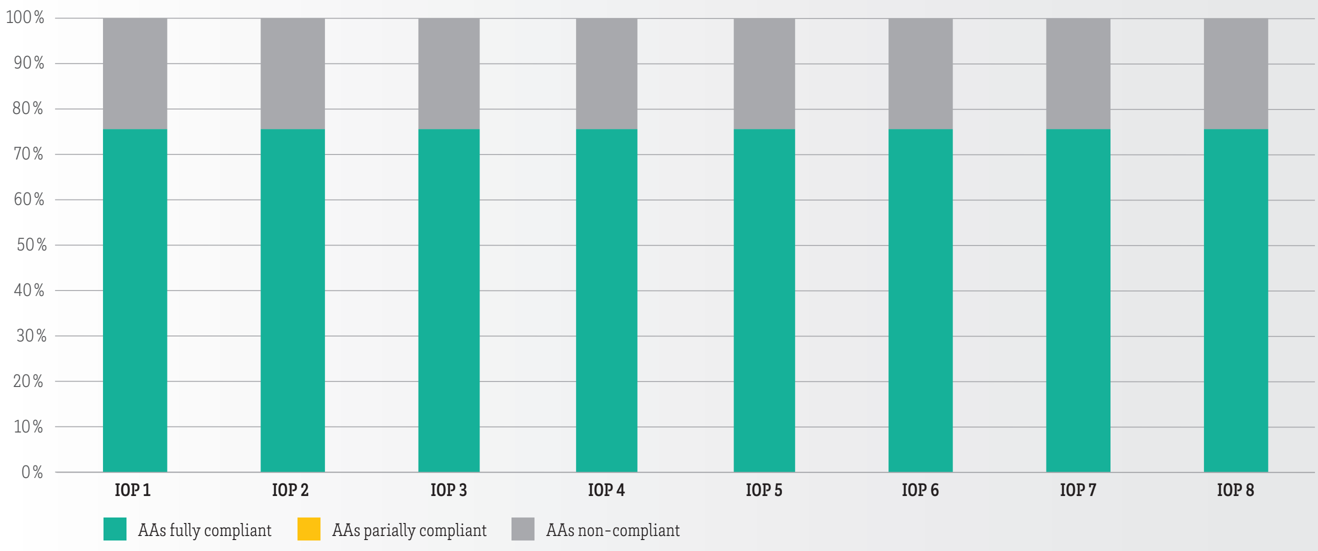


Figure 19 – CGMA results delivery (CGM Indicator 6)

In figure 19 data are shown for all IOP dates in 2018. The green bar shows the TSOs which received results data via OPDE. It should be noted, however, that the KPI does not check whether the files have arrived at the respective recipient, but only the transfer to the communication link (here the CGMA EDX Toolbox). The indicator thus shows whether CGMA was able to deliver the results data and whether the outgoing OPDE data exchange was generally possible. The grey bar shows all TSOs that did not have a connection to the CGMA application via OPDE at the time of the IOP.[27]

Over the period from IOP1 to IOP8 in 2018, a positive trend can be observed, with the number of TSOs connected to CGMA via OPDE increasing slightly and being highest at the last IOP in 2018.

In respect to the core IGM- and CGM-building process and its indicators (i. e., 1a to 4a in table 54), a sustainable setup for recording and analysing the quality indicators has been created for the year 2018 and beyond.[28]

The core of this setup are the tools Elasticsearch and Kibana within the overall CGM IT infrastructure. Elasticsearch is an open source search engine which is highly scalable. It allows users to store and analyse a large volume of information in close to real time. Moreover, it allows parsing of all kinds of data to search for the information in almost real time. Kibana is a data visualization tool that provides capabilities in addition to the content indexed on an Elasticsearch cluster and allows the user to create bar, line and scatter plots, as well as pie charts and maps corresponding to large volumes of data. Both tools are integrated into the Operational Planning Data Management (**OPDM**) application, which allows users to store and extract all the data provided to OPDE, including the KPIs provided here. Both tools have been successfully tested as part of the IOPs.

27 Based on the CGMA Methodology the Indicator 6 is comprised of the dataset "B_070_010" (timely preparation of CGMA output data).

28 In the course of IOPs, no CGM Indicators (i. e., CGM Indicator 1a, 3a and 4a) except the CGM Indicator "IGMs substituted" (which signifies that an IGM of sufficient quality was not available in time) could be recorded/analysed. This is due to the fact that various IT tools both within the CGM IT infrastructure (e. g., OPDM) and "outside" of the CGM IT infrastructure (e. g., merging tools of the RSCs) are responsible for these tasks. At the time of this writing the discussion on how to solve this gap is ongoing.

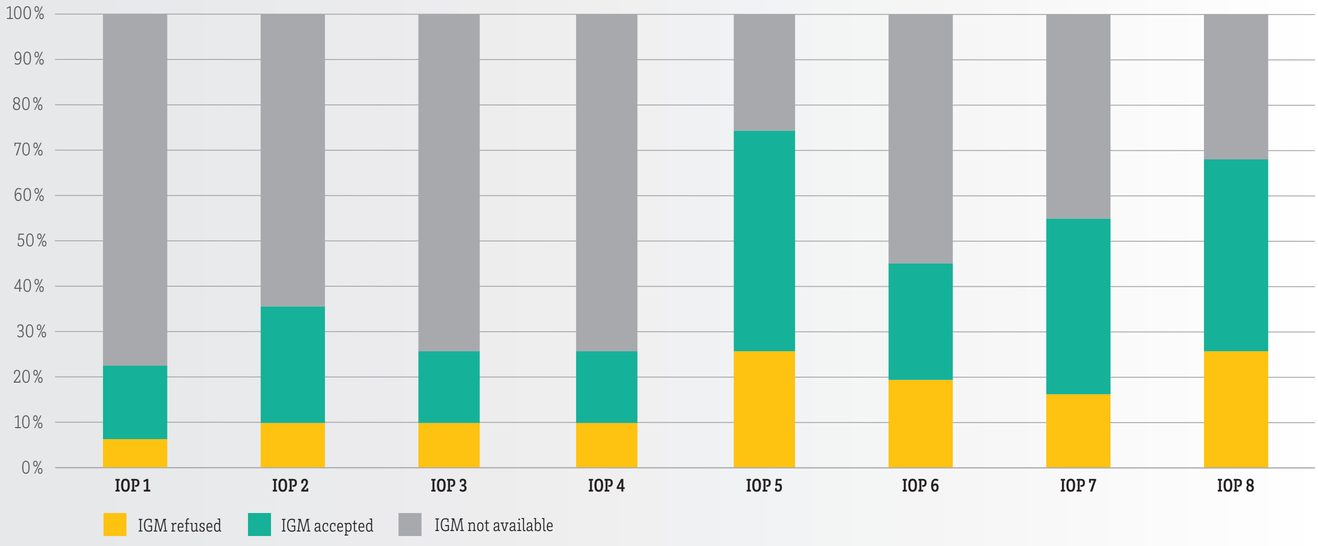


Figure 20 – IGMs refused/accepted (CGM Indicator 1a)

In figure 20 data are shown for all IOP dates in 2018 and refer to the D-1 IGM. TSOs which successfully passed all stages of quality checks (e.g., data format conformity and deadlines) are marked in green (i.e., IGM accepted). TSOs which provided an IGM but did not pass all stages of quality checks are marked in orange (i.e., IGM refused). Additionally, the percentage of all TSOs which did not successfully pass any stage of quality checks or did not participate in the IOP is depicted in grey (i.e., IGM not available).

Over the period from IOP1 to IOP8 in 2018, a positive trend can be observed for the CGM Indicator 1a. TSOs are increasingly able to meet all IGM-related quality requirements. Moreover, more TSOs are able to provide an IGM, and fewer TSOs are not able to participate in the IOPs (e.g., due to a missing OPDE/EDX connection).

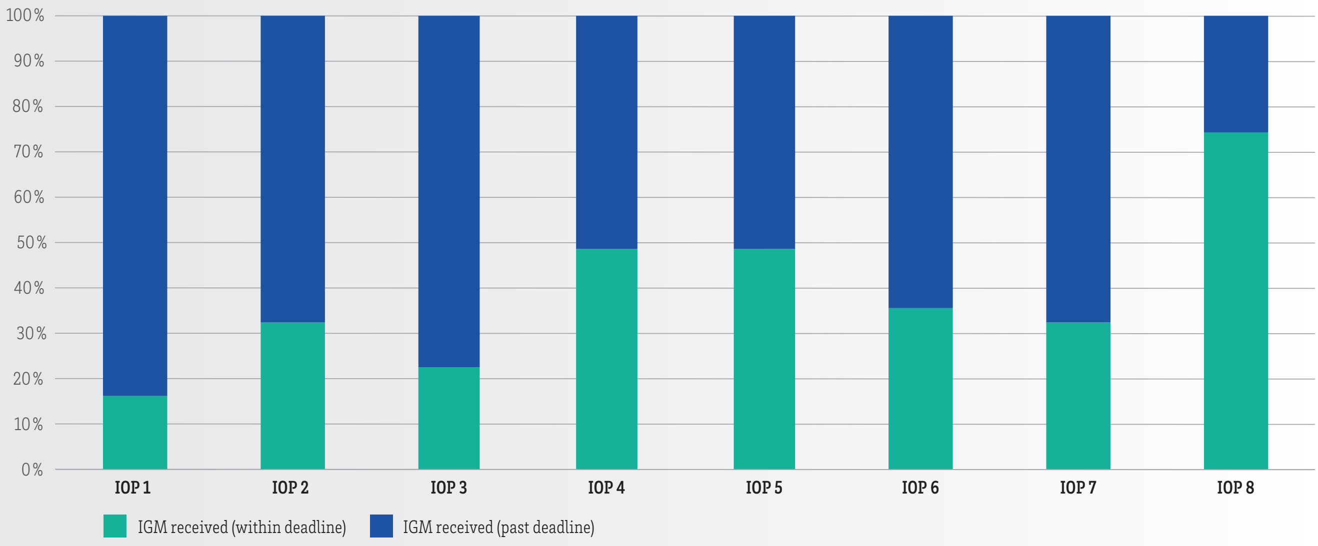


Figure 21 – Timings of IGM delivery for D-1 (CGM Indicator 3a)

In figure 21 data are shown for all IOP dates in 2018 and refer to the D-1 IGM. Depicted are TSOs which provided an IGM within or past the D-1 deadline (i.e., 18:45h). TSOs which provided an IGM, irrespective of its quality level, within the relevant deadline are marked in green (i.e., IGM received – within deadline). TSOs which did not provide an IGM within the relevant deadline are marked in blue (i.e., IGM received – past deadline).[29]

29 Although the CGM Indicator 3a also refers to a 'summary of the timings', this assessment has not, in the course of non-procedural IOP testing, been demonstrated for the sake of overall adherence to deadlines.

Over the period from IOP1 to IOP8 in 2018, a positive trend can be observed for the IGM/CGM Indicator 3a. TSOs are increasingly able to meet the D-1 IGM deadlines. In fact, most TSOs which provided the IGM within the deadline where able to do so well before the 'hard' deadline.

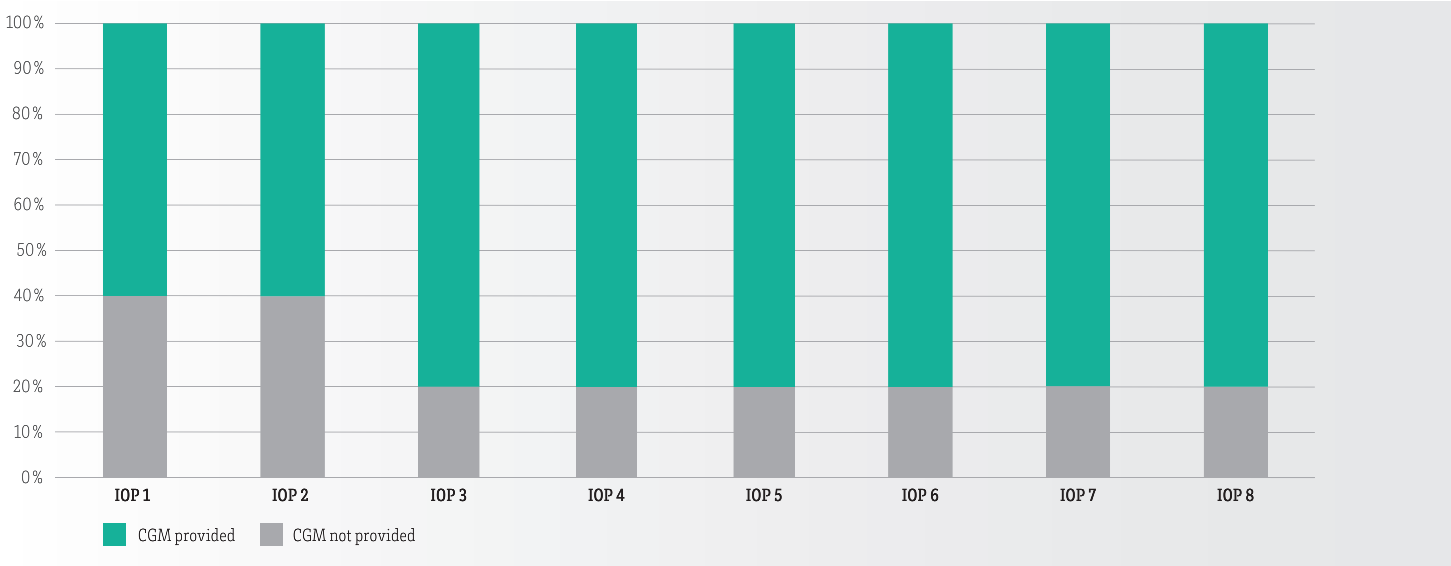


Figure 22 – CGM creation by RSCs (CGM Indicator 4a)

Depicted are a summary of times at which the CGMs were delivered by RSCs for the CGM D-1 process for all IOP dates in 2018. The percentage of times RSCs provided a CGM file adhering to general quality requirements are marked in green (i. e., CGM provided). In the course of testing, CGM was provided only for the AC-relevant topology, and no procedural deadlines were monitored.[30] Moreover, it was agreed by all relevant parties to provide the CGM only via an ENTSO-E internal SharePoint as this enables all parties, irrespective of their progress towards full CGM compliance, to retrieve the CGM for further testing. The percentage of cases in which RSCs did not provide any CGM file are marked in grey (i. e., CGM not provided).

Over the period from IOP1 to IOP8 in 2018 4 out the 5 RSCs were able to create a CGM file. This positive development highlights both the ability of the various merging tools to provide a robust CGM file and also the fact that the CGM building process can be executed with partially missing information and continuous efforts to extend the capacities of the CGM IT infrastructure. Of course, the CGM programme will put great emphasis on expanded CGM creation quality within the relevant deadlines in the 2019 IOPs.

5.1.2 CGM long-term indicators

CC for the timeframes covered by Article 9 of the FCA Regulation may be based on the CGM. Alternatively, CCRs may opt to use the statistical approach pursuant to Article 10(4)(b) of the FCA Regulation.

The CGM methodology for long-term timeframes (**CGMM-v2-plus**) sets out the principal requirements with respect to the CGM process for long-term timeframes. The CGMM-v2-plus also contains the requirements which aim to make it possible to monitor the overall functioning of the CGM process (see Article 23).

The quality indicators defined for these stages pursuant to the requirements in the CGMM-v2-plus are explained in more detail below.

Regarding the input and output stages of the CGM process, the key objective of the monitoring is to ensure that TSOs and merging agents respect their legal obligations under the CGMM-v2-plus. Note that the quality criteria set out in the document 'Quality of CGMES datasets and calculations', approved in November 2016, are binding for all TSOs and summarise the detailed technical requirements contained in the CGMM-v2-plus. IGMs and CGMs are checked against these requirements and are rejected if they do not meet them. This makes it possible to assess both the input and output stages of the CGM process with a small number of quality indicators.

30 All-TSOs jointly decided on 3 April 2019 on a scheme to include HVDC infrastructure in the IGM/CGM files. Implementation of this scheme is planned in all relevant IT tools by Q1 2021.

The following IGM-related indicators for the input stage are to be monitored per TSO and by time-horizon:

1. IGMs refused (including the reason for the rejection)

2. IGMs substituted (signifying that an IGM of sufficient quality was not available in time)

3. A summary of the times at which the IGMs are delivered (including an assessment of whether or not the delivery was on time, i.e., respected the TSOs' deadlines)

   Finally, at the output stage, the IGMs are merged into the CGM; this is monitored via a fourth indicator:

4. A summary of the times at which the CGMs are delivered (including an assessment of whether or not the delivery was on time, i.e., respected the TSOs' deadlines)

The delivery of a functioning CGM is the objective of the CGM process and the starting point for a number of subsequent processes such as capacity calculation and security analysis. If the delivery of the CGM is delayed this may have cumulative effects on those subsequent processes. Conversely, if the monitoring shows that the CGM is always delivered early, it may be possible to move the CGM-related deadline forward in order to gain more time for other tasks. Therefore, the CGM delivery times should be monitored as well.

As of 31 December 2018, the indicators described above are still valid and have not been modified. All of these indicators are available per TSO and timeframe in line with the topology in **figure 13**.

No.	KPIs	Y-1
1b	IGMs refused (including the reason for the rejection).	Yes
2b	IGMs substituted (signifying that an IGM of sufficient quality was not available in time).	Yes
3b	A summary of the times at which the IGMs are delivered (including an assessment of whether or not the delivery was on time, i.e., respected the TSOs' deadlines).	Yes
4b	A summary of the times at which the CGMs are delivered (including an assessment of whether or not the delivery was on time, i.e., respected the TSOs' deadlines).	Yes

Table 55 – Overview of indicator availability for long-term calculation in 2017 – 2018

Progress has been made with respect to the CGM-building process by TSOs (who provide the IGMs that are the basic building blocks of the CGM) as well as RSCs. RSCs, in their role as merging agents, combine the IGMs into a CGM and, in order to be able to complete this task, rely on a number of business applications that are provided centrally by the CGM Programme.

During the period covered by the present report, the IGM- and CGM-building process was being run on a trial basis, coordinated by the CGM Programme. These trial runs serve to identify remaining software bugs and other shortcomings and their successful completion, drawing on an iterative elimination of problems identified, is an essential prerequisite for the smooth operation of the capacity calculation processes that rely on the CGM. Given the trial mode, data on the above-mentioned quality indicators will not yet be collected for the long-term time-horizon; however, we envision beginning the process of collecting and assessing these data as soon as possible.

5.2 CGM organisation

During the period covered by this report, progress has been made with respect to the CGM-building process by TSOs (who provide the IGMs that are the basic building blocks of the CGM) as well as RSCs. RSCs, in their role as merging agents, combine the IGMs into a CGM and, in order to be able to complete this task, rely on a number of business applications that are provided centrally by ENTSO-E via the CGM Programme. The CGM Programme is the joint effort to provide the tools required in order to establish a reliable CGM process and the Secretary-General of ENTSO-E serves as the project sponsor.

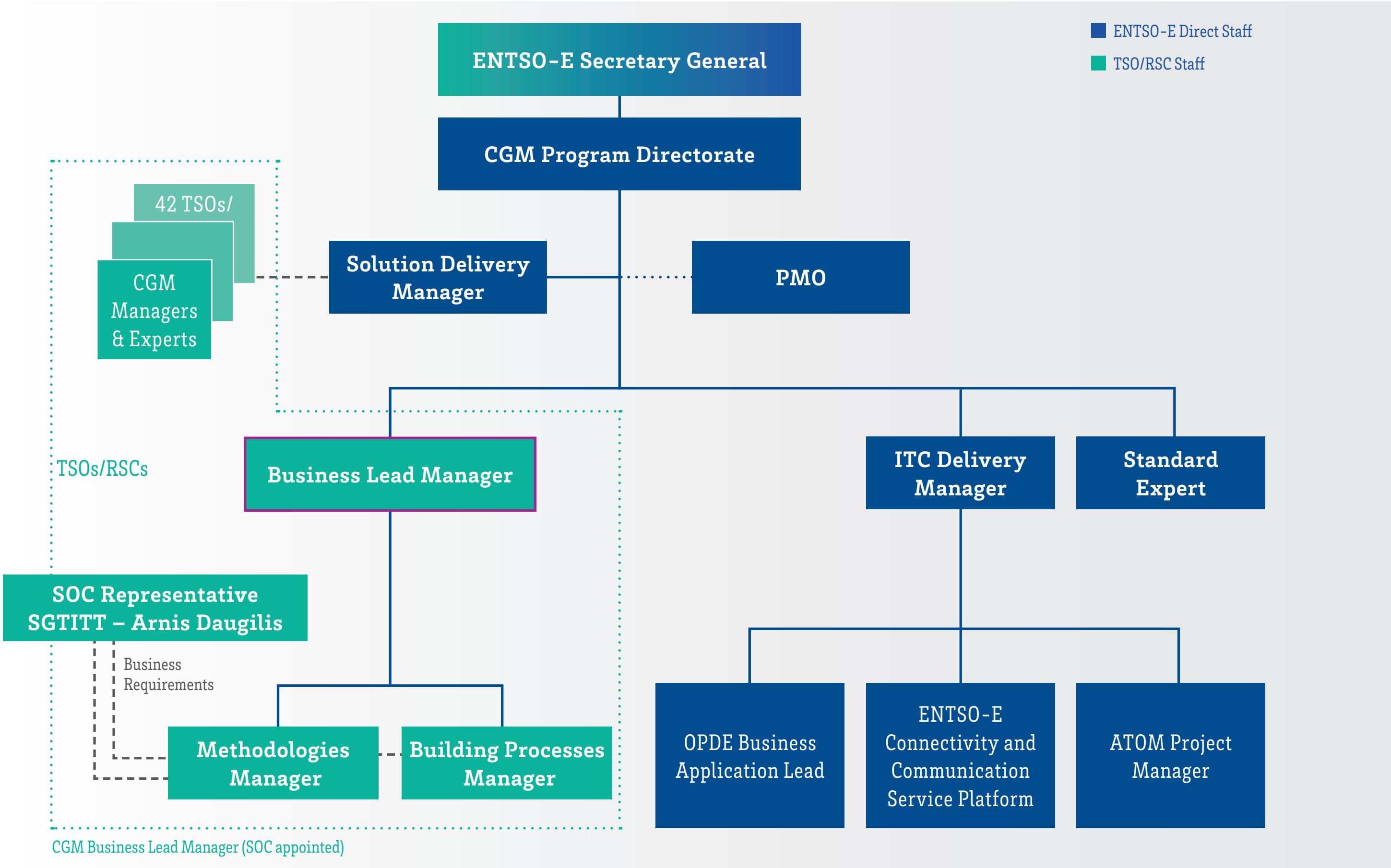


Figure 23 – CGM Programme organisational chart as of May 2018

The Project Implementation Document (**PID**) of the CGM Programme was revised during the reporting period; the finalised document entered into force in May 2018. The chart above shows the organisation of the CGM Programme and at the same time illustrates its principal components. The organisational units in the two bottom rows of the chart are of primary interest in the context of the present report.

"CGM Methodologies" refers to the preparation of the CGM-related methodologies required by a total of three Network Codes (Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management; Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocation; Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation).

With the approval of the Common Grid Model Methodology (CGMM) pursuant to Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (referred to as **CGMM-v3**), the Methodologies drafting team has completed the tasks which are required by European legislation.

"CGM Building Processes" covers all aspects of building a common grid model. It translates the methodologies into a practical business process for the creation of a common grid model out of individual grid models and further inputs as a generic sub-process of the additional RSC services. Moreover, this unit defines the common aspects of the merging algorithm applied by all RSCs, as well as the business requirements for the common ICT deliverables of the CGM Programme.

"CGM ICT Delivery" is comprised of the three components "CGM Business Applications", "ENTSO-E Connectivity and Communication Service Platform", and "ATOM" (the abbreviation for "All TSO Networks for Non-real-time Operational and Market-Related Data Communication Network").

"CGM Business Applications" refers to a number of central applications that each play an important role in the process of building IGMs and CGMs. The Common Grid Model Alignment (CGMA) application ensures that the CGM is built upon a set of consistent net positions in the timeframes where market schedules are not available. The Pan-European Verification Platform Function (**PEVF**) application similarly provides a consistent set of net positions in those timeframes where market schedules are available (i. e., when building IGMs/CGMs for D-1 and intraday). The third central business application is the Boundary Management Application (**BMA**) which provides the information needed to link IGMs at their edges: when combining the IGMs of any two neighbouring areas, the information used to designate the boundary points (linking the two areas and thus the two individual grid models) needs to be consistent; otherwise, the IGMs will not fit together. The Quality Assurance Service (**QAS**) application runs standardised quality checks and provides the raw data for the analysis presented in section 5.1. Finally, the Operational Planning Data Management (**OPDM**) application is a set of distributed software components that serve to support the upload/download, storage and retrieval of grid models and other information in support of the CGM process. All of these distributed software components are part of the Operational Planning Data Environment (**OPDE**), which is the overall term for the IT infrastructure supporting the CGM process.

Within the OPDE, the connection and communication between various business applications and participants is ensured by the energy communication protocol (**ECP**), a generic messaging service called the ENTSO-E Connectivity and Communication Service Platform (**ECCoSP**). The platform is composed of the ECP application and the ENTSO-E Data Exchange (**EDX**) application, which are the principal elements of the ECCoSP.

All of these distributed software components, business applications and the ECCoSP are part of the OPDE,. All components of the OPDE are operated by the RSCs CORESO and TSCNET as well as by the TSO Amprion.

On an infrastructural level, the OPDE and all its communication will be relying on a fully private communication network, established on a pan-European scale, securely connecting all TSOs and RSCs via TSO owned communication lines. The ENTSO-E owned network is being implemented under the name Physical Communication Network (**PCN**, formerly ATOM) and is operated by TSOs Amprion and Swissgrid.

"CGM Standard Expertise" on the right of the organisational chart is about the continued development of the Common Grid Model Exchange Standard (**CGMES**) which is the data format used to exchange IGMs and CGMs.

Many different processes use the CGM. In the context of the present report, coordinated capacity calculation (CCC) is the most important of these processes. However, the CGM is also used in a number of additional processes which are not the focus of the present report, but should be mentioned briefly:

- CSA - Coordinated Security Analysis
- OPC - Outage Planning Coordination
- STA - (Analysis of) Short-Term Adequacy
- CGS - (Analysis of) Critical Grid Situations
- "RSC Coordination" refers to the cooperation and coordination among the different RSCs

At the time of writing, almost all TSOs had appointed an RSC as their Alignment and Merging Agent and the nominations still outstanding are expected to be made during the remainder of 2019.

During the reporting period, the CGM Programme also made substantial progress in developing the contractual framework for the operation of the CGM process. The core document in this respect is the Minimum Viable Solution (**MVS**) Contract to which both TSOs and RSCs are parties. Among the signatories there are a number of TSOs that are not from a member state of the European Union. This proves that TSOs and RSCs are keen on cooperating regardless of possible differences in the legal framework within which they operate.

Looking ahead, the project plan prepared by the CGM Programme sketches out a step-by-step implementation of the CGM process as illustrated in the following diagram:

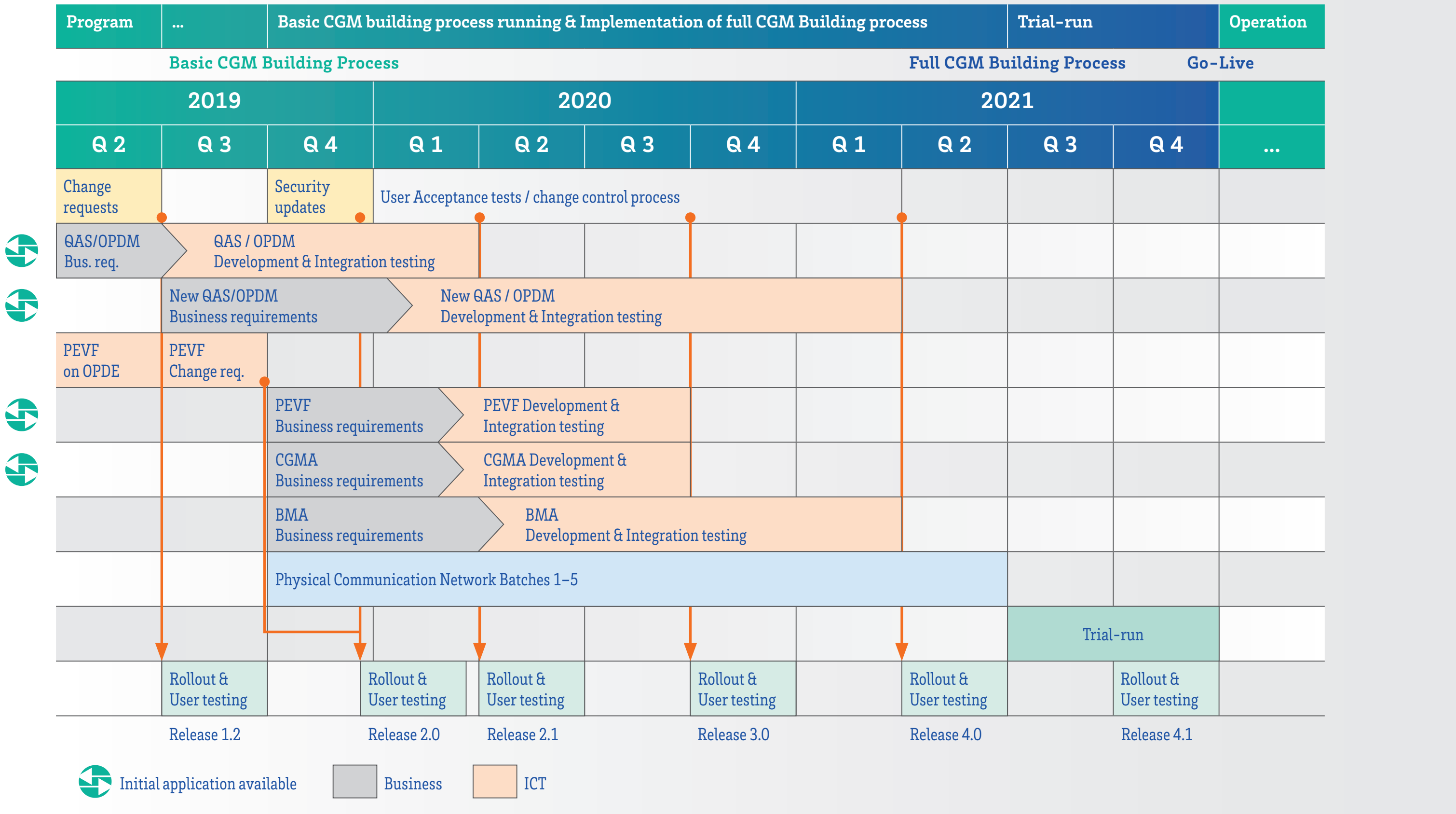


Figure 24 – CGM overall implementation plan

The steps envisioned are straightforward:

- A basic CGM building process is expected to be implemented at the end of Q3 2019. The IT-related work required in order to attain that milestone is referred to as Release 1.2 in the bottom row of the diagram. (The release planning is depicted for the sake of illustration; however, a detailed description of the contents and features covered by each release is beyond the scope of the present report.)

- The subsequent releases serve to implement the full CGM building process. A trial run is planned for Q3 and Q4 of 2021; at the end of 2021, the process will become fully operational ('Go-Live').

The Basic CGM Building Process enables TSOs and RSCs to

- up-/download IGMs
- send IGMs/CGMs via a stable OPDE environment
- perform basic processing of IGMs
- merge IGMs into CGMs
- up-/download CGMs with focus on one timeframe (e.g., D-1)
- align processes and procedures (e.g., CGM Building Process descriptions, AC/DC master data, CGMES implementation guides, quality specification documents)

The following additional functionalities become available as part of the full CGM building process: TSOs and RSCs will then be able to

- publish IGMs (after a quality check)
- process IGMs in CGMES in full
- publish CGMs for all timeframes
- communicate securely
- receive support from the Service Desk
- onboard the operational team
- ensure business continuity
- continue to align processes and procedures (e.g., pan-European master data procedures, DC implementation guides, HVDC requirements)

At the time of the CGM Go-Live (i.e., when the CGM process is fully operational), TSOs and RSCs will be able to use the infrastructure provided by the CGM Programme in order to communicate via a meshed and secure Physical Communication Network and be able to fully operate the CGM building process without support from the CGM Programme.

Figure 24 also illustrates the work to be done on central business applications. The basic principle is that the business requirements are defined first and are then translated into IT implementation, followed by testing.

The three following subsections summarise the relevant milestones, both those representing achievements in the past and those that remain to be attained. While most of the CGM-related milestones are relevant for all timeframes equally, some specific milestones related to the CGM needed for short-term capacity calculation as well as the CGM for long-term capacity calculation are outlined as well.

5.3 General CGM-related milestones

Closed milestones 2017 – 2018	
Quarter	**Description**
Q1 2017	MVS Contract finalised.
Q2 2018	Revision of CGM Project Implementation Document (PID) completed.
Q3 2018	Approval of the CGM Methodology pursuant to the System Operation Guideline, Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation, by the competent regulatory authorities.
Q4 2018	RSC (Alignment Agent/Merging Agent) appointed by most TSOs.

Table 56 – CGM planned general milestones

Planned milestones 2019 – 2021	
Quarter	**Description**
Q3 2019	Basic CGM Building Process implemented.
Q4 2019	Development and documentation of CGM users' requirements (by the CGM - RSC Users Group).
Q4 2019	Nomination of RSCs by TSOs completed.
Q2 2021	Full CGM Building Process implemented.
Q4 2021	CGM Go Live (CGM process fully operational).

Table 57 – CGM planned general milestones

5.3.1 CGM for short-term capacity calculation

Closed milestone 2017 – 2018	
Quarter	**Description**
2017	Common Grid Model Alignment (CGMA) for the D-2 timeframe implemented.

Table 58 – CGM closed milestone for short-term capacity calculation

Planned milestones 2019 – 2021	
Quarter	**Description**
Q3 2020	Pan-European Verification Platform fully developed and operational.
Q3 2020	Common Grid Model Alignment (CGMA) developed and implemented for all relevant timeframes.

Table 59 – CGM planned milestones for short-term capacity calculation

5.3.2 CGM for long-term capacity calculation

Closed milestone 2017 – 2018	
Quarter	**Description**
Q4 2018	Initial development of year-ahead scenarios completed.

Table 60 – CGM closed milestone for long-term capacity calculation

Planned milestone 2019 – 2021	
Quarter	**Description**
Q3 2020	Common Grid Model Alignment (CGMA) developed and implemented for all relevant timeframes

Table 61 – CGM planned milestone for long-term capacity calculation

6 SUMMARY

For the first time, this report provides a joint CACM and FCA capacity calculation perspective. In addition to this, a detailed overview of the status of the Common Grid Model is also included. Thus, the subject is thoroughly covered, as it is the intention of the TSOs to give a view that better describes the concepts and relevant facts that shape the current and future capacity calculation in Europe across all market time horizons.

Moreover, based on the approved methodologies (i.e., CACM CCMs, CGMM, CGMA, CGMAM), the material presented in this document reports on relevant indicators. For the short-term – within the CACM capacity calculation methodologies – their definitions are in line with the approved methodologies by the relevant NRAs or decisions from ACER, with the caveat that not all of the regions at the time of this writing have their CACM capacity calculation methodology approved or implemented. As for the corresponding long-term – under the FCA capacity calculation methodologies – the methodologies are still being drafted or are currently in the approval process. After this is completed, all CCRs will implement the relevant long-term capacity methodology, which will enable them to commit to a statistical list of indicators in light of future operation.

As for the CGM indicators, the information contained in this report is based on the testing data collected during 2018. In this respect, the report proposes a revised set of IGM-/CGM-only indicators relevant to short- as well long-term capacity calculation which update the ones included in the previous edition of 2017.

7 GLOSSARY

ACER	Agency for the Cooperation of Energy Regulators
AHC	Advanced hybrid coupling
AT	Austria
ATC	Available transfer capability
BE	Belgium
BG	Bulgaria
BMA	Boundary management application
BRNN	Brindisi
BZ	Bidding Zone
BZB	Bidding zone border
CACM	Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management
CBCO	Critical branch/critical outage
CC	Capacity calculation
CCM	Capacity calculation methodology
CCR	Capacity calculation region
CCC	Capacity calculation coordinator
CGM	Common grid model
CGMA	Common grid model alignment
CGMES	Common grid model exchange standard
CGMM	Common grid model methodology
CH	Switzerland
CNE	Critical network element
CNOR	Central-North (Italian bidding zone)
CNTC	Coordinated net transmission capacity
CSUD	Central-South (Italian bidding zone)
CZ	Czech Republic
DA	Day-ahead
DC	Direct current
DE	Germany
DK	Denmark
ECCoSP	European and Digital Platform
EDX	ENTSO-E Data Exchange
EE	Estonia
ENTSO-E	European Network of Transmission System Operators for Electricity
EU	European Union
FB	Flow-based
FCA	Forward capacity allocation
FI	Finland
FOGN	Foggia (Italian bidding zone)
FR	France
FRM	Flow reliability margin
GB	Great Britain
GR	Greece
GRIT	Greece – Italy
HR	Croatia
HU	Hungary
IC	Interconnector
ID	Intraday
IGM	Individual grid model
IOP	Interoperability test
IT	Italy
IU	Ireland and United Kingdom
LT	Lithuania
LU	Luxembourg
LV	Latvia
MC	Market coupling
MSF	Minimum stable flow
MTU	Market Time Unit
MW	Megawatt
MWh	Megawatt hour

NEMO Nominated electricity market operator

NL Netherlands

NORD Northern (Italian bidding zone)

NRA National regulatory authority

OPDE Operational planning data environment

OPDM Operational planning data management

PEVF Pan-European verification platform function

PID Project implementation document

PL Poland

PPD Pre- and post-coupling data

PRGP Priolo G. (Italian bidding zone)

PTR Physical Transmission Right

QAS Quality assurance service

Q1 First quarter

Q2 Second quarter

Q3 Third quarter

Q4 Fourth quarter

ROCOF Rate of Change of Frequency

RCC Regional coordination centre

RM Reliability margin

RO Romania

ROSN Rossano (Italian bidding zone)

RSC Regional security coordinator

SARD Sardegna (Italian bidding zone)

SE Sweden

SEE South East Europe

SI Slovenia

SICI Sicilia (Italian bidding zone)

SK Slovakia

SUD Southern (Italian bidding zone)

SWE South West Europe

TR Transmission right

TSO Transmission system operator

XBID Cross-Border Intraday Market Project

European Network of
Transmission System Operators
for Electricity

entsoe