Yearly Activity Report 2021

coreso

One of the six RSCs coordinating electricity flows for all European Transmission System Operators

Coreso is one of the six Regional Security Coordinators (RSCs) and future Regional Coordination Centres (RCCs) as from July 2022, proactively supporting Transmission System Operators to ensure security of electricity supply on a European regional basis.

Coreso, meaning COoRdination of Electricity Supply Operators, was founded in 2008 as one of the first European technical coordination centres shared by multiple electricity Transmission System Operators (TSOs). Today nine TSOs, which territories cover around 55% of the European population, share the company's governance.

Located in Brussels close to the European Commission, we are a team of experienced experts from several European countries, combining their expertise 24 hours a day and 7 days a week to support TSOs in securing and optimising the operations of the high-voltage electricity system, throughout the European continent.

Our RSC activities consist in performing analyses, recommending and coordinating solutions for TSOs and partners in different areas in Europe. We do this by anticipating operations both in the short-term and the long-term, from a year-ahead until intraday (few hours before real time).

As the European electricity system is complex and highly interconnected, strong transnational coordination is indeed essential to ensure security of supply at regional level. Since the integration of large-scale renewable energy generation and cross-border electricity exchanges are increasing in Europe, power flows are much more difficult to predict and calculate than in the past given their increasing fluctuation. Therefore, enhanced coordination between TSOs is needed to ensure the secure and efficient management of the European transmission system.

In this context, Coreso is playing a key coordination role by developing, implementing and delivering the regulated coordination services required by the European regulations.

RSCs evolving to Regional Coordination Centres (RCCs) by July 2022, additional tasks will be added to the RCCs tasks portfolio, as foreseen by the Clean Energy Package (CEP). Listed in the Article 37 of the European Regulation on the Internal Electricity Market (Regulation 2019/943), some of these tasks are still being discussed and defined at European level. With our teams, Coreso aims to be at the first row in building up the adequate operational processes, to cope with those game-changing trends and with evolving regulatory environment.

Our RSC and future RCC tasks in a nutshell, in line with Article 37 of the EU Internal Electricity Market Regulation 2019/943

Task (a)
Coordinated Capacity Calculation · YA -> ID

Calculate the available cross-zonal transmission capacities that can be allocated to the electricity market. Provide improvement proposals to TSOs to optimise available capacities.

Task (b)
Coordinated Security Analysis · DA & ID

Perform security analysis to detect potential operational security violations on the grid, at a regional level. Recommend and coordinate remedial actions for TSOs to solve them.

Task (c)
Common Grid Model · YA → ID

Create a pan-European overview of the interconnected European grid by collecting, checking the quality, and merging the Individual Grid Models provided by TSOs.

Task (d)
Defence and Restoration Plans

Review of TSOs defence plans and restoration plans (to be implemented in case of an emergency restoration state) to identify potential incompatibilities. Propose mitigation actions.

Task (e)
Short-Term Adequacy · WA → DA

Perform adequacy assessments to detect situations where a lack of electricity adequacy is expected in any of the control areas (pan-European) or at regional level, considering possible cross-border exchanges and operational security limits. Propose and coordinate solutions for TSOs to ensure generation meets consumption.

Task (f)
Outage Planning Coordination · YA, MA & WA

Identify tie-lines inconsistencies and outage planning incompatibilities between relevant grid assets, with cross-border impact at pan-European and regional level. Propose and coordinate solutions for TSOs to solve these incompatibilities.

Task (g)
NEW - Training and Certification

Train and certify staff working for RCCs. Put in place an internal structure to train and certify operators before operating any service while allowing traceability and transparency.

Task (h)
NEW - Regional Restoration

Support the coordination and optimisation of regional restoration as requested by TSOs. Task definition still in discussion at European level while RCC involvement needs to be determined.

Task (i)
NEW - Post-Operation Analysis

Carry out post-operation and post-disturbances analysis and reporting. Investigate and prepare reports on incident strongly affecting the European Transmission Network, to support the European expert panel for further analysis.

Task (j)
NEW - Sizing

Regional sizing of reserve capacity. Task definition still in discussion at European level.

Task (k)
NEW - Procurement

Facilitate the regional procurement of balancing capacity. Task definition still in discussion at European level.

Task (l)
NEW - Settlement

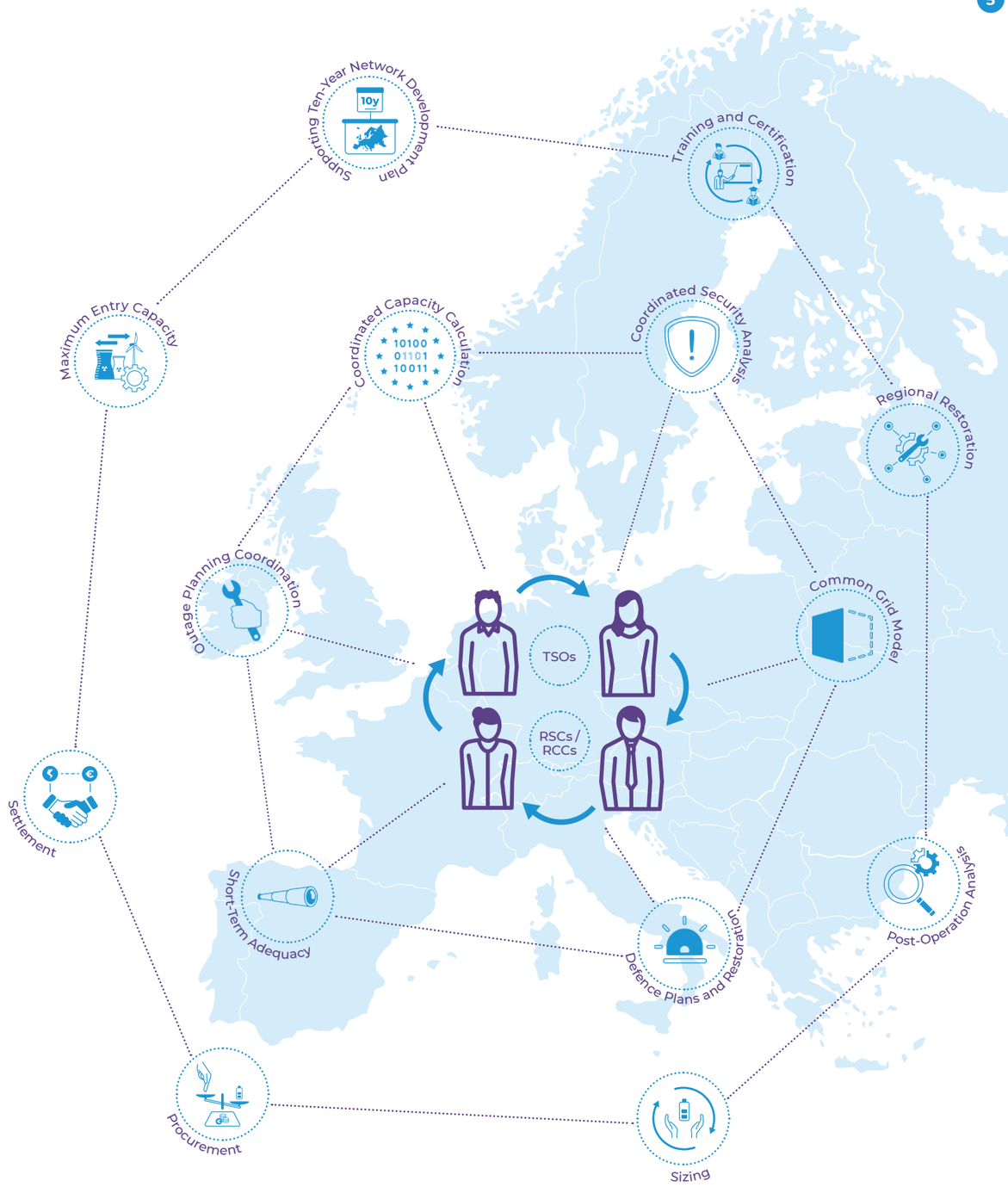
Support TSOs, at their request, in the optimisation of inter-transmission system operators' settlement. Task definition still in discussion at European level.

Task (o)
NEW - Maximum Entry Capacity

Calculate the value for the maximum entry capacity available for the participation of foreign capacity in capacity mechanisms for the purposes of issuing a recommendation. Task definition still in discussion at European level.

Task (p)
NEW - Supporting Ten-Year Network Development Plan

Carry out tasks related to supporting TSOs in the identification of needs for new transmission capacity, for upgrade of existing transmission capacity or their alternatives. Task definition still in discussion at European level.



Did you know ?

"Regional level" refers to an area of coordination that is specified in the regulation based on technical criteria (not a region in a specific country).

The Capacity Calculation Regions (CCRs) and System Operation Regions (SORs) in which Coreso is involved will be further detailed in this report.

Management greetings

Over the past 14 years, Coreso has experienced remarkable growth in accompanying TSOs in the development of regional coordination activities. Today, Coreso is at the crossroads of several challenges and paths to the future, as 2022 is the year of its transformation from Regional Security Coordinator (RSC) to Regional Coordination Centre (RCC). This is a heavy change, with pressure on priorities, planning and budget, for each team member and for the whole organisation.

2021 has proven to be a challenging year and 2022 will also be an extremely special year.

Looking back over the past year while keeping in mind some of the challenges of the future, I am pleased and proud to see that Coreso has continued to develop its business processes while supporting the efforts needed to implement a major internal transformation process. I see us in the midst of an exciting period, on the cusp of significant progress in regional coordination. Furthermore, with the creation of new management functions in 2021, Coreso is now ready to embark on the final major steps of its transformation to meet the challenges ahead.

In 2021, thanks to the dedication, expertise and efforts of the staff, Coreso has continued to grow and progress every day. Amongst various successes, I can mention:

- effective coordination of TSO activity, 24 hours a day, 7 days a week, in a context of increasing general stress on network operations;
- effective cooperation with TSCNET in our joint CorNet Programme;
- launch of an ambitious multi-year IT transformation plan;
- improvement of our project management processes and skills;
- fundamental transformation of our financial and budgetary processes;
- preparation of the internalisation of our HR processes and developing our internal training programme.

Of course, the achievements of 2021 are only a step in the development of regional coordination activities. Therefore, beyond the points mentioned above, we will have to continue our efforts to make regional coordination a success. This will require further standardisation as well as a secure and flexible industrialisation of the solutions provided. The technical complexity, the interdependence with other projects conducted at regional and pan-European level, the diversity of tasks, the specificities associated with each region and the time constraints to deliver the expected services are today and will continue to represent a real challenge for Coreso and all its partners.

In addition, the gradual entry into force of the Network Codes and the Clean Energy Package (CEP) will lead the TSO community and the RSCs/future RCCs to continue to accelerate development in accordance with the European regulations and methodologies. Thus, Coreso and the other RSCs/future RCCs will be faced with a double challenge: (i) to continue to carry out operational coordination activities contributing to improving security of supply in Europe and (ii) to develop new services in an increasingly demanding regulatory framework.

Such a report is a good opportunity to learn from past exercises while preparing for the future to meet these challenges. No one can deny the challenges we have faced over the past year and a half - as individuals and as a company. Although most of our team worked from home, we have been resilient. In the year ahead, this resilience and dedication will be needed more than ever. Hopefully, 2022 will see the pandemic evolve into a more manageable endemic even if the various ongoing crises continue to make the future uncertain.

With the transformation of RSCs into RCCs in July, the year 2022 will mark a major step in the strengthening of coordination between TSOs. The management team of Coreso will evolve as from 1 July 2022 to meet the challenges arisen from this status evolution. **Jan Van Roost** will become the new Chief Executive Officer (CEO) and **Flavio Allella** the new Chief Operations Officer (COO). More than ever, the collaboration between Coreso and all the other RSCs/future RCCs is fundamental to make this transformation a success.

This report will present the key facts and milestones of 2021 for Coreso. We hope that you will find this information useful and that you will enjoy reading it as much as we enjoyed preparing it!

Jean-François Cahungu • Chief Executive Officer (CEO)

It has been a great adventure and a real challenge to accompany Coreso over the last few years until the eve of the RCC transformation on 1 July 2022.

I wish Jan and Flavio (and the management team) much success and happiness as they continue to strengthen this young and dynamic company with its team of talented international professionals!

Coreso in 2021

2021

JAN

The **“RCC Establishment Provisions”** was approved by the National Regulatory Authorities (NRAs) from the Central System Operation Region (SOR) on 15 January 2021. Establishing Coreso and TSCNET as Regional Coordination Centre (RCC) in Central SOR, it determines the allocation of tasks between Coreso and TSCNET.

FEB

FEB & JUN

2

Coreso hosted two **CGM workshops** with our shareholders, focusing on 2021 milestones and the CGM service implementation, to increase readiness for the CGM service go live planned in December 2021.

MAR

On 8 March 2021, TSCNET and Coreso Management aligned on the implementation process of the **STA Pan-European and OPC Pan-European tasks split**.

APR

In collaboration with Coreso, TSOs from the South West Europe Capacity Calculation Region (SWE CCR) have decided to implement a stepwise approach to comply with the Clean Energy Package (CEP) 70% requirement. The first step consists of **monitoring the 70% criterion** to assess the fulfilment percentage: this monitoring was successfully integrated in April 2021 in the day-ahead capacity calculation process performed for the SWE CCR.

MAY

The STA Pan-European IT tool enables RSCs and TSOs to perform daily calculations identifying lack of adequacy for the week ahead (D-1 until D-7). Working on improving the tool since it went live in 2020, the ENTSO-E STA Project Group launched in May 2021 the **STA release R2a**, providing major updates including legal requirements. The STA Project Group is composed of members from all TSOs and RSCs and is led respectively by Coreso and TSCNET.

The Critical Network Element and Contingency (CNEC) selection process was successfully integrated in May 2021 in the day-ahead and intraday capacity calculations performed for the Italy North CCR, in compliance with the Italy North Capacity Calculation methodology. The CNEC selection process aims at defining the list of CNECs to be considered in the capacity calculation process: only the network elements with a sensitivity to cross-zonal power exchanges equal or higher than 5% are selected and monitored.

JUN

On 24 June 2021, the **kick-off meeting** with TSCNET and Coreso management teams took place to engage the implementation of the **STA and OPC tasks split**, which effectiveness is foreseen by 1 July 2022.

MAY & OCT

Launched in 2020, the first release of the OPC Pan-European tool allows the RSCs and all TSOs to coordinate the outage planning on a weekly basis, based on generation and demand forecast provided by all ENTSO-E member TSOs. The **OPC Release 2b**, integrating major requirements, was launched in May and October 2021 under ENTSO-E lead, with the cooperation of all RSC contributors and several TSOs experts.

JUL

ENTSO-E published in July 2021 **the Regional Coordination Assessment Annual Report** to fulfil the obligations from Article 17 of the Regulation (EU) 2017/1485 on establishing a guideline on electricity transmission system operation (SOGL). The report documents the implementation and operational monitoring of the Regional Coordination services, performed by Regional Security Coordinators (RSCs).

AUG

SEP

The **STA Regional - Step1a process** was launched on 15 September 2021, by the STA Project Group and Task Force (both composed of TSO and RSC experts). This regional process allows deeper analyses to be performed and remedial actions to be proposed by both RSCs and TSOs, in case of an adequacy issue at pan-European level. This is done by focusing on impacted TSOs and their neighbours, and on the coordination of the best possible solution.

OCT

As required by the European Regulation (EU) 2019/943, the **CEP 70% requirement** was integrated in October 2021 in the day-ahead and intraday capacity calculations performed for the Italy North CCR.

NOV

The **Improved Coordination Solution process** was successfully launched on 1 November 2021 by the Core TSOs and RSCs. This process consists of improving the coordination of remedial actions among the TSOs and RSCs of the Core region, during the Security Analysis Day-Ahead (SA DA) process.

In collaboration with Coreso and TSCNET, the Core TSOs started in November 2021 the **internal parallel run of the Coordinated Capacity Calculation IntraDay (CCC ID) process** for the Core region. On a weekly basis, experts perform different tasks to test the process steps. The go live of the CCC ID Core service is planned in 2023.

DEC

2022

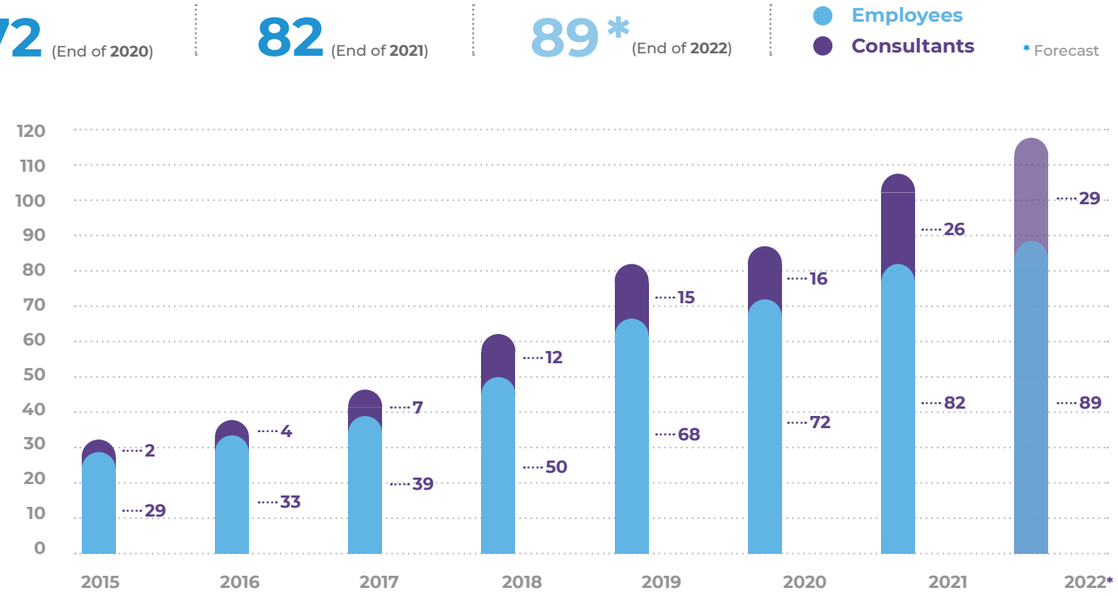
10100
01101
10011

The Joint Allocation Office (JAO) opened the “2022 yearly auctions” on the Italy North borders on 3 December 2021, and the “monthly January auctions” on 15 December 2021. TSCNET and Coreso computed the product, using the methodologies and processes compliant with the Forward Capacity Allocation (FCA) network code, implemented in the framework of the **Coordinated Capacity Calculation Long-Term (CCC LT) project**.

2021 in key numbers

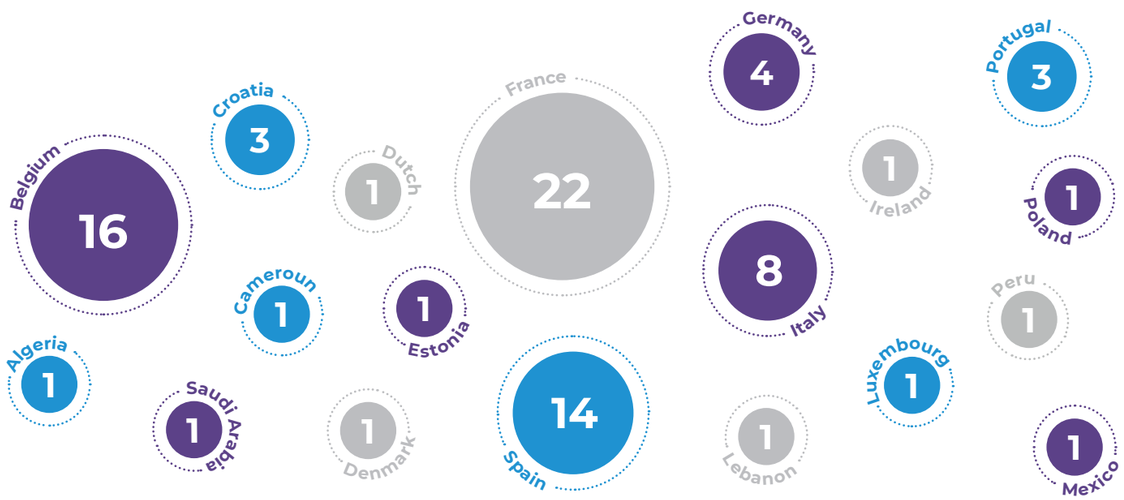
Employees

72 (End of **2020**) | **82** (End of **2021**) | **89*** (End of **2022**)



***** Based on headcount: forecast of the number of people employed at Coreso.

Nationalities



Internships

In 2021, Coreso welcomed 5 interns who completed in total 15 months of internships: this is an important decrease in comparison with previous years (36 months in 2020), mainly due to the pandemic.

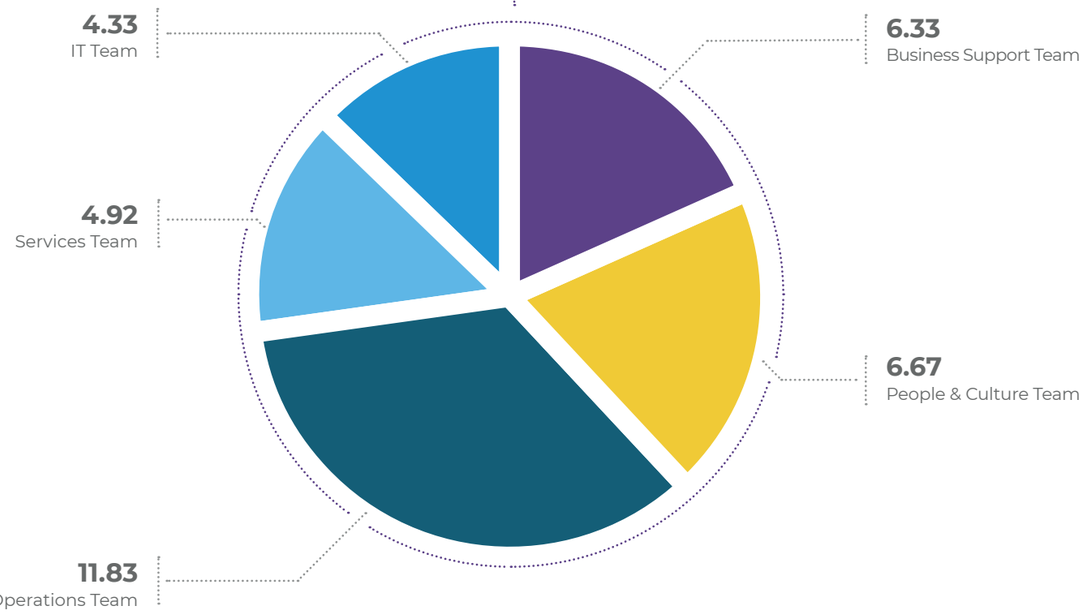
in 2021 — Coreso welcomed 5 interns

15 months — who completed in total of internships

Training days

8.3 Average number of workdays per year spent on training.
> 5 workdays per year on average required by Belgian law.

Average number of workdays per year spent on training, per employee and per department

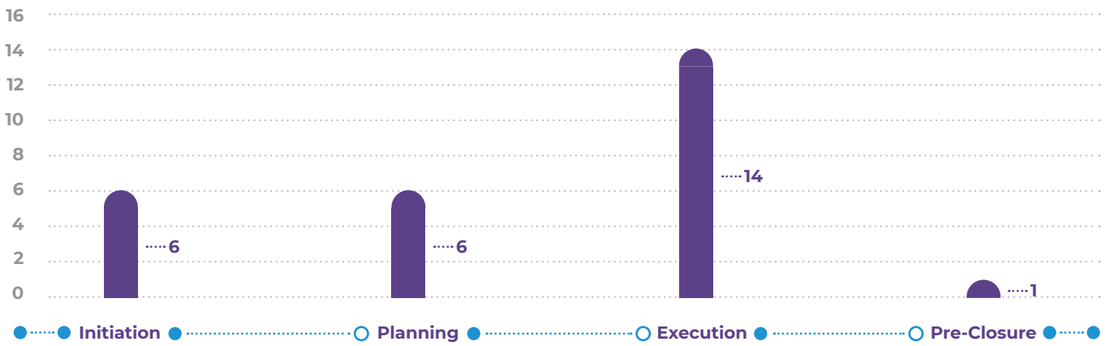


Strategic projects

In 2021, 27 ongoing Coreso projects were classified as “strategic”. Coreso classifies a project as “strategic” when its budget exceeds 300 man-days or 50 K€ of expenses.

Number of projects by team

Status of ongoing strategic projects



Running processes

Common Grid Model (CGM)	Security Analysis (SA)*	Capacity Calculation (CC)	Short-Term Adequacy (STA)	Outage Planning Coordination (OPC)
CGMES Merging Process	DA Core (CWE+CEE)	DA SWE	Cross-regional adequacy assessment	Pan-European Process
	DA IN	ID SWE	Regional adequacy assessment	Regional Process
	DA SWE	DA Core		
	DA Channel**	DA CWE		
	ID CWE	DA IN		
	ID IN	ID IN		
		LT IN		
		ID CWE Available Transfer Capacity (ATC) increase		

DA: Day-Ahead - ID: IntraDay - LT: Long-Term

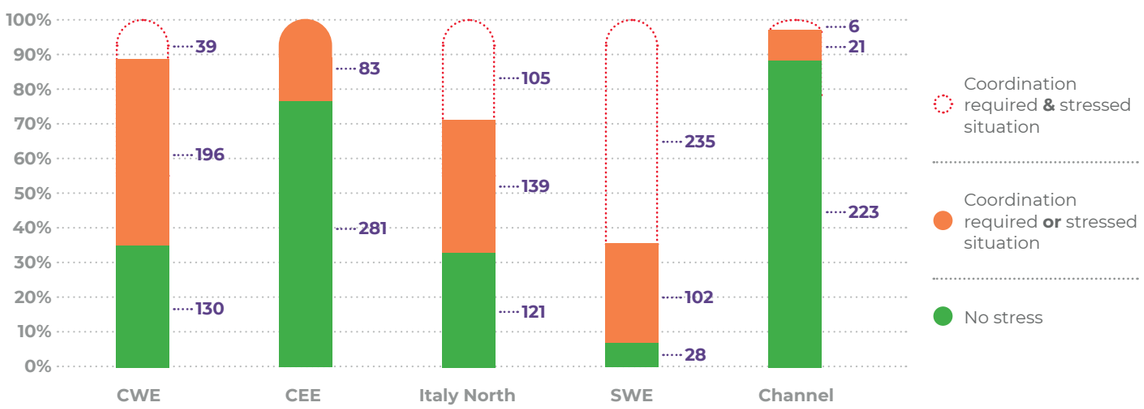
IN: Italy North

* SA vs CSA: Since 2009, the SA services at Coreso have been set up bilaterally with the TSO shareholders. With the implementation of the Coordinated Security Analysis (CSA) process, the SA services will gradually evolve onto the SOGL compliant CSA service.

** Channel region is no longer a regulated region.

Key figures from the Security Analysis service across regions

Stress level identified on the electricity network during the Security Analysis Day-Ahead process:

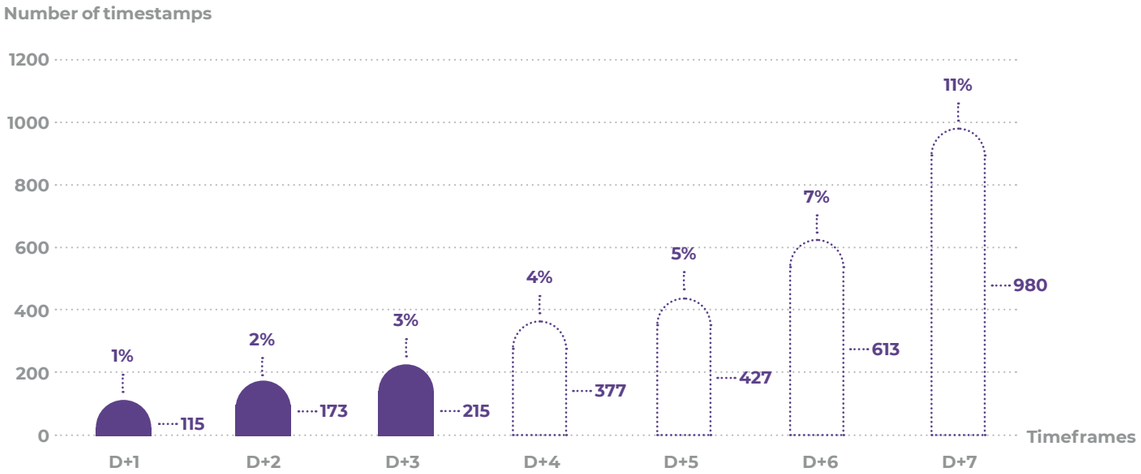


Estimated number of remedial actions coordinated by Coreso on the Day-Ahead and IntraDay Congestion Forecast processes:

	Day-ahead security analysis assessment				Intraday security analysis assessment		
Regions	CWE	CEE	Italy North	SWE	CWE night	Italy North night	CWE afternoon
Estimated number of remedial actions coordinated by Coreso	2,349	62	2,742	5,175	346	442	122

KPIs on STA results

Total number of timestamps (per year and per timeframe), where adequacy issues were detected after the 1st run of the Cross-Regional Adequacy Assessment.



11% Percentage of number of days (41) in 2021 when a 2nd run of Cross-Regional Adequacy Assessment was performed.

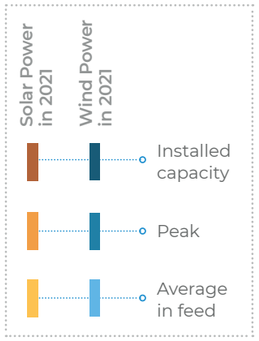
Did you know ?

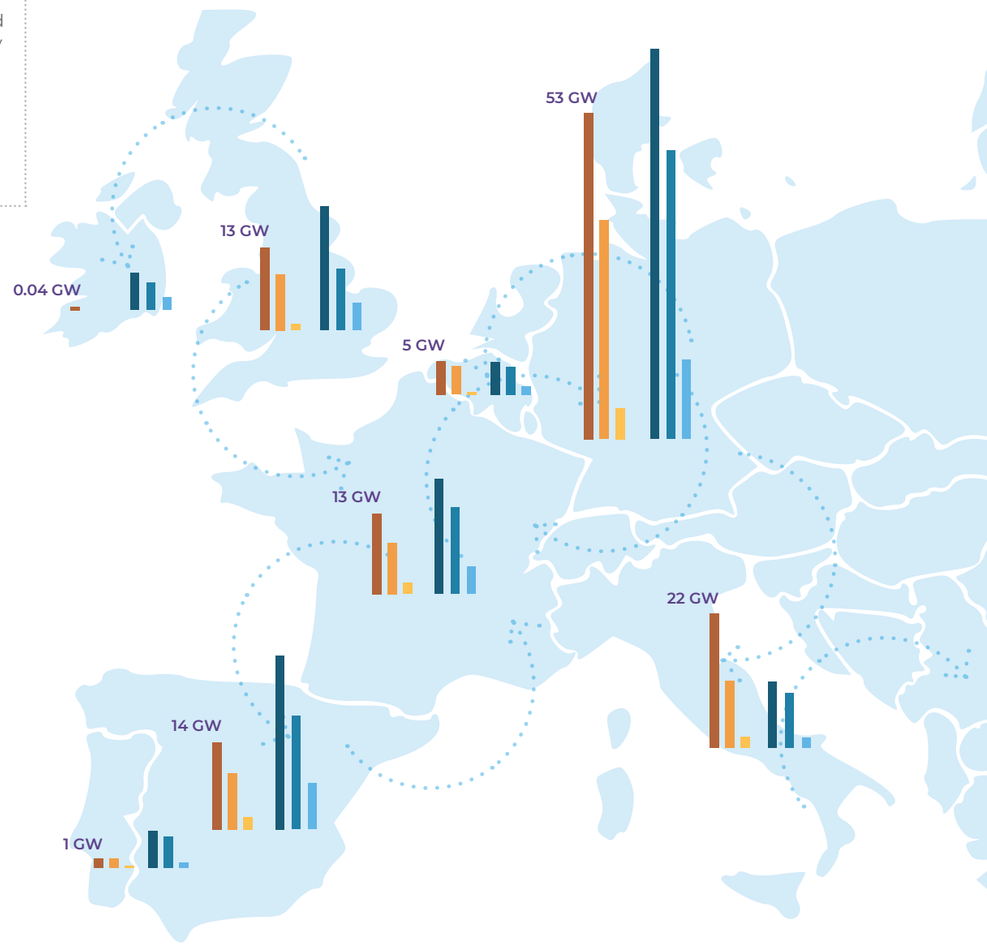
A 2nd run of Cross-Regional Adequacy Assessment can be triggered even if no adequacy issue is detected (i.e., for instance at the request of a TSO, when input data have been improved or updated, or when the initial results are not consistent).

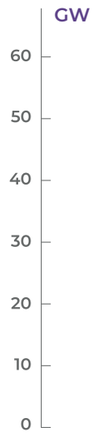
Volumes of renewable energy in some European countries

	Solar			Wind		
All values in GW	Installed capacity	Average	Peak	Installed capacity	Average	Peak
DE	53	5	36	63	13	47
BE	5	0.5	4	5	1	4
FR	13	2	8	19	4	14
IT	22	2	11	11	2	9
ES	14	2	9	28	7	19
PT	1	0.2	1	6	1	5
UK (NGESO)	13	1	9	20	5	10
Ireland island*	0.04	N/A	N/A	6	2	4

* 2020 figures







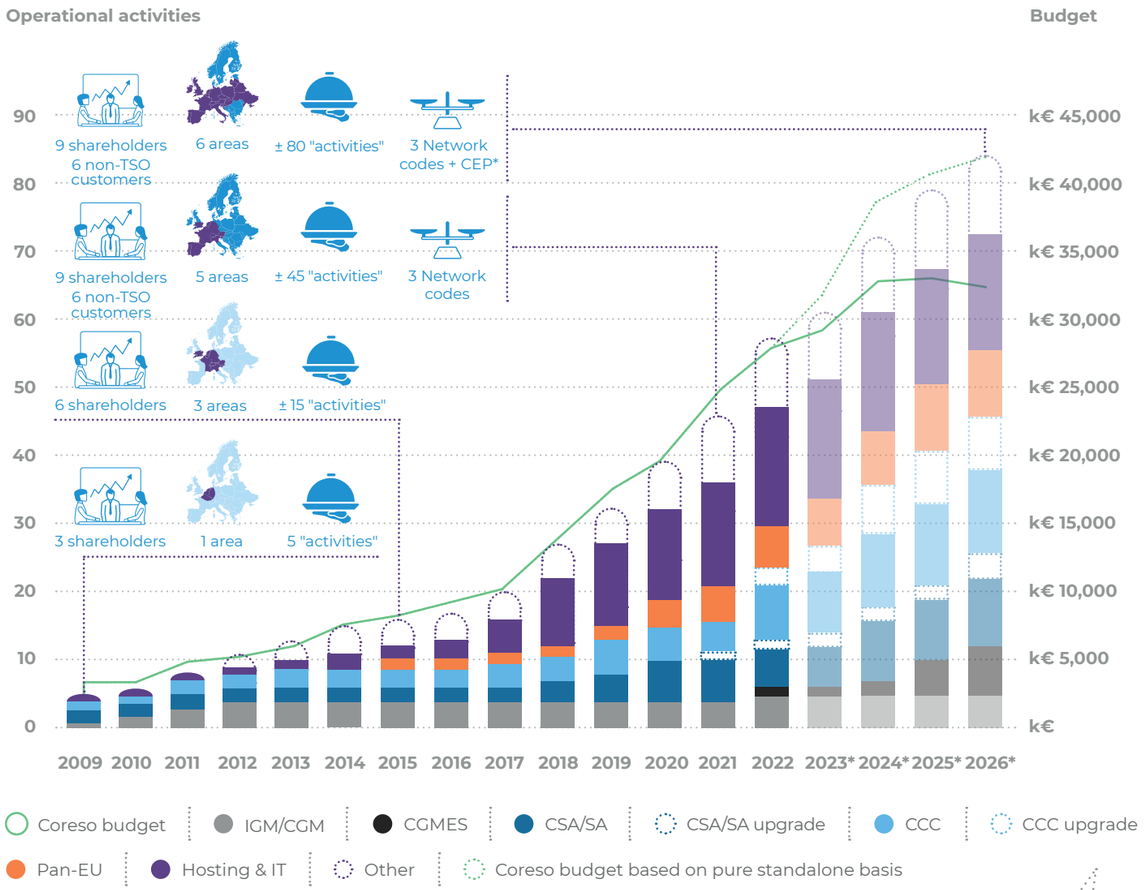
Coreso budget evolution through the years

During the first years of Coreso, then increasingly from 2017, the focus was on the delivery of the first operational services. Throughout this process, with deep-rooted power system engineering experience, Coreso aimed to deliver a first version of the operational services that respond as best as possible to existing regulations.

Today technology is key, and tomorrow it will be even more essential. Coreso core business tomorrow will therefore be to combine our power system engineering experience with technology and robust processes, to be able to deliver the most appropriate value.

The scope and complexity of the regulated services that we perform have also been extended (new processes, improvement of platform tooling), even if the services have retained the same name.

What initially started as a linear trend then became an exponential trend, in terms of demand and complexity. As a result, it will now be essential not to follow the path of exponential growth, in terms of the budget, hence the importance of standardising.



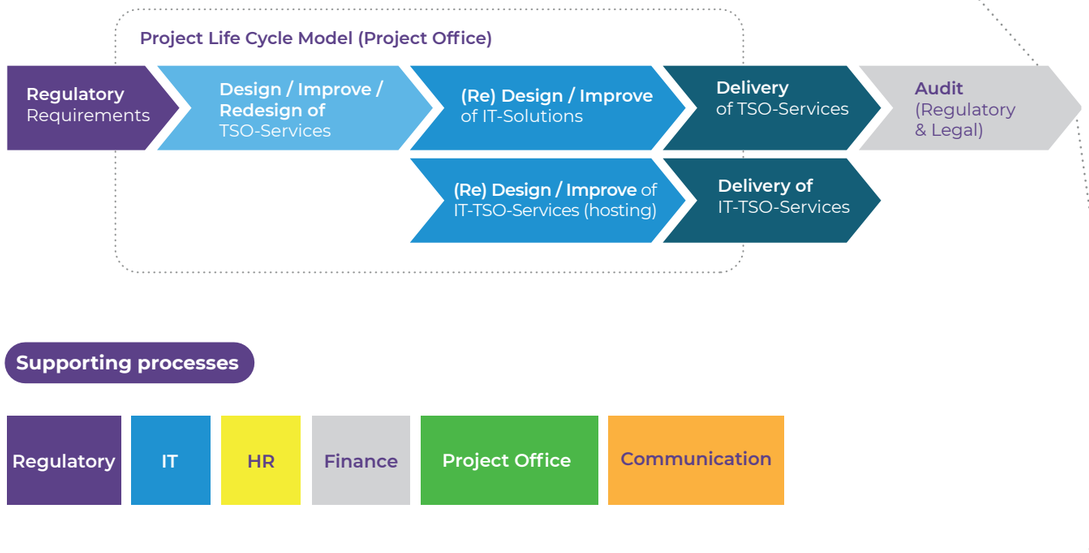
*Estimated information in June 2022

Evolution of the organisation

In 2021 we continued to develop Coreso's organisation in line with the value chain defined previously.

In the early days of the incorporation, activities focused almost exclusively on operational (planning) activities. Today, a value chain adapted to the current context has been defined. Alongside operational activities, it includes Services and IT activities as well as "Business Support" (finance, project office and regulatory) to act "towards regulation" and to strengthen budgetary discipline and internal control.

Core processes



Supporting processes

Regulatory | IT | HR | Finance | Project Office | Communication

The year 2021 was also marked by the final stage in the constitution of Coreso's management team, which was completed with the recruitment of the heads of department. The organisational charts of the various departments were then refined and deployed under the leadership of the newly recruited heads of department.

The focus is now on moving towards Operational Excellence. In concrete terms, this will mean, for example, the reuse of standard IT modules or services that can be deployed in several operational tasks and regions. From an efficiency point of view, this means accepting that some solutions may only cover local 90% of the needs; yet allow for reusing common modules to avoid developing, training, and maintaining twice. Operational Excellence will also lead Coreso to strengthen the structured approach to projects.

Furthermore, a set of 8 guiding principles was drawn up with our shareholders in the spirit of providing Coreso with a Charter, as a clear basis for prioritising activities. In concrete terms, the aim is to enable Coreso's teams to be able to judge and prioritise autonomously, while avoiding duplication of development and sunk costs as much as possible.

As stated in several places in this document, meeting regulatory requirements is an essential part of Coreso's value chain. However, as not all projects can be conducted simultaneously, it is necessary to set priorities that will enable Coreso to progress towards regulatory compliance as at sustainable pace within a realistic work plan.

*Finally, Coreso's Articles of Association were updated to prepare for its transformation into a Regional Coordination Centre (RCC). The Board of Directors of Coreso also appointed a new Chief Executive Officer (CEO - **Jan Van Roost**) and Chief Operations Officer (COO - **Flavio Allella**) as from 1 July 2022.*

Regulation & Compliance in Europe

The monitoring and analysis of regulatory and legal developments are carried out within the Coreso Business Support team. Coreso's activities are significantly triggered and streamed by the European regulations. Thus, Coreso's regulatory expert helps the different teams in the company to better understand the regulatory environment in which the operational activities take place by mapping, structuring, and sharing the information within the company (especially with the Services, IT and Operations teams).

Brexit

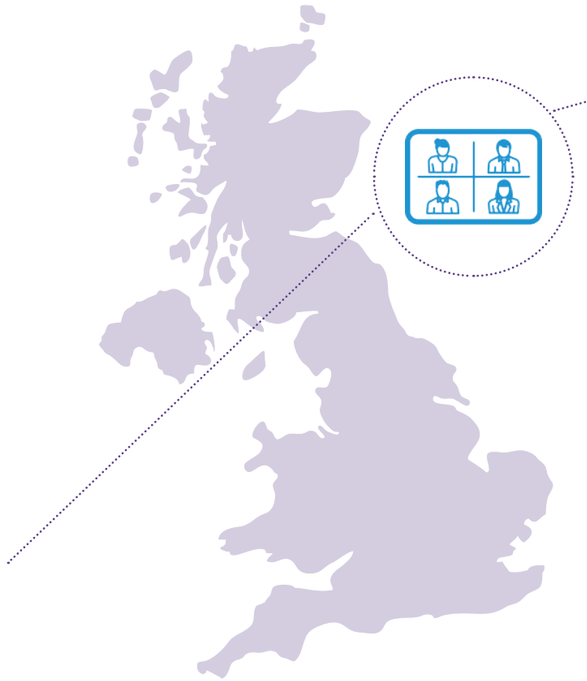
On 19 January 2021, all of the 16 National Regulatory Authorities (NRAs) of the Central Europe System Operation Region (Central SOR) approved the "RCC Establishment Provisions for the Central SOR"*. Consequently, Coreso along with TSCNET will enter into operation as RCC for Central SOR by 1 July 2022.

NRAs specifically mentioned that the Articles of Association (AoA) of Coreso need to be amended to consider the outcome of the Brexit negotiations. The impact of those negotiations on Coreso is that the UK shareholder National Grid ESO (NGESO) is not placed in any SOR as a participating TSO. NRAs of Central SOR asked that non-participating TSOs in a SOR in which Coreso is established should have limited influence at the Board of Directors (BoD).

To propose amendments of the statutes, Coreso set up and convened a task force composed of legal experts from each shareholder. The task force worked out the amendments in line with all Central SOR TSOs and in close cooperation with NRAs. It was a complex and thorough process that ran for almost a year.

Coreso's amended statutes were approved by an extraordinary meeting of shareholders that took place on 29 March 2022. Then TSOs placed in a SOR where Coreso is established as an RCC, submitted the new version to NRAs to formally approve the AoA within the respective RCC establishment provisions before 1 July 2022.

* "RCC Establishment Provisions for the Central SOR" is subject to regular amendments to address punctual topics. The next amended version was submitted to Central SOR NRAs in April 2022.



Transition to RCC

Coreso is already an established private company. Therefore, the transition from Regional Security Coordinator (RSC) to Regional Coordination Centre (RCC) mainly requires the adjustment of the company's Articles of Association (AoA) by 1 July 2022 to address the governance of Coreso after Brexit.

Once it starts operating as an RCC, Coreso will be a regulated entity that will progressively have to meet the additional requirements set out in the EU regulation 2019/943. One of these requirements is to report on the performance of RCCs activities. Additionally, Coreso will have to address the question related to the "cooperative process" provisions that can be summarised as the description of the roles and responsibilities of RCCs and TSOs regarding regulated tasks.

It is generally acknowledged that the keystone of being RCC is the implementation and execution of new tasks (services) in addition to the five historical tasks. These historical tasks such as Coordinated Capacity Calculation, Coordinated Security Analysis, Common Grid Model, Outage Planning Coordination Pan-European and Short-Term Adequacy Pan-European are listed among the other sixteen RCC tasks in the EU regulation 2019/943. Therefore, the ongoing implementation of the five historical tasks is not overruled by the new regulation.

Furthermore, it should be noted that the implementation of the five historical tasks is already underway, in line with the different methodologies that existed prior to the new regulation and, for some tasks, with a timetable that will extend beyond 1 July 2022.

As a result, this means that the entry into force of the RCC does not imply the implementation of all historical and new tasks by 1 July 2022.

Regarding the new tasks, ENTSO-E is mandated to develop a proposal for each of these, and to submit them to the Agency for the Cooperation of Energy Regulators (ACER). Some proposals will be submitted to ACER after 1 July 2022. The timeframe for the implementation of the new tasks will be set out in each of the approved proposals.

The table below provides the list of new tasks set out in the Article 37.1 of regulation 2019/943, and their status (March 2022).

Article 37.1	Task	Abbreviation	Proposal at ENTSO-E	Note
g	training and certification of staff working for regional coordination centres;	Training and certification	Proposal approved by ACER	RCC shall preform the task
h	supporting the coordination and optimisation of regional restoration as requested by transmission system operators;	Regional restoration	Proposal being drafted	Discussion to clarify the role of RCC
i	carrying out post-operation and post-disturbances analysis and reporting;	Post-operation analysis	Proposal approved by ACER	RCC shall perform the task
j	regional sizing of reserve capacity;	Sizing	Proposal being drafted	RCC shall perform the task
k	facilitating the regional procurement of balancing capacity;	Procurement	Proposal being drafted	Task may be requested by Central TSOs
l	supporting transmission system operators, at their request, in the optimisation of inter-transmission system operators' settlement	Settlement	Proposal being drafted	Task will likely be requested by Core CCR
m	carrying out tasks related to the identification of regional electricity crisis scenarios if and to the extent they are delegated to the regional coordination centres	Crisis scenario	Proposal approved	Task not delegated by ENTSO-E
n	carrying out tasks related to the seasonal adequacy assessments if and to the extent that they are delegated to the regional coordination centres	Seasonal adequacy assessments	Proposal approved	Task not delegated by ENTSO-E
o	calculating the value for the maximum entry capacity available for the participation of foreign capacity in capacity mechanisms for the purposes of issuing a recommendation	MEC	Proposal approved	RCC shall perform this task
p	carrying out tasks related to supporting transmission system operators in the identification of needs for new transmission capacity, for upgrade of existing transmission capacity or their alternatives	Supporting 2YA TYNDP (Ten-Year Network Development Plan)	Proposal being drafted	RCC shall perform this task

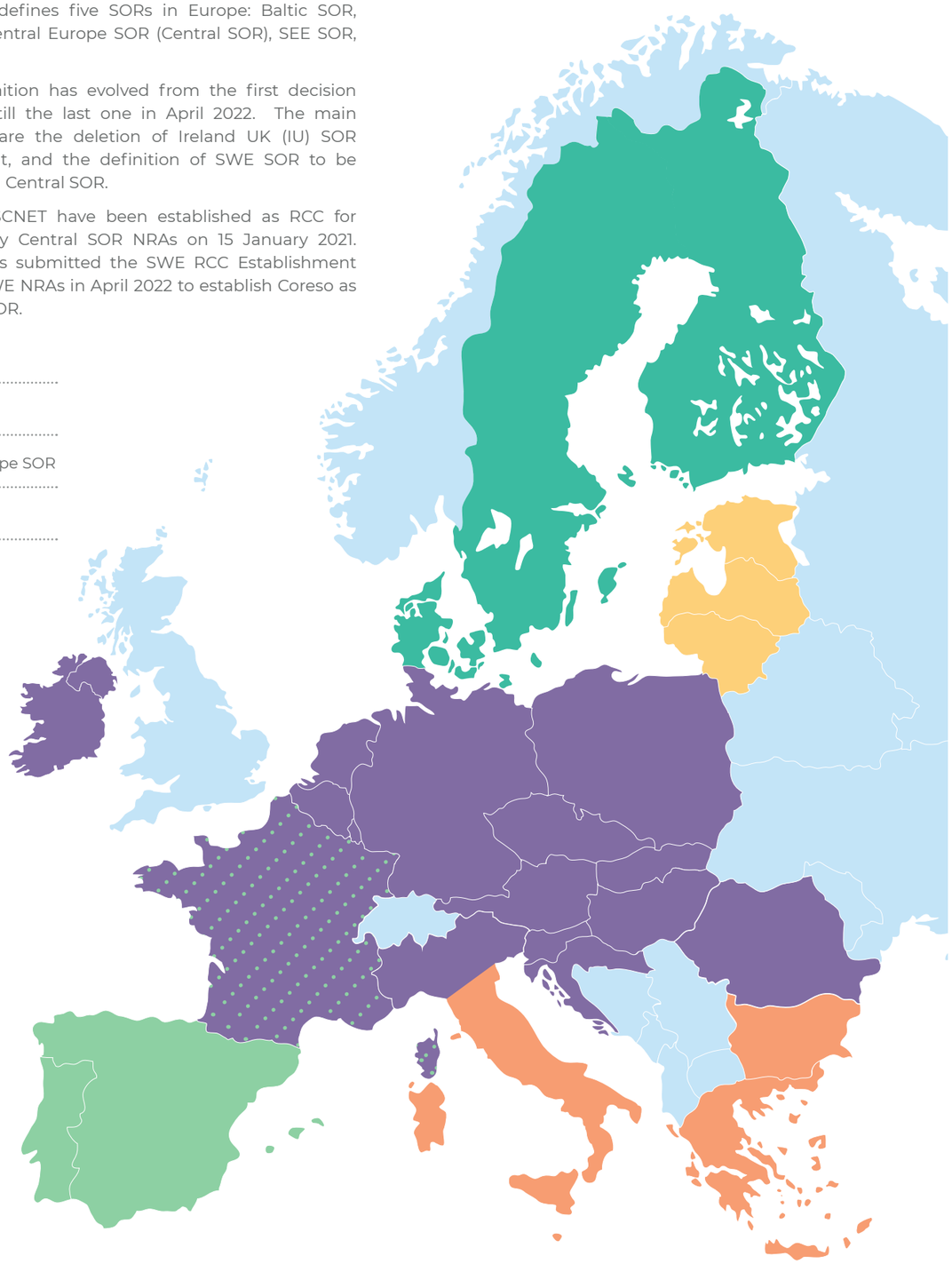
ACER draft revised decision on System Operation Regions

On 8 April 2022, ACER adopted a new decision on the definition of System Operation Regions (SORs). The new decision defines five SORs in Europe: Baltic SOR, Nordic SOR, Central Europe SOR (Central SOR), SEE SOR, and SWE SOR.

The SOR definition has evolved from the first decision in April 2020 till the last one in April 2022. The main modifications are the deletion of Ireland UK (IU) SOR following Brexit, and the definition of SWE SOR to be separated from Central SOR.

Coreso and TSCNET have been established as RCC for Central SOR by Central SOR NRAs on 15 January 2021. SWE SOR TSOs submitted the SWE RCC Establishment Provision to SWE NRAs in April 2022 to establish Coreso as RCC for SWE SOR.

- Nordic SOR
- Baltic SOR
- Central Europe SOR
- SEE SOR
- SWE SOR



Cybersecurity network code (common response from all RSCs/RCCs to ACER)

In 2021, ACER published a Framework Guidelines for the network code on Cyber Security in which several significant tasks were set out for RCCs. Aware of the extremely high level of expertise required for such tasks, Coreso and the other RCCs have provided feedback so that their specificities can be considered. Coreso and the RCCs consider that the tasks and activities defined in the Framework Guideline go beyond the original scope and purpose of RCCs.

When drafting the new network codes, ACER and ENTSO-E considered TSOs and RCCs feedback and considerably reduced the requirements for RCCs, although some requirements still need to be fulfilled by the RCCs.

ENTSO-E delivered the Cyber Security network code to ACER beginning of 2022. The approval process is expected to last until the end of 2022.

Publication of the Regional Coordination Assessment report (Article 17 SOGL)

To fulfil the obligations from Article 17 of the Regulation (EU) 2017/1485 on establishing a guideline on electricity transmission system operation (SOGL), ENTSO-E published end of July 2021 the Regional Coordination Assessment Annual Report. It aims to document the implementation and operational monitoring of the Regional Coordination services, performed by RSCs. In this regard, Coreso and the other RSCs provided ENTSO-E with an assessment report that this association combined.

For that purpose, the document provides key-performance indicators (KPIs), such as the average process duration or the percentage of process failure. The KPIs are referring to the legally compliant services, namely the RSC services that are implemented according to legal requirements (OPC and STA).

Besides, the report describes the current implementation status as well as the good practices applied so far, for the other services that are not yet fully legally compliant (CSA and CGM) and whereas some RSCs have legacy services in place to varying degrees. Nevertheless, the report will gradually integrate new KPIs related to the different services in development, once they are legally compliant.

The Regional Coordination Assessment Annual Report, published in July 2021, is the first of its kind. The KPIs in the report highlight the significant implementation efforts made by the RSCs to ensure a value creating operational planning process. The publication of the report more than two months before the deadline is a testament to the intense preparation and great collaboration between the RSCs and ENTSO-E.

Louise Norring • Senior Regional Advisor in ENTSO-E

Did you know ?

Legacy services are services implemented on a voluntary basis prior to the legal requirements from the methodologies approved by the regulatory authorities.

Our services

Common Grid Model

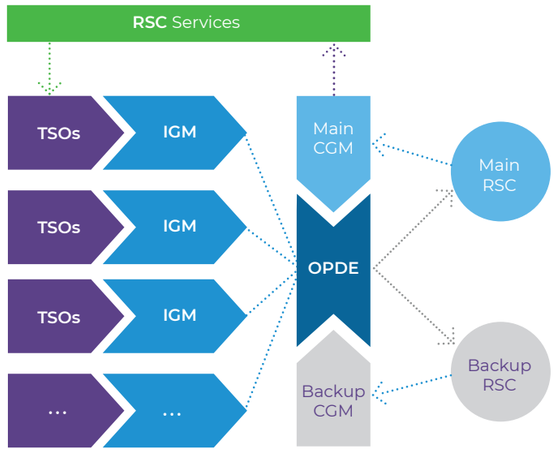
To improve operational coordination and to ensure security of supply at European level, Transmission System Operators (TSOs) share their operational planning data with Regional Security Coordinators (RSCs). Thanks to a digital and secure communication network infrastructure, TSOs provide their Individual Grid Model (IGM) which is a mathematical representation of their own electricity grid. Then, RSCs merge the network models made available by the TSOs to create a Common Grid Model (CGM) representing the electricity grid at European level.

This service is provided for different time horizons: Year-Ahead (YA, also referred as Y-1), Month-Ahead (MA, also referred as M-1), Week-Ahead (WA, also referred as W-1), 2 Days-ahead (D-2), Day-Ahead (DA, also referred as D-1), but also multiple times per day in IntraDay (ID - a few hours before real time).

The CGM process allows all European TSOs and RSCs to have the same accurate overview of the pan-European electricity network, and more precisely the same overview of flows on high-voltage lines. The created CGMs are used as a basis to guarantee grid security and cost-efficient operation, as well as to increase cooperation between all European TSOs and RSCs. The CGM process is also the foundation for most TSOs and RSCs delivered services, such as Coordinated Capacity Calculation (CCC), Outage Planning Coordination (OPC) and Short-Term Adequacy (STA).

To summarise, the different stages of the CGM service are as follows:

- The TSOs create IGMs for specific timeframes, based on a harmonised data format (CGMES) allowing a precise description of their network.
- The IGMs are exchanged via the Physical Communication Network (PCN), supported by ENTSO-E's Operational Planning Data Environment (OPDE) platform.
- The RSCs merge the IGMs from 40 pan-European TSOs, carry out quality checks to ensure the consistency of the IGMs, and help TSOs to improve the files.
- The RSCs create CGMs, fundamental for the provision of operational services derived from the network codes.



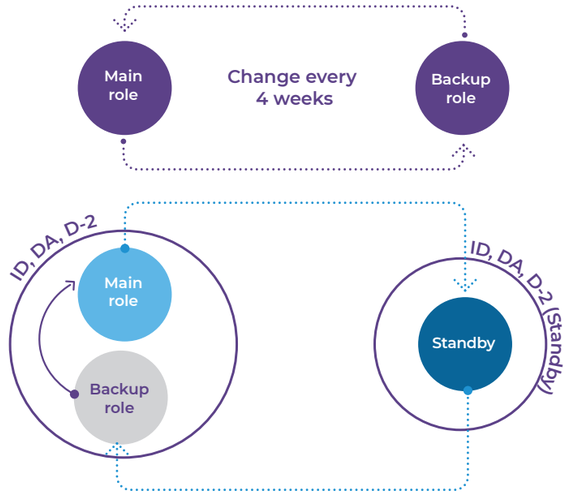
Did you know ?

The Operational Planning Data Environment (OPDE) is a set of application programs and equipment developed to allow the storage, exchange and management of the data used for operational planning processes between TSOs and RSCs.

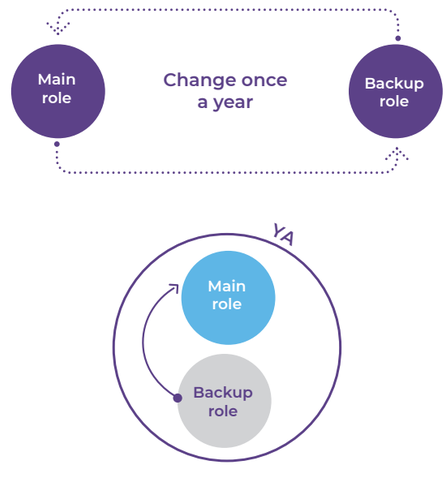
TSOs provide their IGMs on OPDE. RSCs can retrieve this data to create a CGM, which is then published on OPDE.

The RSCs participate in the CGM creation process based on a rotational principle and according to an agreed calendar, with one main RSC and one backup RSC at all times.

RSC Group 1: D-2, DA and ID processes



RSC Group 2: YA process



*The WA process is still under development.

Governance of the service

The CGM process to be performed by TSOs and RSCs is a legal obligation arising from the following European network codes:

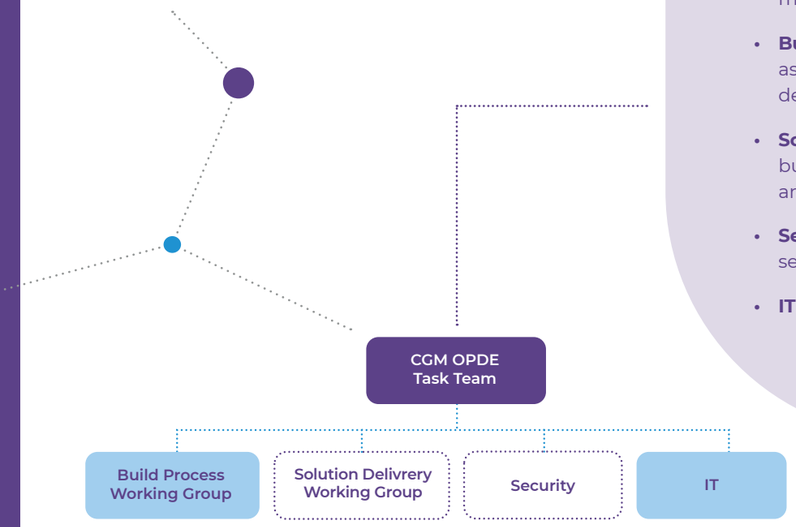
- Article 17 of Commission Regulation (EU) 2015/1222 of 24 July 2015, establishing a guideline on Capacity Allocation and Congestion Management (CACM).
- Article 18 of Commission Regulation (EU) 2016/1719 of 26 September 2016, establishing a guideline on Forward Capacity Allocation (FCA).
- Articles 67(1) and 70(1) of Commission Regulation (EU) 2017/1485 of 2 August 2017, establishing a guideline on electricity transmission system operation (SOGL).

Moreover, the process must fulfil the CGM methodologies approved by the NRAs.

The **ENTSO-E CGM program** started in 2016 with the main objective of ensuring the implementation of a secure and operational "common network model construction process" between TSOs and RSCs. It is governed via the ENTSO-E Board and System Operations Committee (SOC). The program ensures that the pan-European Common Grid network models are provided in accordance with the requirements of the network code. In December 2021, the CGM Programme go live marked the delivery of the data exchange systems and IT infrastructure for the Common Grid Model Build Process. This includes (see more details in the CGM go live section):

1. Implementation of Common Grid Exchange Standard (CGMES) to be used by TSOs and RSCs/RCCs to produce IGM/CGM.
2. Design and implementation of an ICT system, allowing data exchange between TSOs and RSCs.
3. Quality rules for design and implementation to ensure completeness and validity of exchanged grid models.
4. Description of the CGM Building Process.

The go live of December 2021 represented the culmination and the end of the ENTSO-E CGM Programme. Of course, the end of the development program does not mean the end of the efforts. On the contrary, it is now a matter of ensuring the sustainability of operational activities and their continuous improvement. Therefore, a new structure was defined to ensure efficient management of the delivery of tools, platforms, and processes to meet the obligations from SOGL, CACM and FCA regulation while being able to consider operational needs. The Steering Group Regional Coordination (StG ReC) at ENTSO-E will govern the business elements, while the Steering Group IT & Tools (StG ITT) will govern the Information and Communications Technology (ICT) part. The CGM OPDE Task Team will then report to both Steering Groups.



Did you know ?

The scope and responsibilities of the different bodies in charge of the development of the CGM service under the ENTSO-E **StG ReC** can be summarised as follow:

- **CGM OPDE Task Team**: steering and management.
- **Build Process Working Group**: quality assurance, Data Management, and definition of business processes.
- **Solution Delivery Working Group**: business requirements, prioritisation, and roadmap definition.
- **Security**: risk management and security plan.
- **IT**: delivery management.

General timeline of implementation

After the successful go live of December 2021, the most recent achievement of the CGM Programme was to define key focus areas for 2022, summarised in the table below.

Topic	What?	Why?
CGM Rotational Principle	Rotational principal calendar, main / backup CGM labelling and reporting	Efficient execution and management
Week-Ahead (WA) Build Process	Provision of WA CGM	Requested by OPC & STA services
Extension of intraday	Delivery of CGM build process each hour, for the remaining hours in the Energy Delivery Date	Requested by CSA service
File/Model Validation	Various process / validation rule improvements	Quality improvement
Central Authentication Solution	Central OPDE service for authentication across all Business Applications	Security
Technical / Security	Various technical and security changes identified as a priority for early post go live delivery	Security

OPDE priority focus areas for 2022 (Source: ENTSO-E)

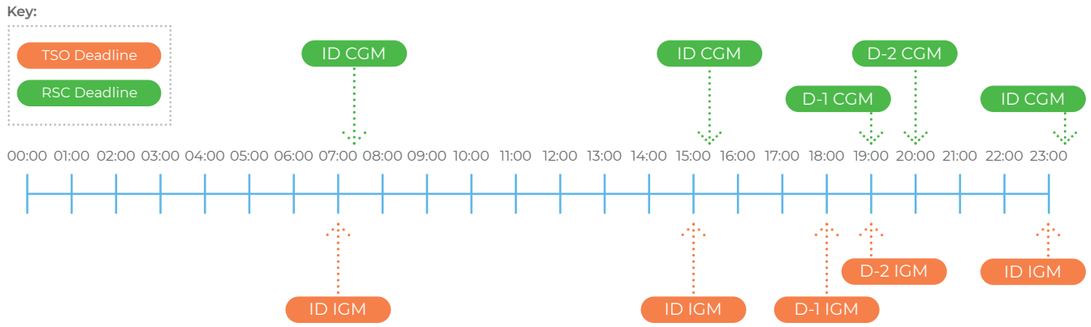
CGM Programme go live

ENTSO-E Board formally approved a SOC recommendation for the CGM Programme go live on 8 December 2021, which delivered the capability for secure pan-European exchange of network model data between TSOs and RSCs. This was a significant milestone for TSOs and RSCs in the ongoing development of RSC services. Future CGM OPDE development work is now governed by the new StG Regional Coordination, established under SOC. In addition to active engagement with the CGM Programme Team by all RSCs, Coreso and TSCNET provide ongoing OPDE operational support and services as set out under the MVS Agreement.

Derek Lawler • Head of the CGM Programme

After several years of implementation, the CGM Programme went live in December 2021 delivering the following ENTSO-E, TSOs and RSCs (and future RCCs) requirements:

1. The **OPDE exchange data platform** and its supported Business Applications (OPDM, QAS, CGMA, PEVF, BMA) went live in accordance with the approved Business Requirements and/or Change Requests.
2. TSOs publish their ID, DA, D-2 and YA IGMs on OPDE exclusively via Physical Communication Network (PCN) and following the OPDE methodologies and End-to-End documentation.



CGM Business Process deadline for all time horizons in scope of its go live

3. TSOs exchange daily scheduling data on OPDE, via PCN, to the Common Grid Model Alignment (CGMA) and Pan-European Verification Function (PEVF) applications. The TSO-nominated Alignment Agents support and operate the CGMA process for D-2 and YA time-horizons.
4. According to the SOC decision, at least 2 RSCs (1 main and 1 backup) shall participate in the CGM Building Process and provide on the OPDE, via PCN, at least 2 CGMs for each timestamp of the aforementioned time-horizons.
5. All exchanged IGMs and CGMs shall be compliant to the modelling requirements defined by CGMES standard v2.4.15 and explained in AC and DC Implementation Guides.
6. All parties are compliant with the Security Plan of the Minimum Viable Solution, based on an audit process.
7. A new governance and legal frameworks have been implemented for the CGM Programme closure to guarantee that future changes and developments are properly addressed and considered.

First CGM workshops

In February and June 2021, Coreso hosted 2 CGM workshops with its shareholders, focusing on 2021 milestones and the implementation of the CGM service. About 20 experts from 6 different shareholders participated in these sessions.

The workshops focussed on different areas:

- Insight on the ENTSO-E CGM Programme ongoing progress;
- Update on Coreso CGM Service roll-out plan and CGM Parallel Run;
- Quality of grid models (focus on IGM): clarification of quality rules to submit models in OPDE platform, and guidelines on how to resolve the remaining modelling issues;
- Market data requirement and Master Data alignment (IGM, Boundary Set, PEVF, CGMA).

Both workshops were welcomed very positively by the participants who acknowledged the necessity to increase readiness for the go live of the CGM service.

CGM Stabilisation phase

Following the CGM go live in December 2021, ENTSO-E has launched the “stabilisation phase”. Its objective will be to ensure that all TSOs and RSCs/future RCCs achieve a sufficient level of compliance with the safety and quality of the submitted IGMs.

This stabilisation phase is scheduled to end in June 2022 and includes the implementation of the following activities:

- Improvement of IGM and CGM quality;
- Coordination for transition to operations of remaining TSOs and RSCs;
- Stabilisation of operational service;
- Training plan.

Support in creation of year-ahead scenarios

Coreso and SCC, its counterpart based in Belgrade, supported ENTSO-E in the creation of Common Grid Models (in UCT def and CGMES format) for the definition of year-ahead scenarios for 2022. Our support consisted in building year-ahead models for each season and for Continental Europe. In total, 5 Common Grid Models “UCT def” and 1 Common Grid Model “CGMES” scenarios were created in 2021.

This assistance will continue annually in order to build the scenarios for the next few years.

Did you know ?

In 2013-2014, multiple data formats (e.g., UCT def, CGMES) were analysed to define which one supports best the business needs. CGMES is not only more compliant than UCT def but also it allows a more complete and detailed modelling (e.g., transformer modelling, shunt-connected reactive devices and HVDCs) of the power system as well as supporting accurate reporting. However, CGMES format brings challenges in terms of data storage as it requires unique identifiers for each equipment.

Coordinated Security Analysis

The objective of the Coordinated Security Analysis (CSA) process is to assess the operational security of the transmission system and to agree on the remedial actions needed to maintain it, for both day-ahead and intraday timeframes.

To this end, the RSCs perform a contingency analysis on the merged Common Grid Model to detect potential constraints on the grid. Multiple actions in different TSO networks may be necessary in case there is a violation of operational security limits on cross-border relevant network elements, requiring close coordination between TSOs and RSCs.

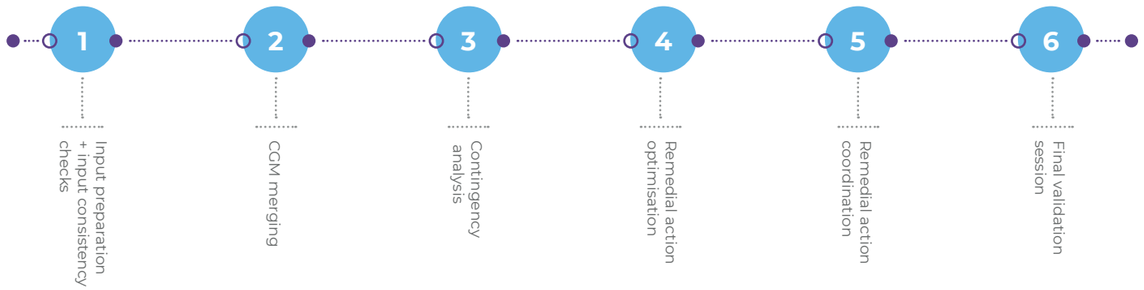
Afterwards, the RSCs propose the most efficient and cost-effective set of remedial actions to solve all identified constraints. All TSOs affected by a proposed remedial action are included in the coordination process so that they can evaluate the impact of the proposed remedial action on their grid before agreeing to activate it.

In addition, where remedial actions agreed within one Capacity Calculation Region (CCR) have a significant impact on physical flows in another CCR, a cross-regional coordination process between these CCRs ensures that the residual violations in the overlapping zones are addressed.

To enable RSCs to perform the CSA service, TSOs needs to provide RSCs with different inputs:

- **Their Individual Grid Models (IGMs) that RSCs will merge into a Common Grid Model (CGM);**
- **The list of their assessed elements;**
- **The contingencies that need to be simulated;**
- **The available Remedial Actions (RAs).**

6 main activities during the CSA process:



Governance of the service

The relatively complex legal context and the high number of stakeholders require Coreso to interact at multiple levels. The legal framework underlying the CSA process has indeed been defined at two levels: pan-European level and regional level.

At **pan-European level**, the high-level principles and main steps of the CSA process are defined in the methodology for coordinating the operational security analysis (CSA methodology). This methodology was developed by all European TSOs in accordance with Article 75 of SOGL and approved by ACER in June 2019. It was then further amended in 2021 (read more details in the CSA methodology amendment section).

Furthermore, at **regional level**, each CCR has developed a methodology for Regional Operational Security Coordination (ROSC methodology – Article 76 of SOGL) covering the regional specificities while respecting the pan-European CSA methodology. The main points regionally determined are:

- **Conditions and frequency of intraday coordination and updates to the Common Grid Model;**
- **Principles for Remedial Action (RA) optimisation and coordination.**

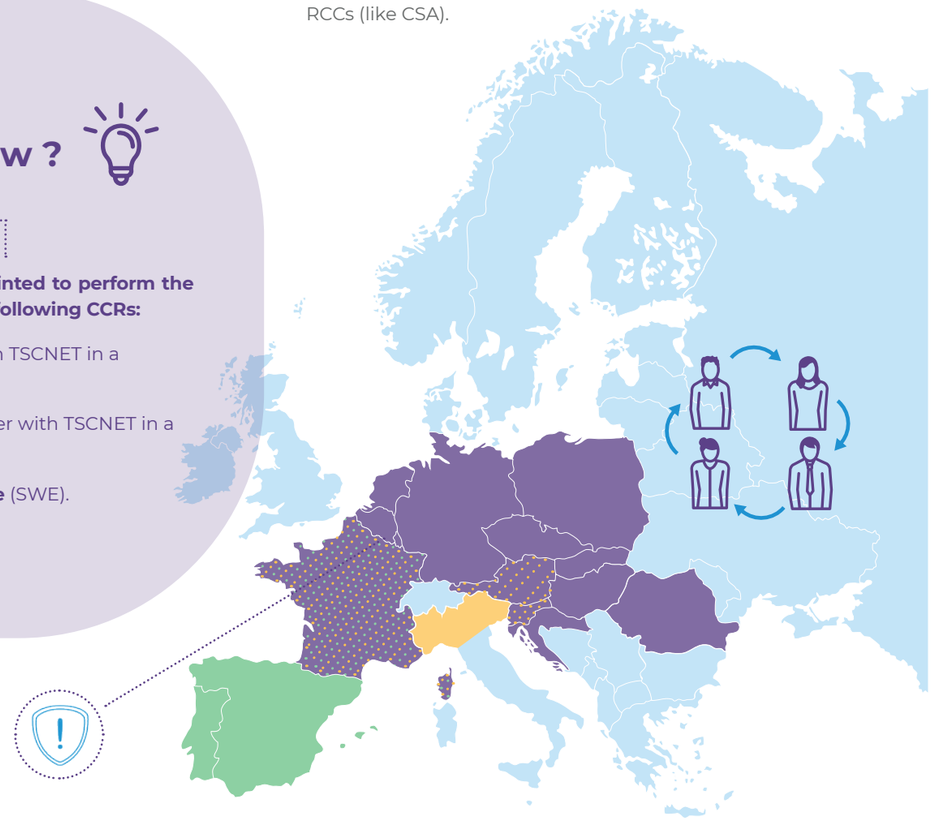
Coreso has supported TSOs in the relevant CCRs to develop methodologies in line with the regulation (SOGL). In addition, Coreso continues to contribute to the relevant ENTSO-E working groups and is engaged with stakeholders in the different CCRs to promote consistency across the regions.

Coreso has also launched the CorNet cooperation Programme, in collaboration with TSCNET (see CorNet chapter), in light of the complexity and the expanding coordination role of RSCs and future RCCs. It will enable Coreso to find synergies in the design, development and implementation of common services of RSCs and future RCCs (like CSA).

Did you know ?

Coreso has been appointed to perform the CSA processes for the following CCRs:

- **Core** - together with TSCNET in a rotational model;
- **Italy North** - together with TSCNET in a rotational model;
- **South West Europe** (SWE).



General timeline of implementation

The timeline for implementing the CSA process in each Capacity Calculation Region (CCR) is defined at regional level. Coreso has thus contributed to the harmonisation of the implementation plans of the Core and Italy North CCRs, to exploit the potential synergies between the CCRs and to allow the development of common tools.

In the Core CCR, a gradual implementation of the CSA service is foreseen. In April 2024, a first version of the target solution with a reduced scope is expected, while the second version should be implemented in June 2025.

In the SWE and Italy North CCRs, only one target version of the CSA service will be implemented: in March 2024 for the SWE CCR and early 2026 for the Italy North CCR.

Status Overview	2021	2022	2023	2024	2025	2026
CORE CSA						
Improved Coordination	✓					
First version of target solution		✓				
Second version of target solution				✓		
Italy North CSA						
Target Solution					✓	
SWE CSA						
Target Solution				✓		

ACER decision on CSA methodology amendments

On 14 June 2021, ACER issued a decision on the amendments to the CSA methodology developed in accordance with Article 75 of SOGL. The amendment covers the following topics:

- **Rules for inclusion of remedial actions in the TSO's IGMs in day-ahead and intraday timeframes;**
- **Process for identifying cross-border relevant network elements that overlap between 2 or more CCRs;**
- **Process for Cross-regional coordination of remedial actions used to resolve residual operational security violations on overlapping cross-border relevant network elements;**
- **Rules for sharing costs of remedial actions activated to address the residual operational security violations, by assigning the shares of costs to individual overlapping cross-border relevant network elements.**

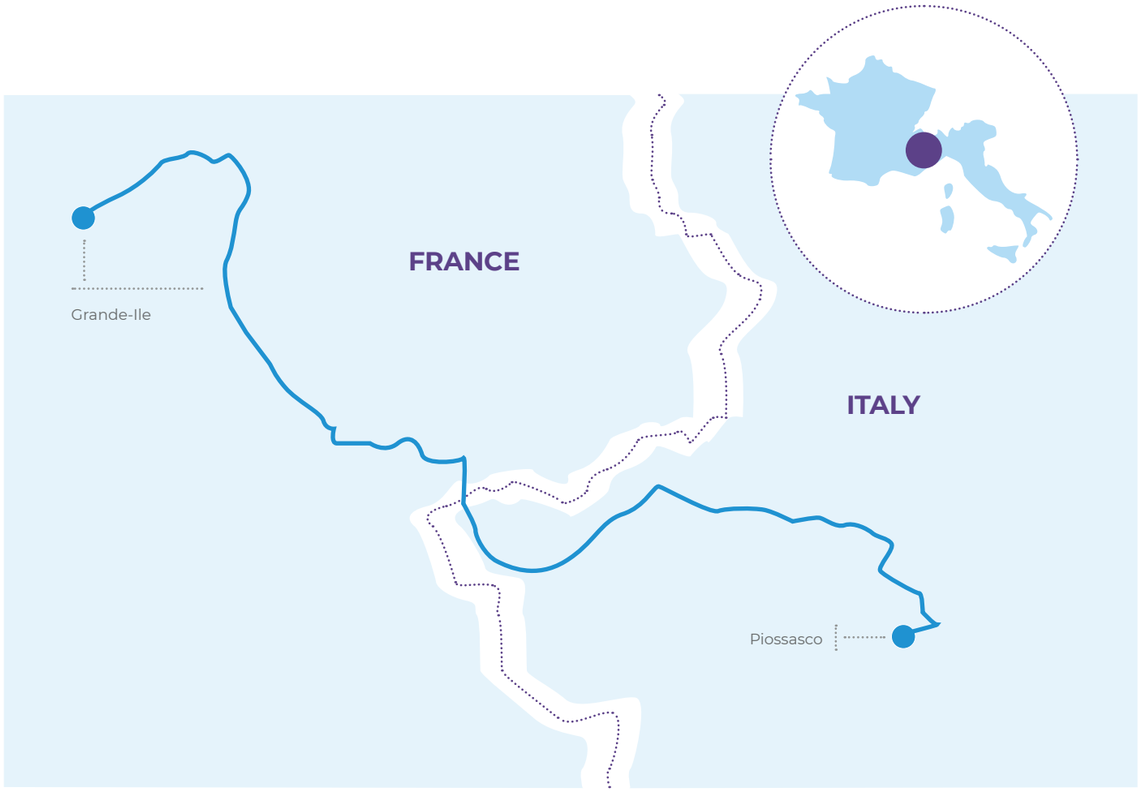
The legal deadline for implementing the cross-regional processes is 18 months from the moment the last CCR among the concerned CCRs of an overlapping zone has implemented the target solution. This is based on the Regional Operational Security Coordination (ROSC) methodology developed in accordance with Article 76 of SOGL.

To prepare the implementation of the cross-regional coordination processes, Coreso, in close cooperation with TSCNET, leads the ENTSO-E working group. This group recommends the general principles of coordination between CCRs, and updates the CSA business process in line with the amendments to the CSA methodology.

New PiSa High Voltage Direct Current cable

The new High Voltage Direct Current (HVDC) cable, called Piemonte - Savoie (PiSa), will connect in 2022 the two electrical substations of Piossasco (Italy) and Grande-Ile (France).

With a nominal capacity of 1200 MW divided into two bipolar lines after the commissioning of the first link scheduled for the end of Q2 2022 and the second link for Q3 2022, energy exchanges between Italy and France will be increased. This will strengthen the overall security of supply between European TSOs in this area.



During 2021, Coreso worked on the integration of the new asset into the existing processes, as the commissioning of the 'new DC interconnector' has an impact on the two main RSC services and future RCC services.

Security Analysis (SA)

Everyday RTE, Terna and Coreso will be responsible for defining the day-ahead operational program of the Interconnector.

A new tool has been developed at Coreso to manage the schedule of the HVDC link, with the possibility to adjust it. During our day-ahead security analysis study, Coreso will be able to consider the latest updated schedule and propose modifications to cope with the overloads detected in the area. In addition to these adaptations, a new function, called "Import Function", simplifies the model of the HVDC in the Security Analysis tool.

Further integration tests will be carried out in Q1 2022, in coordination with the involved TSOs, to be ready when the link is operational.

Coordinated Capacity Calculation (CCC)

Both links will be represented in the Individual Grid Models (IGMs) of RTE and Terna.

As a merging entity for the day-ahead, intraday and close-to-real time timeframes, Coreso merges these IGMs to create Common Grid Models (CGMs) which are the inputs to perform the CCC process. Therefore, the CCC Day-Ahead and CCC IntraDay processes developed for the Italy North region must be adapted to consider this new HVDC link. Indeed, when optimising the capacity, the flow regulation of the two links (2 x 600 MW links) could be used as a remedial action to solve constraints (which could have limited the capacity increase).

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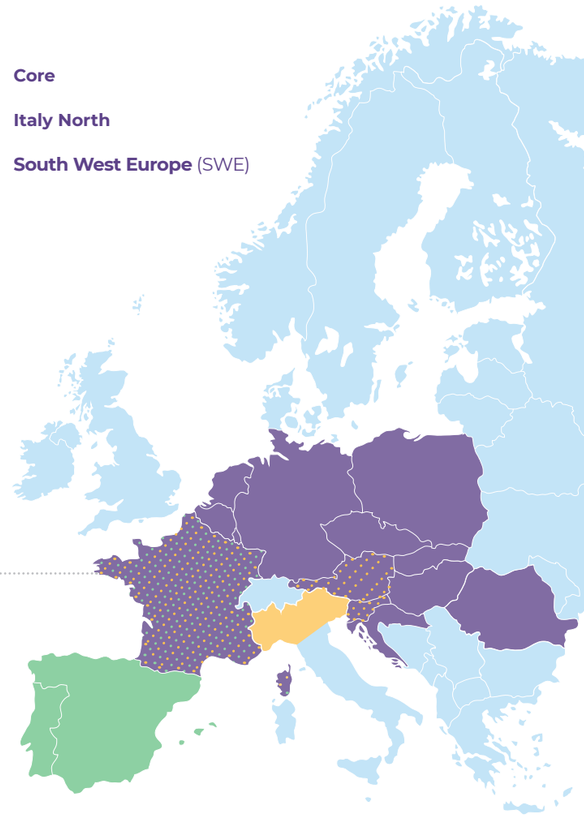
Coordinated Capacity Calculation

Coordinated Capacity Calculation (CCC) plays an important role in the European interconnected system as large volumes of energy exchange across the European TSOs allow the mutualisation of generation needs and reserves.

Coreso is a key player since it performs the coordinated capacity calculation in three Capacity Calculation Regions (CCRs): Core, Italy North and SWE.

Coreso calculates cross-border capacities across continental European countries, while optimising and ensuring the security of the grid. The capacities are then shared with the market energy platforms where actual trade of energy takes place.



Governance of the service

The regulation on Capacity Allocation and Congestion Management (CACM) defines binding requirements for Transmission System Operators (TSOs), Nominated Market Operators (NEMOs), National Regulatory Authorities (NRAs) and the Agency for the Cooperation of Energy Regulators (ACER). The requirements cover the implementation and functioning of the integrated electricity market, in the day-ahead and intraday timeframes. For the long-term horizon, additional requirements for the implementation of the Coordinated Capacity Calculation (CCC) service arise from the Forward Capacity Allocation (FCA) network code.

One of the main requirements of these network codes is the calculation of capacities between bidding zones. Here, the TSOs are obliged to regularly calculate cross-zonal capacities available for exchanges between bidding zones. This process is performed within CCRs. Moreover, it relies on the technical parameters of the electricity grid on the one hand, and the best generation and load forecasts on the other hand, which are considered as inputs. The TSOs of a given CCR delegate the capacity calculation computation to an RSC that sets up a CCC process.

Giving the specificity of each CCR, CACM requires the TSOs of each CCR to develop a methodology related to the capacity calculations. The methodologies for the calculation of day-ahead and intraday capacity in Core, SWE and Italy North are all approved. Some of them will be updated. Coreso supported the TSOs in drafting the methodologies.

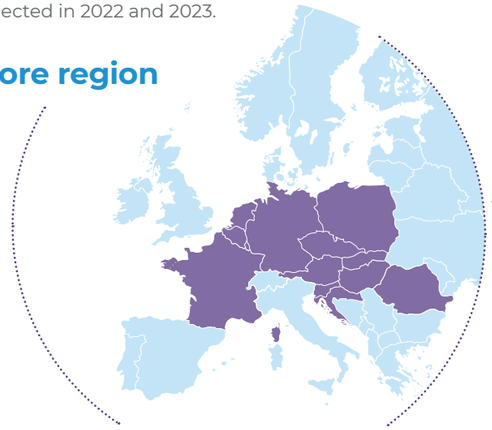
The approval of the methodology triggers the development and implementation of the services. As RSC and future RCC, Coreso is present in several relevant working groups, leads tool developments, and organises process tests via internal and external parallel runs. On an ad hoc basis, Coreso prepares and supports TSOs to inform external stakeholders (mainly NRAs, ACER and EU representatives) on the status and challenges of regional capacity calculation implementation. Strong project and stakeholder management skills are therefore required to support TSOs in delivering the expected requirements.

General timeline of implementation

In 2021, several milestones related to the implementation of network codes or the requirements of the Clean Energy Package (CEP) were reached:

- In the **Italy North** region, the 70% capacity criterion was implemented in October 2021, allowing the TSOs to comply with the Clean Energy Package (CEP) requirement. Another important achievement was the go live of the Coordinated Capacity Calculation Long-Term (CCC LT - yearly and monthly capacities) process which took place at the end of 2021 for the 2022 auctions.
  Coreso played a leading role in the accomplishment of both projects.
- For the **Core** region, Coreso supported the current implementation of two services, namely the CCC Day-Ahead Core and the CCC IntraDay Core, respectively expected in 2022 and 2023.
- Coreso also prepared and tested the CCC IntraDay service in the **SWE** region, along with the CEP 70% criteria fulfilment, both expected to go live in 2022.
- In a joint effort for the **Italy North** and **SWE** regions, Coreso has also been working on the development of a tool to report on the CCC service carried out in these regions, in full compliance with the CACM reporting requirements. The tool is expected to be delivered in 2022. The report will then be elaborated in collaboration with ENTSO-E, and shared with ACER.

Core region



Start of internal parallel run for CCC IntraDay

In November 2021, the Core TSOs together with Coreso and TSCNET started the internal parallel run of the Coordinated Capacity Calculation IntraDay (CCC ID) process for the Core region. Different tasks are performed on a weekly basis by experts to test the process steps. In this context, Coreso provides the Common Grid Models (CGMs) and operates, with TSCNET, the common tool used to support this CCC process.

The go live of the CCC ID Core service is planned in 2023, one year after the launch of the CCC Day-Ahead Core process.

Progress on CCC Day-Ahead go live

The internal parallel run of the Coordinated Capacity Calculation Day-Ahead (CCC DA) Core process was launched in 2020, during which TSOs together with Coreso and TSCNET could test and enhance the developed tooling and the quality of calculation results.

Initiated in November 2020, the external parallel run phase continued in 2021. During this phase, the Core TSOs and RSCs performed a flow-based capacity calculation process, seven days a week. Several improvements were made to the tools and the infrastructure supporting the process. These include enhancements to the Common Grid Model (CGM) and Net Position Forecast (NPF) services that Coreso provides to Core TSOs, to improve the accuracy and reliability of the CCC DA process. At the end of 2021, final tests were performed to integrate Coreso's Remedial Action Optimizer (RAO) functionalities into the external parallel run process by early 2022.

The go live of the CCC DA Core service is foreseen in June 2022. Several projects to upgrade the service delivery will be initiated after the launch.

Did you know ?

The Remedial Action Optimizer is an algorithm used to find technical solutions in case of overloads. It is applied to optimise network operations, technically and/or economically.

Methodology finalisation and ACER decision on CCC Long-Term

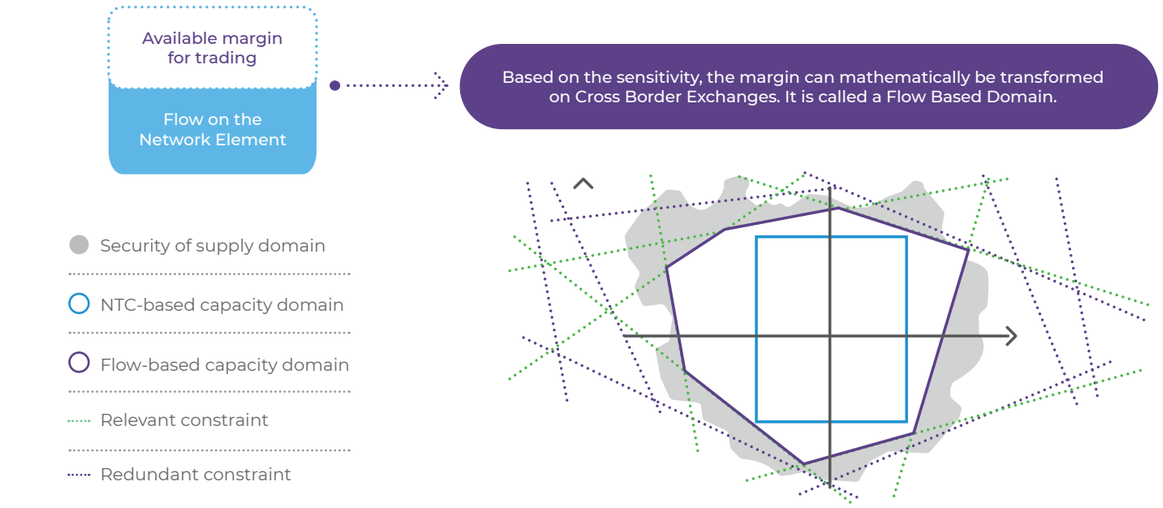
The Coordinated Capacity Calculation Long-Term (CCC LT) is a service required by the Forward Capacity Allocation (FCA) regulation EU 2016/1719, where the Forward Market represents the Long-Term Market, precisely all the market gates before the day-ahead market coupling. For Continental Europe, the Yearly and Monthly market gates are concerned.

The methodology for the CCC LT to be performed for the Core CCR was submitted in January 2021 by the Core TSOs to the National Regulatory Authorities (NRAs), which decided to refer to the Agency for Cooperation of Energy Regulators (ACER). As Convener of the Core TSOs project team, Coreso led the ACER referral process.

On 3 November 2021, ACER approved the Flow-Based methodology, after 6 months of referral and multiple discussions and consultations with different parties (including Core TSOs). This specific methodology aims at computing the Flow-Based parameters for the Long-Term Explicit Flow-Based allocation.

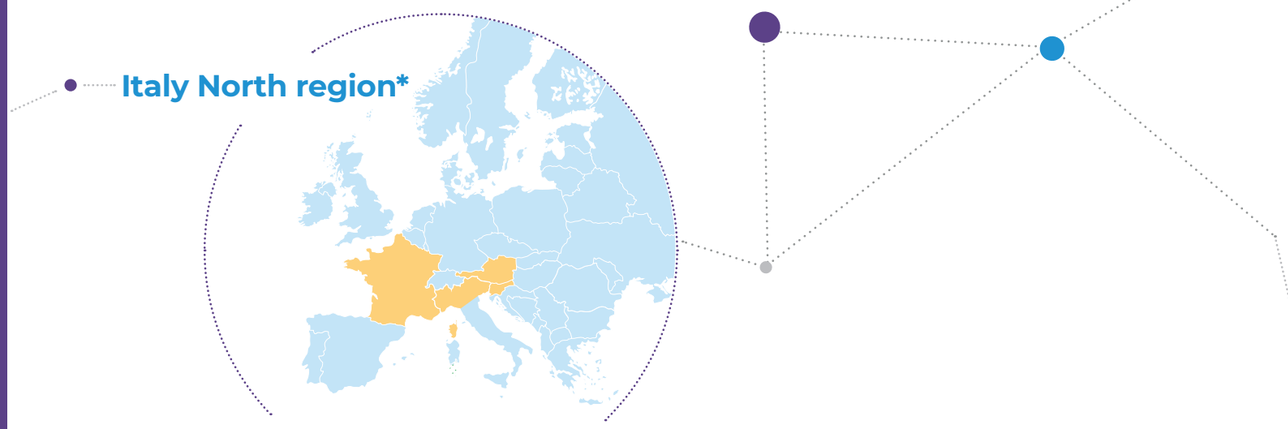
Currently, Core TSOs are computing Net Transfer Capacities (NTCs) on a non-coordinated basis for the Long-Term Explicit NTC allocation. As a result, the transition from NTC to Flow-Based Explicit allocation will require an adaptation of the processes and practices for each involved parties (i.e., TSOs, Single Allocation platform and market parties). Moreover, such changes will require TSOs to review certain methodologies and designs of the Forward Market.

Following this ACER decision, Core TSOs and RSCs have three years to implement the new processes and method, with a go live expected for 2025 Yearly Auction (i.e., first computation in November 2024).



Did you know ?

In February 2020, Coreso was appointed Convener of the Core TSOs project team. The role of the convener consists of leading the project team, composed of the TSOs, RSCs and a Project Management Officer (PMO). It is tasked with achieving specific objectives that are mostly fixed by regulations (the draft and submission of a methodology for approval, as well as the design, development and implementation of a process in compliance with the methodology). As Convener, Coreso is also in charge of making the link between the project team and the other Core CCR bodies (like the Steering Group, NRAs, ACER or market parties).



Go live of the CNEC selection

In May 2021, the Critical Network Element and Contingency (CNEC) selection process went live in our operational environment for the day-ahead and intraday capacity calculations performed for the Italy North (IN) CCR. These processes are now compliant with the Article 6 of the IN Capacity Calculation methodology which considers the general principles and goals set in the Capacity Allocation and Congestion Management (CACM) regulation.

The CNEC selection process consists of defining the list of CNECs to be considered in the capacity calculation process: only the network elements whose sensitivity to cross-zonal power exchanges is equal or higher than 5% are selected and monitored.

A sensitivity analysis is performed for each calculated timestamp, in different network states (including the base case, after contingencies and after applied remedial actions).

The sensitivity of critical network elements to cross-zonal power exchanges is evaluated through a Power Transfer Distribution Factor (PTDF) matrix. This matrix represents the influence of a commercial exchange between bidding zones on the power flows on the considered combinations of CNECs.

To ease the implementation in our operational process, Coreso has performed a study to assess the correlation between the threshold for the selection of CNECs and the volume of remedial actions to be activated in the Coordinated Security Analysis (CSA) process.

Go live of the Coordinated Capacity Calculation Long-Term

At the end of 2021, the Joint Allocation Office (JAO) opened the auctions on the Northern Italian borders for the “2022 yearly auctions” (3 December) and “monthly January auctions” (15 December). The product was computed by Coreso and TSCNET using the methodologies and processes compliant with the Forward Capacity Allocation (FCA) network code, implemented in the framework of the Coordinated Capacity Calculation Long-Term (CCC LT) project. This represents the culmination of two years intensive work.

In addition, the report detailing the capacity calculation data and a simulation for the whole 2022 Monthly computation was sent to JAO and ENTSO-E Transparency platform, in time and as required by the European regulations (FCA and CCC LT IN methodology).

*SwissGrid is not part of the IN CCR, but receives some services from RSCs/future RCCs.

Coreso led the development and implementation of the CCC LT IN service in close collaboration with TSCNET, as all our processes and tools are common.

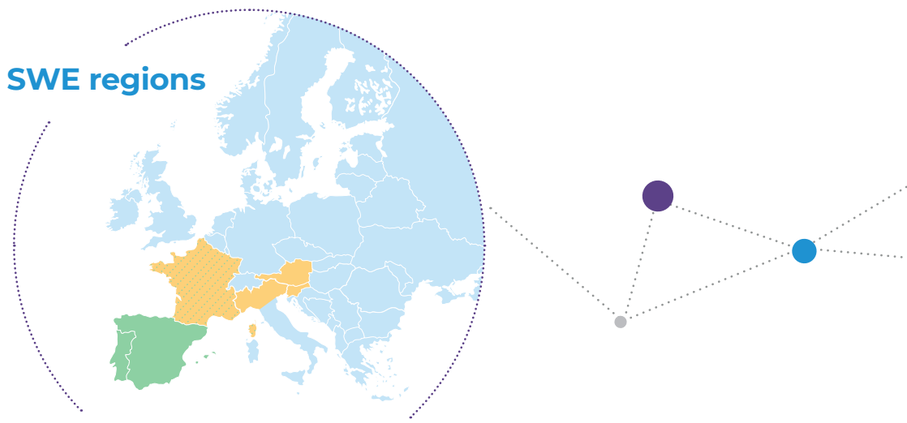
Did you know ?

The Joint Allocation Office (JAO) is a service company that hosts Europe’s single leading trading platform (e-CAT) for cross-border transmission capacity. On behalf of TSOs, it auctions the available long- and short-term transmission capacity rights on all internal EU borders. It also organises shadow auctions, which act as backup for Single Day Ahead Coupling (SDAC). *(Source: JAO)*

The CCC service for the Italy North Capacity Calculation Region (IN CCR) is operated by Coreso and TSCNET on a rotational basis, with one main RSC and one backup RSC. The calendar determining the main RSC for this region is based on an agreed monthly rotation between the two RSCs.

Approved at the end of 2020, the CCC LT IN and Splitting Rules** methodologies were to be implemented for the 2022 Yearly auctions. As a result, in 2021, the first phase focused on their design and the second phase on their development. Given the tight implementation deadlines before the go live, the IN TSOs and RSCs decided to implement a Minimum Viable Product containing the basic functionalities for capacity calculation. This solution provided the basic tool functionalities to be able to provide capacity for the Yearly auctioning, as well as the mandatory reports. The final automated and industrialised solution is expected to be in operation by Q1 2022.

**According to the Article 16 of the FCA network code, “TSOs of each CCR shall jointly develop a proposal for a methodology for splitting long-term cross-zonal capacity in a coordinated manner between different long-term time frames within the respective region”.



Implementation of the CEP 70% requirement

The Clean Energy Package (CEP) stipulates that at least 70% of the maximum cross-zonal transmission capacity shall be available for cross-zonal trading. It therefore guarantees sufficient cross-zonal trade capacity to optimise the European transmission grid.

SWE region

SWE TSOs in collaboration with Coreso have decided to adopt a stepwise approach to comply with the "70% requirement":

- **Step 1:** monitoring of the 70% criterion to assess the fulfilment percentage.
- **Step 2:** calculating the additional Net Transfer Capacity (NTC) necessary to comply with the EU requirement.

The first stage of monitoring was successfully integrated in April 2021 into the day-ahead capacity calculation process that is carried out for the SWE CCR. The results obtained from this monitoring were used to define and adjust the necessary developments for the second stage, to better answer the needs raised by the SWE TSOs and National Regulatory Authorities (NRAs). The process to calculate the necessary additional NTC was implemented in the day-ahead process on 1 February 2022.

Italy North region

In October 2021, the 70% requirement was integrated into the day-ahead and intraday capacity calculations performed for the Italy North CCR, as required by the European Regulation (EU) 2019/943 which is part of the CEP.

As a further step towards compliance with CCC methodology, the implementation of this requirement allows us to compute the margin available for cross-zonal trade (MACZT) on each Critical Network Element, using Power Transfer Distribution Factor (PTDF) calculation. If the minimum margin available doesn't meet the "minimum 70% target", the cross-border transmission capacity is increased while respecting operational security limits.

Coreso's teams (Operations, IT and Services) involved in the operational stages of the project, supported and guided by the TSOs, worked closely together to ensure a smooth integration of these new processes into the daily operations. In addition, 24/7 support was guaranteed in case of unforeseen circumstances.

Shift engineers were trained, operational procedures were updated and an IT environment was set up to host the new technology where the computations are performed.

Reporting to ACER on CCC results

The Regulation (EU) 2019/942 and the CACM regulation mandate the Agency for the Cooperation of Energy Regulators (ACER) and ENTSO-E to monitor the implementation of the CACM regulation.

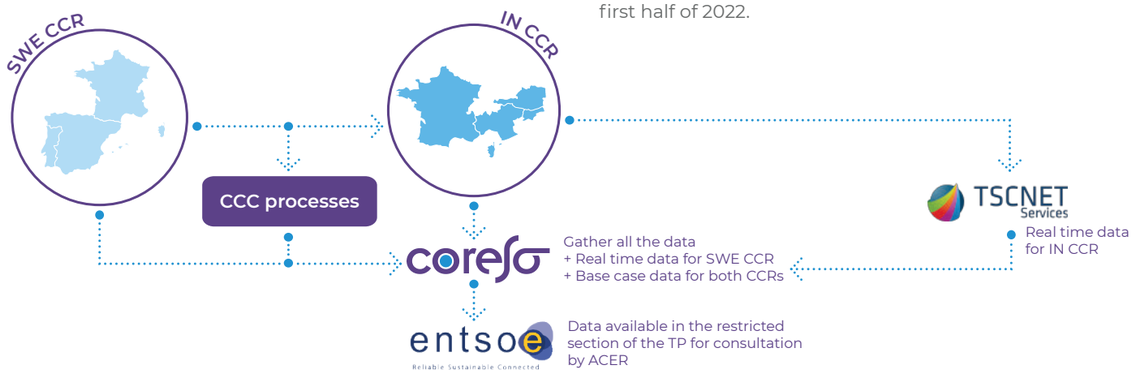
The monitoring consists of evaluating the implementation effects, with regards to:

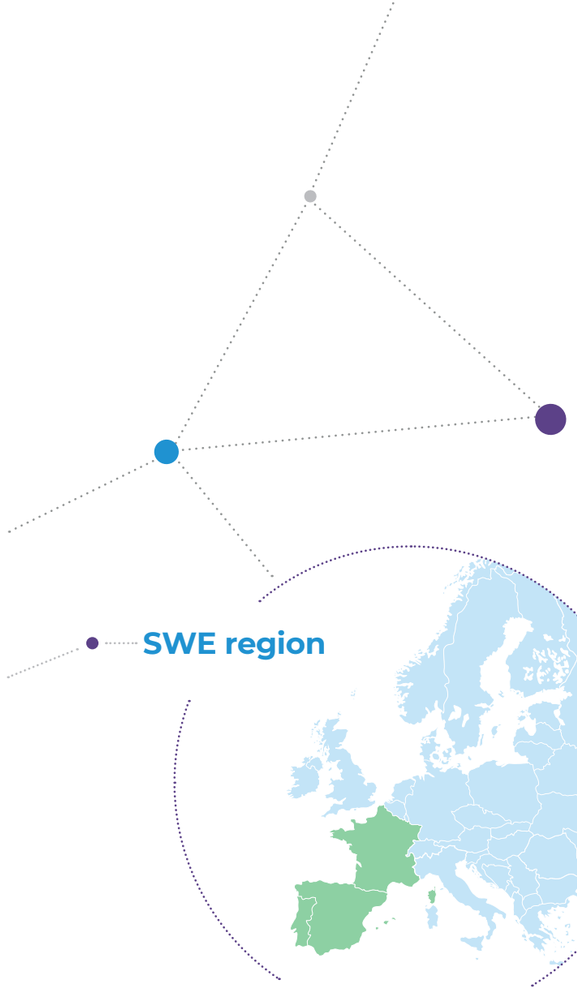
- **harmonisation of applicable rules aimed at facilitating market integration;**
- **non-discrimination;**
- **effective competition;**
- **efficient functioning of the electricity market.**

To facilitate this assessment and provide guidance to stakeholders (TSOs and NEMOs), ACER has issued a list of recommendations on the data required to properly monitor the implementation. On the other hand, ENTSO-E has created a restricted area in its "Transparency Platform" where the required data can be published and consulted by authorised users.

For the SWE and Italy North CCRs, most of the monitoring data comes from the CCC processes managed by Coreso. For this reason, TSOs from these two regions together with TSCNET and Coreso have defined a coordinated way to provide the required data to ACER.

Coreso took the initiative to design the technical solution tool which should allow the collection of existing data (from the CCC processes), the generation of missing data and the publication of all information on the Transparency Platform. The monitoring tool delivery is planned for the first half of 2022.





Did you know ?

The ENTSO-E Transparency Platform (TP) was created in 2015 after the entry into force of the Regulation (EU) N°5 43/2013 on submission and publication of data in electricity markets. Briefly, this regulation establishes that transparency is essential for the implementation of the Internal Electricity Market and requires European Member State data providers and owners to submit fundamental information related to the electricity network for publication through the ENTSO-E TP.

First run of CCC Day-Ahead and IntraDay processes

The TSOs of the SWE CCR, with the support of Coreso, have developed the common SWE Coordinated Capacity Calculation Methodology (CCCM) for the day-ahead and intraday market timeframes. This methodology was approved by the SWE NRAs in October 2018.

Following this approval, the SWE TSOs and Coreso implemented the CCC process for the day-ahead market, which went officially live in January 2020. This process is the first one that uses the CGMES format and considers angle and voltage constraints during the calculation.

After a 6-month stabilisation phase for the day-ahead process, SWE stakeholders have started the development of the CCC process for the intraday market. This development is split in two parts that will be implemented and then go live sequentially:

- **The first run is based on Day-Ahead Congestion Forecast (DACF) and covers a full business date.**
- **The second run uses IntraDay Congestion Forecast (IDCF) and covers the second half of the same business date.**

The implementation started with the first run which is like the CCC Day-Ahead process. Nevertheless, it came with many challenges; some of which proved more difficult to overcome and led to delays. NRAs were informed in time and solutions satisfactory to all parties were found.

This first intraday run went live on 16 March 2022.

Short-Term Adequacy

Short-Term Adequacy (STA) is one of the mandatory services to be provided by RSCs and future RCCs to European TSOs. This service is required by the European Commission Regulation establishing a guideline on electricity transmission system operation (SOGL). This service aims at increasing the operational security of European power system.

During the **STA Pan-European (or Cross-Regional) process**, the RSCs perform regional adequacy assessments to detect situations where a lack of adequacy between generation and consumption is expected in one of the control areas or at regional level (pan-European view). The assessment takes into account possible cross-border exchanges and operational security limits. The diagnosis may also include recommendations for optimising cross-border exchanges.

To enable RSCs to achieve such evaluations, each TSO provides them with the necessary information (expected total load, availability of power generation modules and operational security limits) for its control area. This data is collected in the STA Industrial Tool, also called STA Pan-European or Cross-Regional tool.

Following the Pan-European process, the **STA Regional process** consists of conducting a Regional Adequacy Assessment (RAA) for a specific adequacy region, when triggered by the results of STA Cross-Regional assessment or at the request of a TSO (for instance, in case of regional scarcity issue or insufficient cross-zonal capacities). When an adequacy issue is detected, the RSC will identify and propose possible counter-measures to the associated TSOs, to reduce risk in the related region and to coordinate them with the impacted RSCs.

The adequacy reviews are realised for short-term timeframes, based on hourly forecasts for the upcoming week (D-1 until D-7), but also for seasonal outlooks.

Governance of the service

The STA and OPC Pan-European IT tools have been developed under the governance of ENTSO-E System Operations Committee (SOC), ENTSO-E RSC Project Steering Group and steered by ENTSO-E Secretariat Digital section.

The project was supported by the contribution of the STA and OPC Project Groups and Task Forces; bringing together TSO experts, convened by Coreso for STA. The “IT single point of contacts” from all TSOs were also appointed to support the integration and interoperability of the tools with local TSO IT solutions. The TSOs and RSCs colleagues participated in detailed design workshops and user acceptance tests.

The RSC project was closed on 31 October 2021. A new governance structure was established with the approval of the Steering Group Regional Coordination (StG ReC) at ENTSO-E: the OPC and STA future developments will be addressed within a Task Team under the StG ReC.

The RSC services Multilateral Agreement signed in 2020 by the ENTSO-E SOC provides the contractual arrangements for the pan-European tools and processes, and covers the Coreso operational cost.

General timeline of implementation

Pan-European level

Launched in May 2020, the STA Pan-European or Cross-Regional tool enables RSCs and TSOs to perform daily calculations to identify a possible lack of adequacy for the week ahead (D-1 until D-7).

Since then, the ENTSO-E STA Project Group (composed of members from all TSOs and RSCs - led by Coreso and TSCNET respectively) has been working on improving the tool.

On 24 May 2021, a milestone was reached with the go live of the **STA release R2a**. This release mainly covers the legal requirements from Risk Preparedness regulation; according to which HVDC and Generation tripping are taken into consideration for probabilistic adequacy assessment to improve quality of STA assessment output.

Scheduled in 2022, the Release 3 of the STA Pan-European IT Tool will incorporate an automatic downward regulation analysis. It consists of identifying the excess inflexible generation during low demand periods (e.g., run-of-river hydro generation, solar and wind generation, possibly also combined heat and power units or generators to maintain dynamic voltage support). For instance, in the case of high renewable infeed during a period of low demand, generation could exceed demand at the country level, even while pumping for hydro storage. As a result, the excess generation then needs to be exported to a neighbouring country and even curtailed once all available export capacity has been used.

This evolution of the tool will improve the granularity of TSO inputs and the results of the Net Position Forecast for the coming week. Coreso will be convening this work through the ENTSO-E STA Task Team.

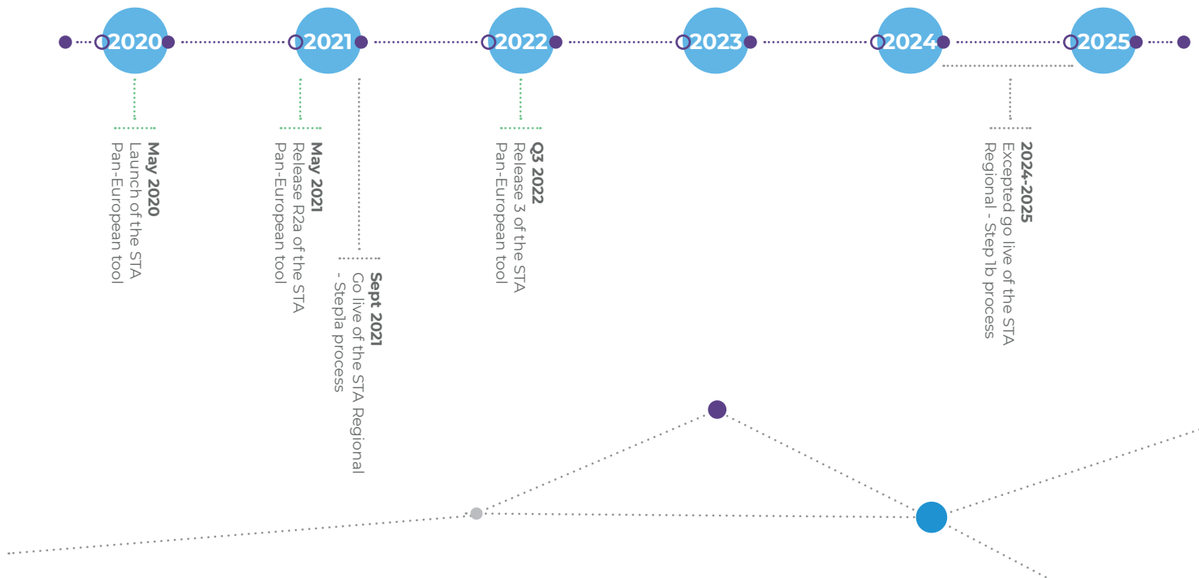
Regional level

The **STA Regional - Step1a process** went live on 15 September 2021. In the event of an adequacy issue detected during pan-European (cross-regional) process, this regional process ensures that deeper analyses can be performed by RSCs and TSOs, focusing on impacted TSOs and their neighbours but also on the coordination of the best possible solution. Proposed remedial actions aiming to solve adequacy issues are based on the expertise of the TSO members taking part in the process.

The STA Regional - Step1a process has been developed in collaboration with TSO and RSC experts contributing to the STA Project Group and Task Force.

Coreso’s work on the Regional STA process does not end here: the project team will continue to offer information sessions as well as training sessions to TSO and RSC colleagues involved in operational activities.

In addition, from 26 June 2021 through the end of the year, Coreso led three workshops set up to define the high-level business description of the upcoming STA Regional process – the Step1b process. This new process is expected to be launched by 2024-2025 and will include the grid study in the Regional Adequacy Assessment when it is triggered. The next steps of this project will be to update the STA Methodology document, and then write the document describing the functional design of the future process.



4th experimentation of STA Regional process

Part of the continuous training, the process simulations are essential to enable European STA operators to test the associated tools and communication channels.

The fourth experimentation of the STA Regional process took place on 16 November 2021, during which the Regional Adequacy Assessment was triggered for the first time since the go live of this process. The simulation was based on a lack of adequacy case in the Swissgrid control area, which involved the participation of the following entities: Swissgrid, RTE, APG, SEPS, Transnet BW, Amprion, 50Hertz, Tennet DE, and Coreso, with PSE and REN as observer.

Examples of triggered Regional Adequacy Assessment process:

The STA computation for 25 November 2021 revealed a lack of adequacy in France for 26 November 2021. The lack of adequacy detected in the deterministic results for the 07:30 to 09:30 timestamps led to an automatic triggering of Regional Adequacy Assessment (RAA) for the worst 07:30 timestamp. Under the coordination of Coreso, the remedial actions proposed by the TSOs concerned and accepted by all, allowed to solve the lack of adequacy initially observed.

In early December 2021, the RAA was triggered five times (on 5, 6, 8, 9 and 10 December) for timestamps in the period D+1 to D+3, for the bidding zone of the Polish TSO PSE. In such cases, the RSC in charge is responsible for performing the RAA to mitigate the identified adequacy issues. However, after agreement with PSE, the RAA process was finally not performed as the adequacy issues could be solved internally.

STA and OPC tasks split between TSCNET and Coreso

The “RCC Establishment Provisions”, approved by Central SOR NRAs on 15 January 2021, establishes Coreso and TSCNET as RCCs in Central SOR. It also determines the allocation of tasks between Coreso and TSCNET where there is a split of the STA Pan-European and OPC Pan-European tasks.

The effectiveness of this tasks split is scheduled for 1 July 2022. Taking into account the future participation of SEleNe CC, ENTSO-E foresees a rotational operation of five RSCs (Baltic RSC, Nordic RSC, SCC, SEleNe CC and Coreso/TSCNET). To reflect the splitting approach on pan-European level and to avoid inefficiencies:

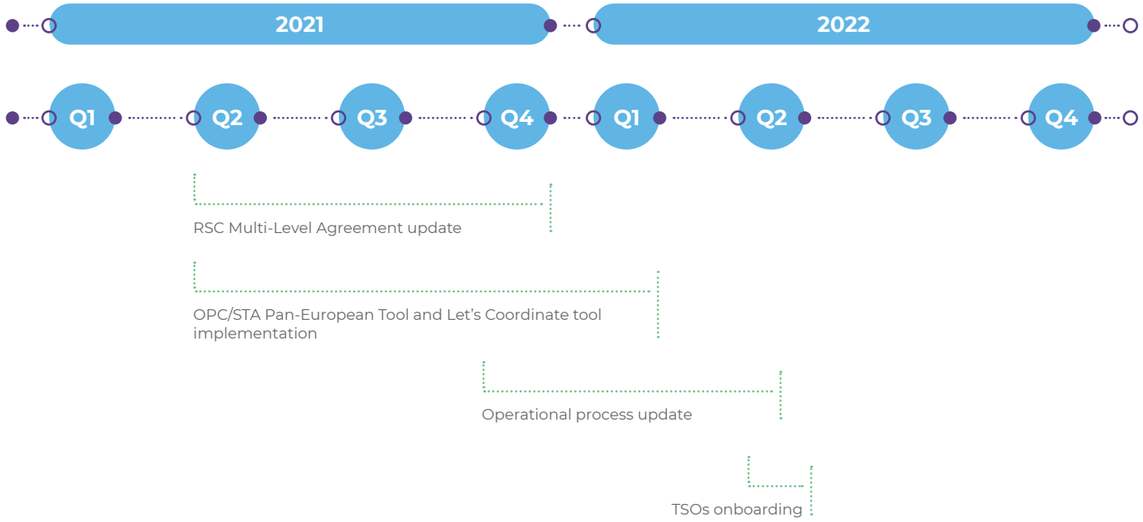
- Coreso will perform the entire STA process for the pan-European part, for Coreso and as an agent of TSCNET in the rotating cycle among the five RSCs.
- TSCNET will perform the entire OPC process for the pan-European part, for TSCNET and as an agent of Coreso in the rotating cycle among the five RSCs.

Implementation of the Pan-European STA and OPC tasks split process

TSCNET and Coreso Management took the following decision on 8 March 2021. “*For target Pan-European OPC and STA S2: Task split implementation based on ENTSO-E tools. The proposal is to implement the task split along with SEleNe CC joining the service (Q2 2022).*”

After the tasks split, Coreso will carry out the STA processes for all concerned TSOs in the SWE region, and also in the Core and IN regions (where the TSOs are both shareholders in Coreso and TSCNET), while TSCNET will provide OPC tasks in the Core and IN regions.

The implementation of the Pan-European STA and OPC tasks split process began in Q2 2021. This implementation foresees changes in operational procedures at both RSCs as well as modifications in the Pan-European Tool. The contractual go live of the Pan-European process will begin from Q3 2022.



Outage Planning Coordination

Being one of the RSC and future RCC mandatory services to be provided to European TSOs, the main role of Outage Planning Coordination (OPC) process is to:

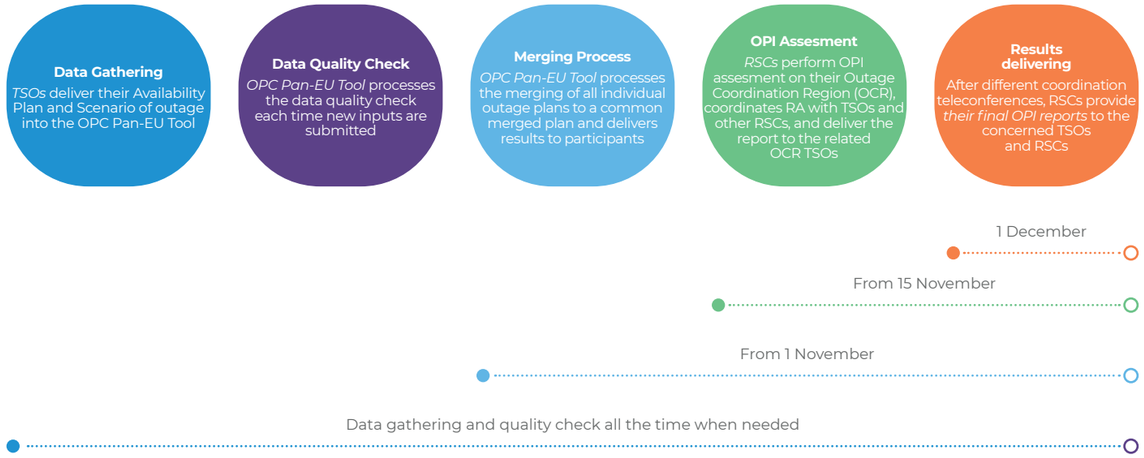
- Merge the individual unavailability plannings delivered by each ENTSO-E member TSO;
- Determinate Tie-Lines Inconsistencies (TLI) at a pan-European level;
- Analyse Outage Planning Incompatibilities (OPI) per region and propose solutions to the TSOs to relieve the incompatibilities, such as non-costly remedial actions;
- Coordinate the costly remedial actions that could be applied (outages planning adaptation, re-dispatching, etc) with the other RCCs.

Based on a rotational approach, the RSCs monitor the OPC Pan-European process on a monthly and weekly basis. In addition to these two timeframes, a yearly process is performed once a year, in which all RSCs carry out OPI assessments for their region and the entire upcoming year.

The whole OPC process is achieved through close coordination with the concerned TSOs and/or impacted RSCs. The governance and structure of the project is described in the STA section as both STA and OPC are managed in the same way.

Yearly process

Each year in November, the RSCs perform the yearly process to assess the impact of the main outages planned by the TSOs for the following year. The purpose is to detect potential outage inconsistencies and incompatibilities, as well as validating the year-ahead TSOs outage plannings. Each TSO involved in the process provides its own Outage Planning data input in the OPC Pan-European Tool.

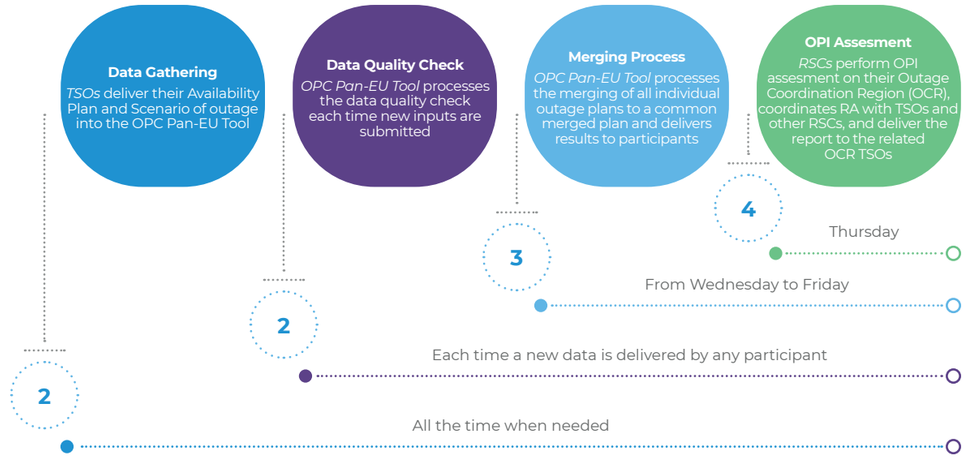


Monthly process

The goal of the OPC monthly process is to provide TSOs with a long-term outlook in the pan-European outages planning, covering the period from the first day of the next month until the end of the year. Performed automatically, this process merges individual TSO unavailability plannings, and determines the Tie-Lines Inconsistencies (TLI) between the TSO areas.

Weekly process

The weekly process is like the yearly process: RSCs perform it from Wednesday to Friday, to cover the period from the following Saturday to Friday of the following week.



Did you know ?

During the OPI process, RSCs determine whether the outage planning of TSOs is secure. If incompatibilities between relevant assets (grid elements, generators or loads) are detected, RSCs propose Remedial Actions (RAs) and perform a security assessment to determine if the grid is secure after the RAs are applied.
For the TLI process, RSCs identify if the TSOs information regarding outages on their common tie-lines is consistent (date, time and outage type). If inconsistencies are detected, then TSOs need to align and coordinate the status of their tie-lines.

Split of OPC and STA tasks between TSCNET and Coreso

As described in the STA chapter, the split of tasks between Coreso and TSCNET for the OPC and STA Pan-European processes is engaged. In 2022, an interim solution that concerns this split of tasks will be implemented. According to the planning, Coreso will cease its role in the OPC Pan-European service delivery on 1 July 2022.

Releases go live for the OPC Pan-European Tool and “Let’s Coordinate” tool

The first release of the OPC Pan-European tool successfully went live in 2020, allowing the RSCs and all TSOs to coordinate the outage planning on a weekly basis, based on generation and demand forecasts provided by all ENTSO-E member TSOs.

Under the leadership of ENTSO-E, with the cooperation of all RSC contributors and several TSOs experts, the **OPC Release 2b** was launched in May and October 2021.

The following main requirements were implemented.

- **Integration of generation and consumption unit outages:** this evolution fulfils the requirements of SOGL Articles 81 and 84, by allowing TSOs to integrate internal relevant asset outages (which include Generation and Consumption units’ outages from the ENTSO-E Transparency Platform) into the OPC database.

- **Relevant Asset Element List Integration & Relevant Asset Outage Coordination (RAOC):** the objective of this development is to comply with the SOGL Articles 86 and 88, enabling TSO users to update the internal relevant assets on an annual basis and to fulfil the obligation to coordinate relevant asset outages.

At the same time, the "Let's Coordinate" Tool has been updated and is designated as the Tool to be used by TSOs where they are required to coordinate for the outage of Relevant Asset. In its role as RSC, Coreso will also use this tool to monitor the status of the coordination and to support the TSOs.

As per 2021, two additional releases of OPC Pan-European tool are planned for 2022, providing the following updates:

- **Release 3:**

  The OPC-STA tasks split between Coreso and TSCNET will be integrated into the tool: reassignment of TSOs under TSCNET's area of responsibility to Coreso for STA tasks, and TSOs under Coreso's area to TSCNET for OPC tasks.
  SEleNe CC will also be included as it is the sixth RSC that will deliver OPC and STA services.

- **Release 4:**

  An outage planning map will be developed to facilitate the visualisation of outages on grid element as well as the potential interaction with the adequacy results of the STA Cross-Regional assessment.

Go live of Relevant Asset Outage Coordination

Since 4 October 2021, Coreso has been monitoring the Relevant Asset Outage Coordination (RAOC) on a weekly basis.

The implementation of RAOC is a result of the SOGL requirement to coordinate the outages of elements considered as Relevant Assets for Outage Coordination. A Relevant Asset for Outage Coordination represents any relevant demand facility, power generating module or grid element which participates in the outage coordination and whose availability status influences cross-border operational security.

According to the OPC and STA Services Multi-Level Agreement, TSOs must coordinate their unavailability planning with TSOs that have marked internal elements as relevant assets. This means that, when a relevant asset is planned to be out of service for maintenance, the TSOs concerned should align and agree on the unavailability of this relevant asset.

Then, the RSCs have to coordinate the OPC RAOC process with all the TSOs concerned: RSCs monitor the RAOC process ensuring coordination is completed for the relevant period (no more coordination pending).

In short, based on the unavailability planning they provided in the OPC Pan-European tool, TSOs have to coordinate assets marked as relevant for them, using the "Let's Coordinate" tool. RSCs then monitor the coordination of the ongoing outages in the same tool. Afterwards, RSCs continue to foster the Outage Coordination process during the Weekly Outage Planning Teleconference (WOPT) and Yearly Outage Planning Teleconference (YOPT) calls.

As a member of the Task Force, Coreso collaborated with the other RSCs and TSOs members to review the "High Level Concept and Detailed Functional Design" documents. Coreso also took part to the User Acceptance Tests.

KPIs on detected Outage Planning Incompatibilities

The first part of the OPC process, which consists of merging the TSOs unavailability plans, was successfully performed in 2021 for at least 3 out of 4 merges, each week. Unsuccessful merges may occasionally happen due to failures arising from the OPC Pan-European tool.

For the OPC year-ahead 2022 process, the Outage Planning Incompatibilities (OPIs) assessment was completed on time, resulting in OPIs being detected for 3 different weeks and the coordination of a new period for 1 outage.

During the weekly process, 1 or more OPIs were detected for 9 different weeks of 2021 in the CSE region, and 6 weeks in the SWE region. The OPI detection triggers a coordination between Coreso and the TSOs, which can later decide to update their unavailability plan to avoid any inconsistencies. However, sometimes OPIs are not identified as related to planned outages, but to high-exchange levels or hypothesis (i.e., cross-border exchanges) for which TSOs prefer not to act a week in advance.

2021	Number of weeks	% process performed	% OPI detection
CWE	52	100%	0%
CSE	52	100%	17%
SWE	52	100%	12%

OPI studies results – Weekly process

Critical Grid Situation

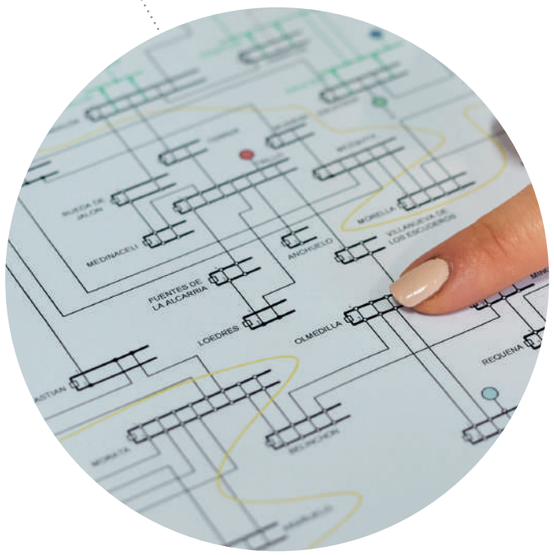
Events such as unexpected frequency drop or extreme weather conditions, can impact the interconnected power system at any time, leading to a Critical Grid Situation (CGS). This situation can be defined as a potential emergency situation, identified in the operational planning phase and related to an adequacy or security analysis issue.

In case of a CGS, alignment and close collaboration between TSOs are then necessary to maintain operational safety and security of supply, as these events may impact the control areas of multiple TSOs.

The CGS process can be triggered by TSOs or RSCs in the operation planning phase or during the procedure for handling forced outages between Day-7 and Hour-1 (till "close to real time").

At that moment, RSCs support TSOs by playing an important coordination role. They disseminate information to all TSOs, conduct studies and propose mitigation measures such as the review of cross-border capacities or load flow re-dispatching.

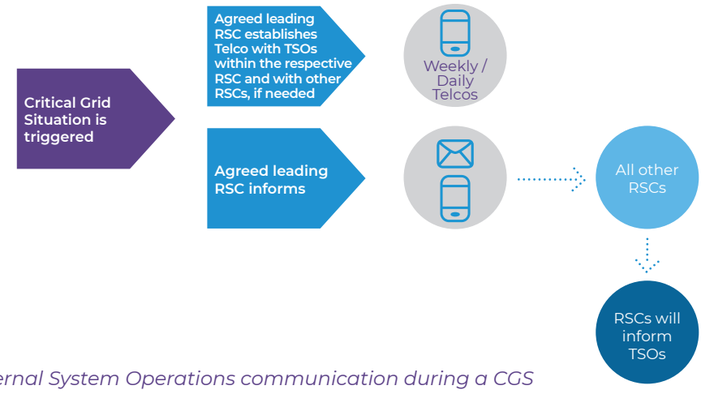
The CGS service was implemented in 2017 as an initiative from TSOs and RSCs, under the facilitation of ENTSO-E. To enhance their cooperation, Coreso and TSCNET agreed to align their training support and offer joint live sessions to test the CGS communication process each year.



CGS communication process

The current communication procedures specify the following step-by-step actions to be taken once a CGS is triggered. The communication process ends once an agreement is reached on the necessary actions to be taken.

A specific operational procedure is dedicated to the Italy North area: Coreso performs a particular study, applying variation of Load and Generation after agreement between the TSOs Terna, RTE, Swissgrid, APG and Eles. In a second step, Coreso then performs a Security Analysis to solve the identified constraints. A live test is scheduled every year to prepare the teams to perform this unusual specific process.



Internal System Operations communication during a CGS

Future RCC services

Post-Operation Analysis

Regional Security Coordinators (RSCs) will evolve to Regional Coordination Centres (RCCs) by July 2022, as established by the Clean Energy Package (CEP). Article 37 of the Regulation (EU) 2019/943 enlisting the tasks and roles of RCCs, mandates the RCCs to carry out Post-Operation and Post-disturbances Analysis and Reporting (Article 37.1.i). Within this framework, as future RCC, Coreso will thus have to investigate and prepare reports on incidents across the European Transmission Network.

Different scales (threshold from 0 to 3) are used to assess the level of severity of an incident: from a noteworthy local incident (level 0) up to a general, extensive, major and Europe wide incident (level 3). According to the Incident Classification Scale (ICS) methodology, each TSO shall rank the events affecting system operation to their rightful level of importance regarding system security. When an incident reaches a threshold of 2 or higher, RCCs must provide a detailed report on the incident to a panel of experts nominated at European level, to support them for further investigation. Throughout this task, Coreso and the other RCCs will play an active role in an incident investigation, in partnership with the TSOs.

To provide RCCs with additional guidelines to execute this task in an effective manner, ENTSO-E drafted a methodology with the contribution from the future RCCs. The document aims to:

- Provide definitions;
- Describe the investigation process;
- Enlist the threshold for RCC investigation;
- Explain the data collection process;
- Indicate the work of the Expert Panel;
- Guide the RCCs in the process of preparing the post-disturbance report.

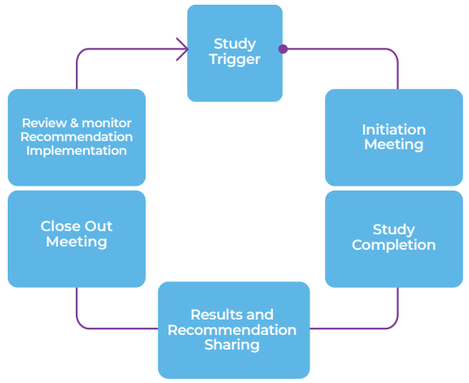
The methodology was submitted for approval to ACER in early 2022. After a public consultation, ACER adopted the methodology on 31 March 2022.

Post Event Analysis process

To anticipate the provision of the regulated task in line with Article 37.1.i of the Regulation 2019/943, Coreso has set up a **Post Event Analysis (PEA) process** to foster operational excellence while ensuring continuous improvement of the existing services provided to our stakeholders. The scope is to carry out studies after an unexpected event: Coreso analyses incidents in the European Transmission Network, but also its own operational services. This process seeks solution proposals based on the studies performed. It shares the findings with the suitable audience and finally monitors the implementation of solution proposals, in collaboration with both internal and external stakeholders.

The following three key outputs are used:

- **Case study:** Aims to assess complicated situations in unstressed circumstances and to facilitate effective discussion about the actions taken.
- **Identification of root causes and good practices:** Consists of investigating and identifying the root cause of events and good practices.
- **Continuous improvement**: Ensures as the final step that the studies outcomes are turned into a solution proposal and are applied to improve standard operational work.



Workflow of Post Event Analysis

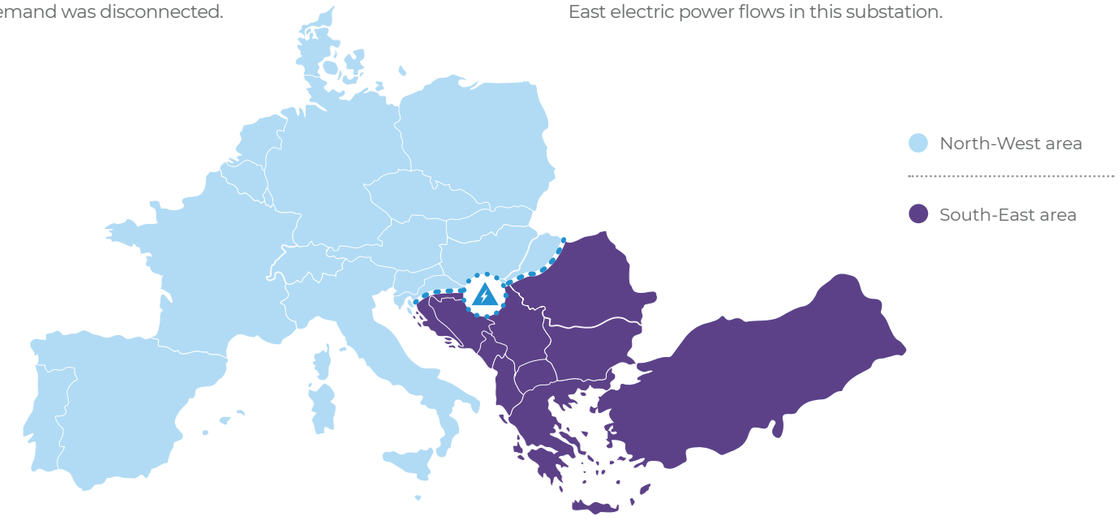
Throughout 2021, Coreso focused on stabilisation of the process. Coreso integrated several new tools and developed its communications and documentation. This ensures a higher quality of process and greater level of transparency is provided to process users.

Completed Post Event Analysis studies performed during 2021:

Major grid incident on 8 January 2021

At 14:05 CET on 8 January 2021, an incident classified as level 2 of the Incident Classification Scale occurred. There was a separation of the synchronous European transmission network leading to two electrical islands: one in the South-East area where the frequency rose to 50.6 Hz, and another in the North-West area with a frequency drop up to 49.74 Hz where demand was disconnected.

On 15 July 2021, ENTSO-E published a final report on this incident. Investigations showed that the initial event was the tripping of a 400 kV busbar coupler in the substation Ernestinovo (Croatia) by overcurrent protection at 14:04. This resulted in a decoupling of the two busbars in the Ernestinovo substation, which in turn separated North-West and South-East electric power flows in this substation.



After stabilising both areas with automatic defence actions as well as manual countermeasures, the resynchronisation process started with HOPS TSO acting as the resynchronisation leader. During the preparatory actions, HOPS, EMS, and NOSBiH (respectively Croatian, Serbian and Bosnia & Herzegovina TSOs) agreed to form three strong reconnection points, which could then be used for the resynchronisation sequence. The resynchronisation sequences started with the reconnection of the busbar coupler in Ernestinovo 400 kV, which was equipped with a synchro-check device and was thus able to reconnect the two separated areas. Further reconnections were then performed on the other disconnected transmission lines in a coordinated manner.

Coreso Study Analysis and ICS Reporting Contribution

Since the goal of Coreso and the RCCs is to improve coordination between TSOs to enhance security of supply, Coreso carried out a comprehensive analysis to assess the performance of its services on 8 January 2021 and to issue recommendations based on lessons learnt.

The study includes the following elements:

- Analysis of the performance of Coreso's diagnostic tools, the situation experienced in the coordination room, and the communications with other control centres after the event;
- In-depth analysis of the regulatory framework and the impact it may have on Coreso's activities as RSC and future RCC;
- Results of studies related to the different processes conducted in parallel by Coreso, including the results of Short-Term Adequacy (STA), Outage Planning Coordination (OPC), and Security Analysis (SA) in different timeframes (from day-ahead to intraday) for all Coreso regions;
- Analysis of CGM snapshots cases before and after the incident;
- Comparison of the international flow trends in the CGMs for the day-ahead, intraday and snapshot periods (from the pre-incident time stamp to the end of the day).

The Coreso PEA team issued 4 key recommendations to enhance our processes. Today, three out of the four have been already implemented.

Iberian Peninsula Incident on 24 July 2021

On Saturday, 24 July 2021 at 16:36 CET, an incident classified as level 2 of the Incident Classification Scale happened. The Continental Europe Synchronous Area was separated into two areas: the Iberian Peninsula and the rest of Continental Europe. A fire on Baixas-Gaudière area (South-West of France) led to cascading effect trips of several transmission power system elements. However, due to the fast and coordinated approach of TSOs, no major damage was observed in the power system and the system was resynchronised at 17:09 CET.

The incident was defined as a scale 2 incident and, in accordance with the System Operation Guideline and the Incident Classification Scale Methodology, an expert panel was established.

2 synchronous areas after the system split

As part of the **ICS expert panel incident investigation,** Coreso led the provision of data for the CGMs studied during the analysis for the factual and final reports. Coreso also played a role in the drafting of the factual report, providing details of the different services such as OPC, STA, CCC and SA results with the role of RSC during this event. The factual report was published by ENTSO-E on 12 November 2021. The final report and recommendations of the ICS expert panel incident investigation were published on 28 March 2022.

From the perspective of regional security coordination, it can be concluded that the operational situation was consistent with the forecast, within the limits of usually expected deviations. Coreso is also completing an internal investigation in parallel with the ICS expert panel investigation whereby several recommendations in line with the final report are defined for implementation.

RCC Training & certification

The Training and certification of the Regional Coordination Centre staff is a task required by the Article 37.1.g of the Regulation (EU) 2019/943 of the Clean Energy Package (CEP).

In compliance with this regulation, ENTSO-E has drafted a proposal to define how RCCs should handle the training and certification of their staff. As a reminder, Regional Security Coordinators (RSCs) will evolve to Regional Coordination Centres (RCCs) by July 2022, as established by the CEP.

RCC Training & certification proposal

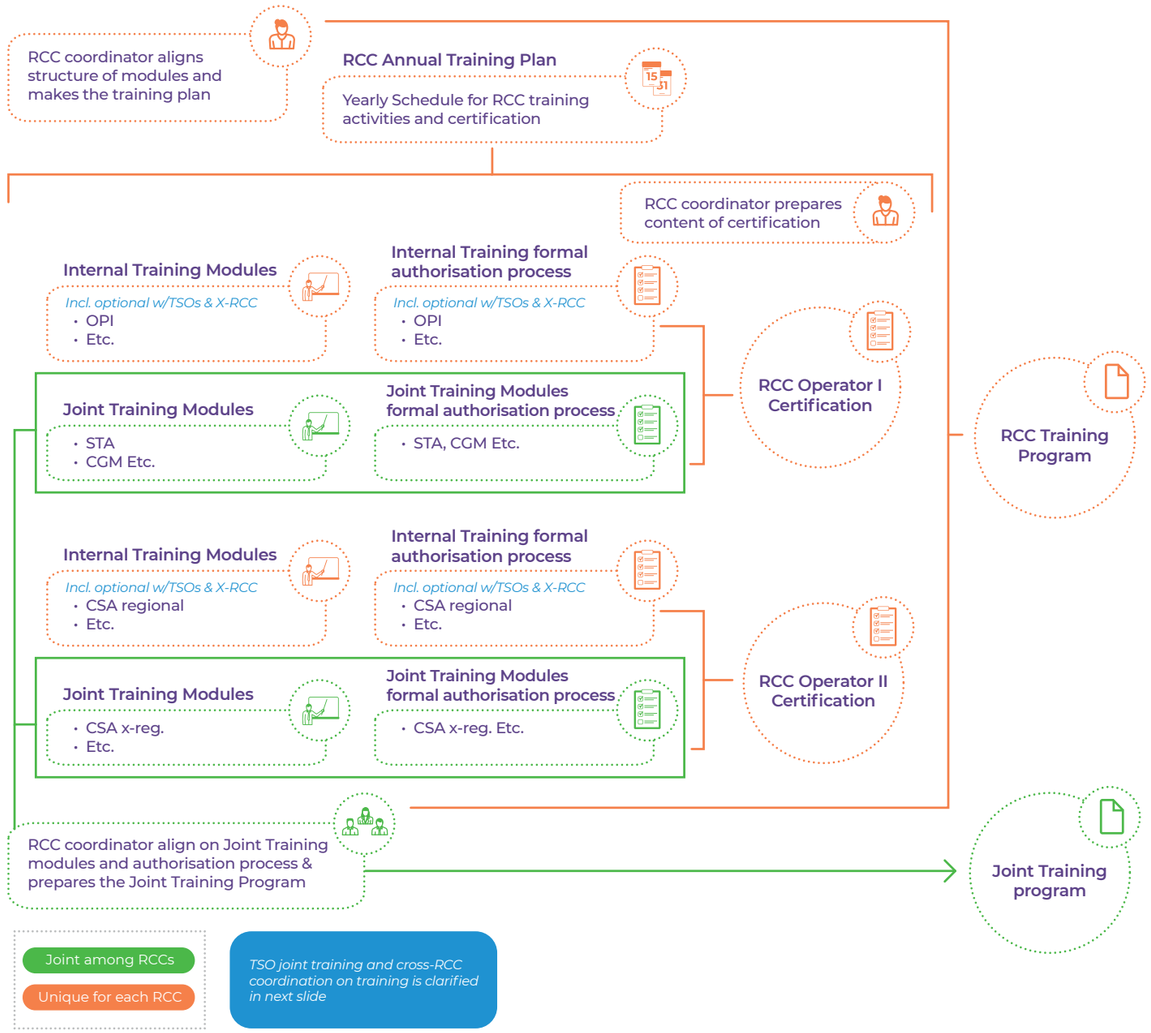
With Coreso as Convenor, a project team at ENTSO-E composed of members from all RSCs, TSOs and ENTSO-E has drafted the proposal for the new RCC task "Training and certification". This proposal focuses on the RCC operators:

- The first part of the proposal deals with the internal and joint RCC training sessions (between all RCCs), the RCC trainings to be organised in collaboration with TSOs, and the cross-RCC trainings (training for processes where at least two RCCs are involved). Some criteria have been defined to allow RCCs to decide whether the training should be common, internal or cross-RCC.
- The second part of the document focuses on the certification of RCC staff. ENTSO-E proposal has been inspired by the training requirements for TSOs outlined in SOGL Article 61 (Certification of system operator employees in charge of real time operation) and adapted to the specificities of the RCCs.

The proposal has been drafted in close collaboration with ACER, to capture their expectations and requirements.

In October 2021, a public consultation was launched to enable all relevant parties to react on the text. The proposal has been submitted to ACER by ENTSO-E on 18 February 2022.

Once validated by ACER, the RCCs will then have 24 months to implement the proposal. Afterwards, only operators certified as complying with the requirements of the proposal will be allowed to perform the RCC tasks.

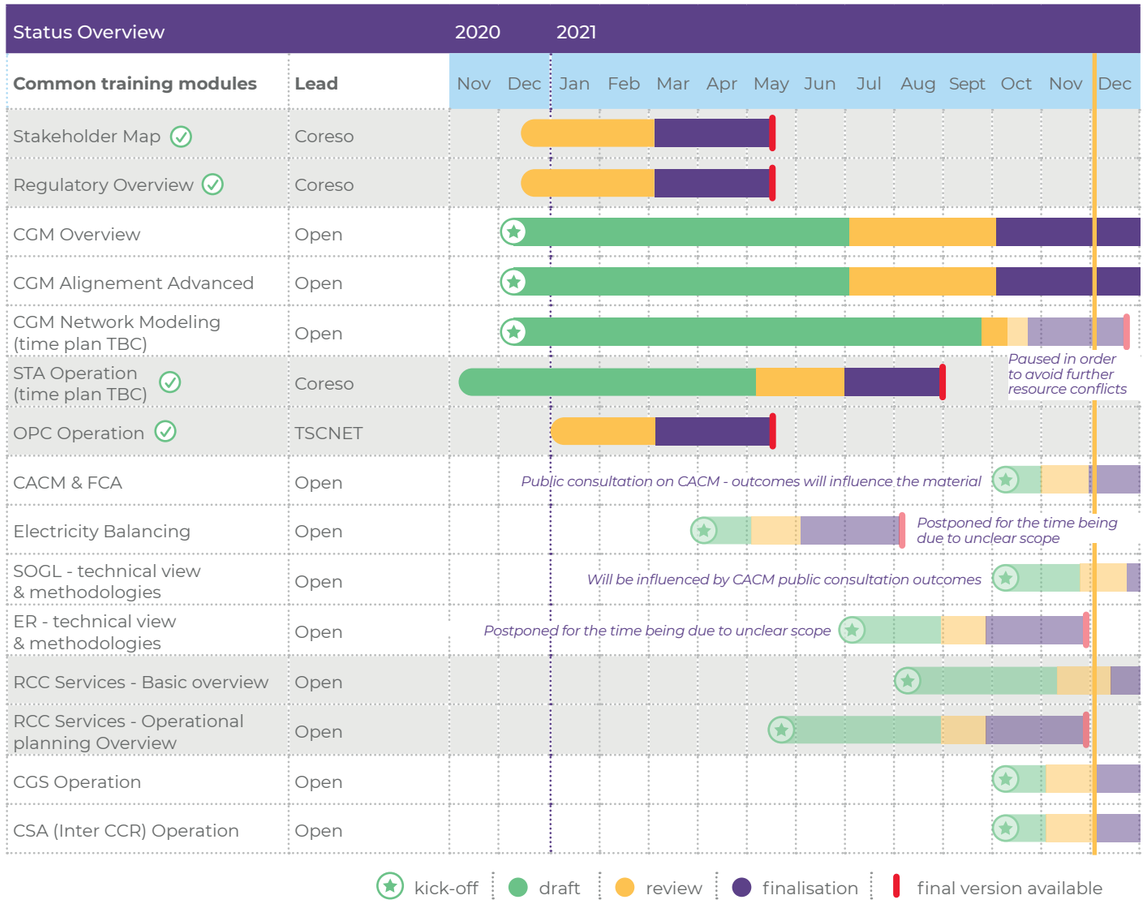


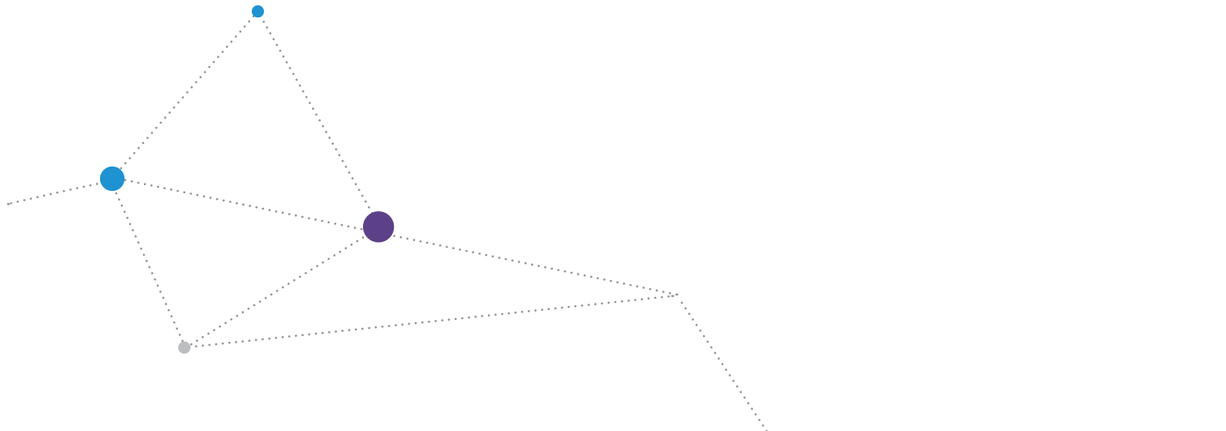
RSC Working Table Training

The RSC Working Table Training is a working group where RSCs collaborate to align their developments. This specific body is hosting a project for common training development to anticipate the new RCC Training and certification task as well as to start the RSC collaboration on training.

Led by Coreso, the "RSC Working Table Training" project group defined a training catalogue in 2020. This catalogue sets out all of the training modules for RSC staff, as well as an implementation roadmap for 2021.

During 2021, the working group has implemented four common training modules. Two of these will be integrated on the TSCNET Academy e-Learning platform, as an experiment. The aim of such experimentation for RSCs is to gain experience on e-Learning modules design, preparation and use.





Supporting pillars

IT

IT activities range from fixing small technical details to conceiving a service and its delivery model, with the aim to sustain the best value for the company.

Coreso's IT team is deeply engaged in supporting our projects to develop and deploy new services for our stakeholders, as well as supporting the existing services.

Therefore, in 2021, Coreso raised awareness among its teams on how to efficiently contact the IT department and make use of the Coreso Service Desk tool. Through this usage rise, IT requests and incidents can be followed up in a more professional and structured way.

Did you know ?

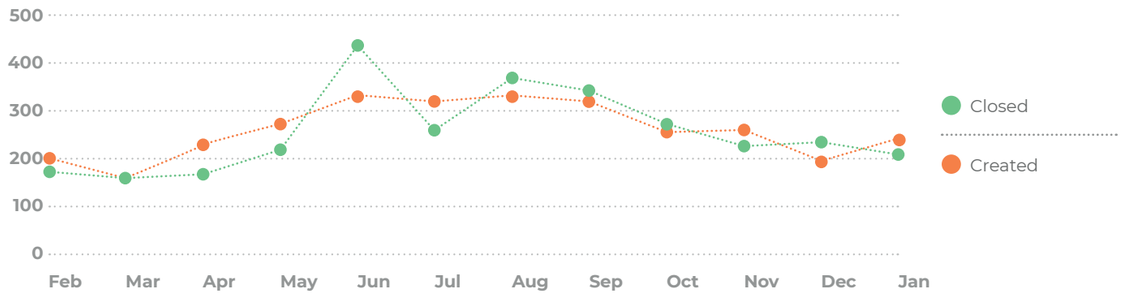
Coreso Service Desk (CSD) is the IT tool facilitating requests for our IT team.

Total number of tickets created in CSD

2021	Critical	High	Medium	Low	Total
Change		5	18	33	56
Incident	35	103	261	502	901
Problem			3		3
Service Request		29	96	951	1076

2020	Critical	High	Medium	Low	Total
Change		5	3	8	16
Incident	71	35	99	290	495
Problem	1		1		2
Service Request	1	10	13	418	442

Number of tickets on a monthly basis

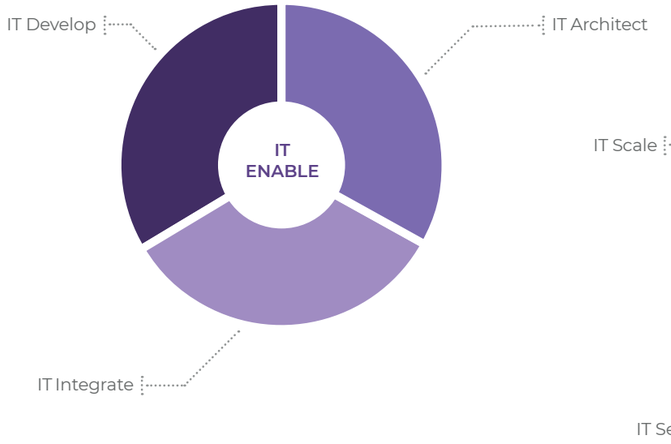


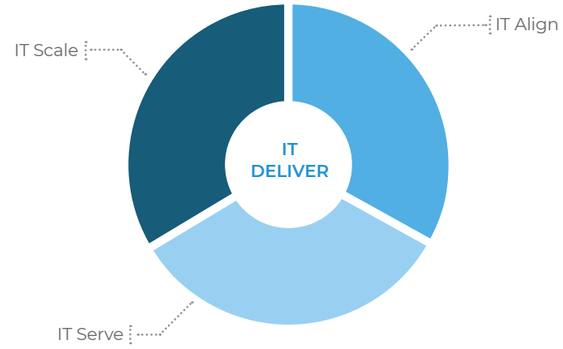
IT Strategy development

Coreso has launched an IT Transformation plan to bring IT (Technology, Processes, People) up to the level needed to address current and upcoming challenges with the required level of predictability and professionalism. The objective is to deliver business projects efficiently while improving the resilience and robustness of current operations.

The Coreso IT Transformation plan is based on two major sub-portfolios:

- **IT Enable: concentrating on defining standards & processes;**
- **IT Deliver: materialising the processes through tools, simplifying current IT eco-system and delivering new technologies capabilities to support the business.**





IT Enable

This portfolio is structured in around three main domains:

- **IT Integrate:** ensuring the proper transversal integration of IT in the company eco-system;
- **IT Develop**: improving the software development capabilities and processes;
- **IT Architect:** defining the application architecture vision and standard while improving the IT Solution architecture capabilities.

During 2021, there were major accomplishments:

- The first Information Security Management System (ISMS) was implemented based on the ISO 27001 standards and processes.
- A set of detailed practices related to processes for incident and service fulfilment has been defined and designed.
- The controlled IT purchasing processes was integrated within budget.
- The architecture and standards of the IT target application were defined.
- The IT integration into the project management method was improved through the definition and development of standard deliverables and use of better estimation capabilities.
- An agile organisation of the Internal Software Development team was done to provide business with better view and commitment.

IT Deliver

IT Deliver program is based around three major streams:

- **IT Align:** focusing on the simplification of the current complex IT eco-system;
- **IT Serve:** implementing the tools supporting the processes defined in the context of IT Enable;
- **IT Scale:** providing Coreso with “New Technology” capabilities to support the target Application Architecture standards.

The following developments were implemented in 2021:

- All the Coreso users’ repositories were consolidated to build up a central authentication solution able to support the requirements of Information Security Management System (ISMS).
- A lot of technical dependencies on the existing Manages Service Provider (MSP) were alleviated to smoothen the transition to the new one, but also to provide us with the required capabilities to operate more pro-actively from an IT viewpoint.
- The deployment of the new endpoints (workstations) management platform was completed.
- The endpoint leasing contract was completed and will become the approach for any new equipment replacement.
- The ISMS Controls & Remediations implementation is progressing with priority on OPDE/CGMA applications, currently managed on the Risk Review Board with Application Security Centre (ASC).
- A first production environment was delivered offering Kubernetes (open-source system for automating deployment, scaling, and management of containerised applications) & Container capabilities to support the current running projects.

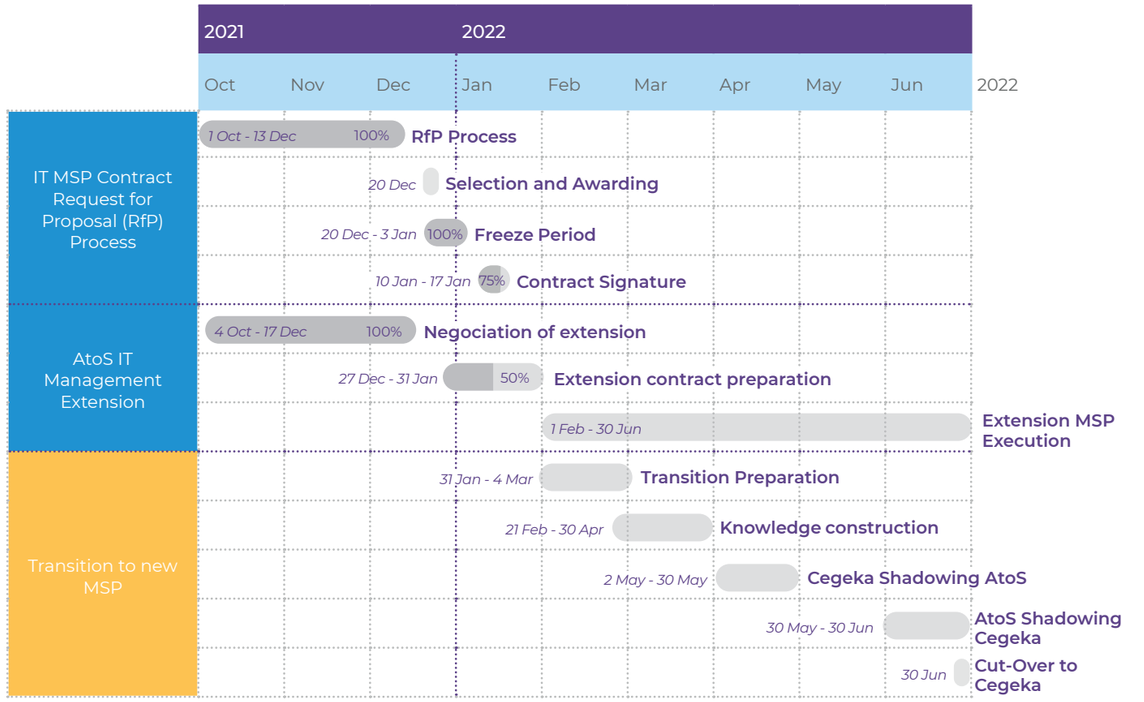
EU Tender for New IT Managed Service Provider selection

During the year 2021, Coreso performed the first EU Tender to replace its IT Managed Service Provider (MSP) and to prepare for the future. The role of the MSP consists of endorsing the operational support of our IT infrastructure and applications in our Data Centres, Cloud providers and office premises.

As the previous provider’s contract ends in January 2022, a new contract was pursued through a European tender process. After more than one year process, Cegeka was selected as our new MSP in December 2021. Given the time constraints and risk exposure of a short transition, Coreso negotiated an extension with our previous MSP until end of June 2022 to ensure business until the transition to Cegeka.

In 2022, Coreso and Cegeka will be entering the exploratory phase to assess how the onboarding could be accelerated and therefore how the project execution could be improved, at the same time as the knowledge construction phase for Cegeka.

The timeline below presents the different phases of the European tender process, which ended with the contract signature early January 2022. The next step is the finalisation of the contract extension negotiations with previous MSP, to smoothen the transition process and minimise the risks. Starting end January 2022, the transition preparation phase will consist of drafting the transition plan covering critical dependencies and risks, as well as preparing a fast onboarding of new MSP on the domains not covered by the previous provider. The MSP transition will be integrated in the IT Transformation program management for further follow-up.



OPDE Minimum Viable Solution Security Plan

Coreso successfully passed the first Minimum Viable Solution Security Plan Audit with a score of 8.5/10 for both Participant and Hosting Provider roles. This grants us full access to the OPDE environment needed to perform our services to the TSO community.

Outstanding security risks are being mitigated and followed up by the Risk Review Board at the OPDE Application Security Centre, on a regular basis.

Both IT and Service Development are intensively working on getting the outstanding risks mitigated within the required timeframe.

Business Support

Coreso has grown rapidly over the last decade and has significantly accelerated in terms of demand and complexity during the last five years. The organisation is currently going through an important transformation. There is a growing need to improve and streamline processes and structures, as well as to take a more methodical and proactive approach in terms of project management and deployment of new services. There was also a need to improve collaboration within the various departments. This resulted in efficiency gains and a more collaborative environment.

Business support covers Finance, Regulatory, Legal & Compliance, Procurement, PMO function and Program Management for Corporate projects. The team is composed of seven persons.

The Business Support team supports the other departments, aligns the financial strategy with the company strategy, and guarantees that Coreso has the necessary financial resources to achieve its strategic goals. It ensures financial transparency, provides insights in the costs per department, and ensures that the costs stay under control. It acts as a Business Partner for the different departments and challenges the realisation of their budgets.

The Regulatory officer clarifies the regulatory framework, creates a regulatory roadmap and works closely with the Business (Services, Operations and IT) to guarantee alignment and compliance with these regulations.

Coreso is undergoing a transformation and there is a growing need for better structures, improved processes and methodologies. The PMO reinforces the project methodology, which leads to improved project management (i.e., improved monitoring of projects budget, clear milestones and deliverables, priorities and deadlines management). Regular trainings are organised to share the knowledge with the Project and Program Managers.

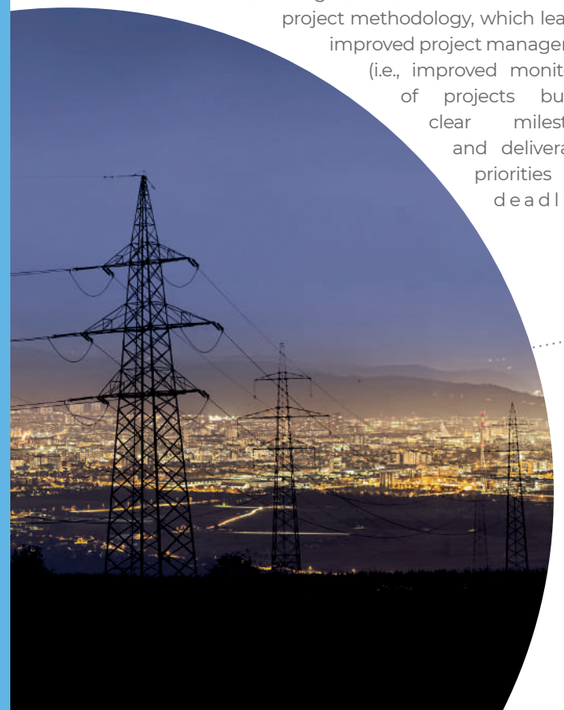
A Corporate Program Manager leads the major Corporate projects which are critical to Coreso's future (HR internalisation, Finance Transformation, going from RSC to RCC, including RCC reporting), and accelerates the upgrade of the Project Methodology.

Procurement and Legal are also key, although they are currently outsourced.

In 2021, the Finance team launched a "Finance Transformation Plan" to improve the granularity and quality of finance information shared with the other departments. Coreso has implemented a more robust Multi-Year Budget process and has begun to prepare the full internalisation of the Finance function (i.e., the internalisation of ERP and accounting). This internalisation is essential to be ready for the next stage and to enable us to better understand the costs drivers of the services to better manage them. This will ensure transparency and auditability of the costs, and give Coreso the good basis for performance management.

The Regulatory Officer further invested in sharing the regulatory knowledge within the company and in ensuring that Coreso's interests are adequately represented in key regulatory working groups and task forces. Together with the legal representatives of the shareholders, the Regulatory Officer led the translation of the impact of Brexit on Coreso's governance which led to an update of the company's Articles of Association. She also anticipates the next steps in Coreso's transformation from RSC to RCC, such as working on new services and developing cooperative processes.

The PMO and Corporate Program Manager have mainly invested in the improvement of the Project Methodology and in the refinement of the internal PMO tool. The focus was on the quality of the information available in the tool as well as on the completeness of the reports available through this tool.

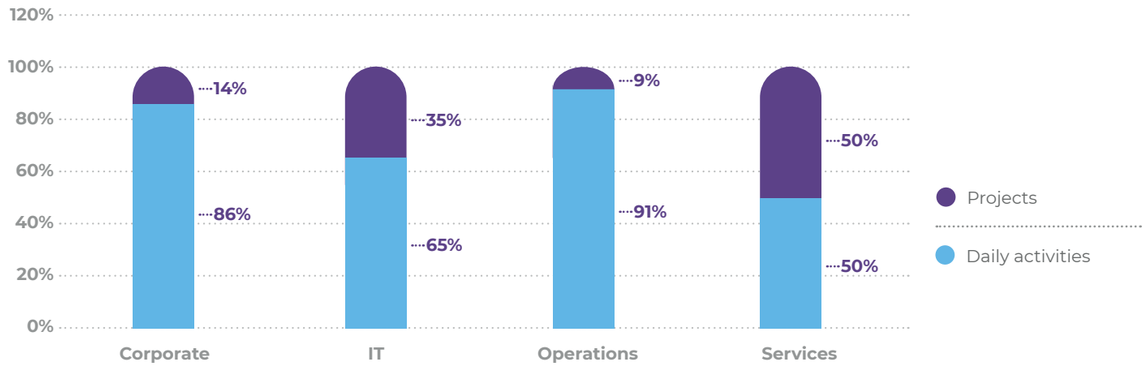


Timesheet at Coreso

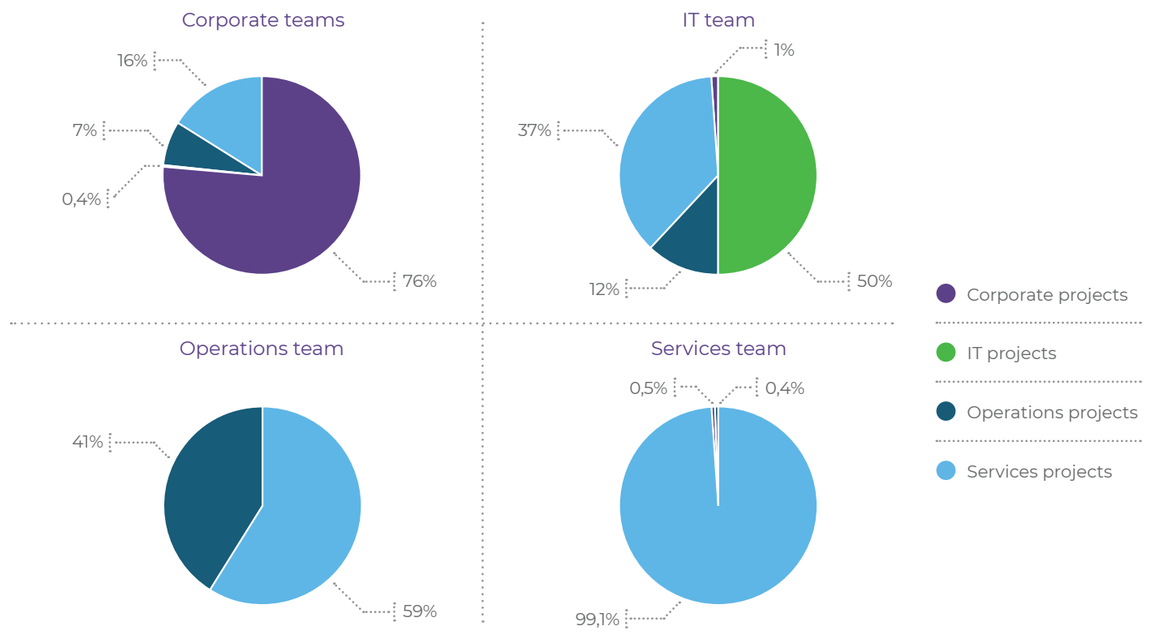
2021 is the second year that the PMO tool is used at Coreso. It includes not only the resources and costs planned on projects but also time-sheets data (actuals). In 2021, regarding the time-sheets, Coreso focused on:

- **Improving the quality of information. This information is crucial as it enables Coreso to understand the workload associated with the projects in order to manage resources and set up priorities;**
- **Introducing time registering for some daily/run activities as well (e.g., for statistical purposes);**
- **Increasing the use of the timesheets. In December 2020, 67% of timesheets were filled in. Completed timesheets reached 90% in September 2021 and 99% in December 2021;**
- **Training to ensure proper understanding and optimal use of the tool.**

Distribution of daily activities and projects by teams



Distribution of projects, by team:*



*Figures from August 2021 to January 2022

Information and Knowledge Management

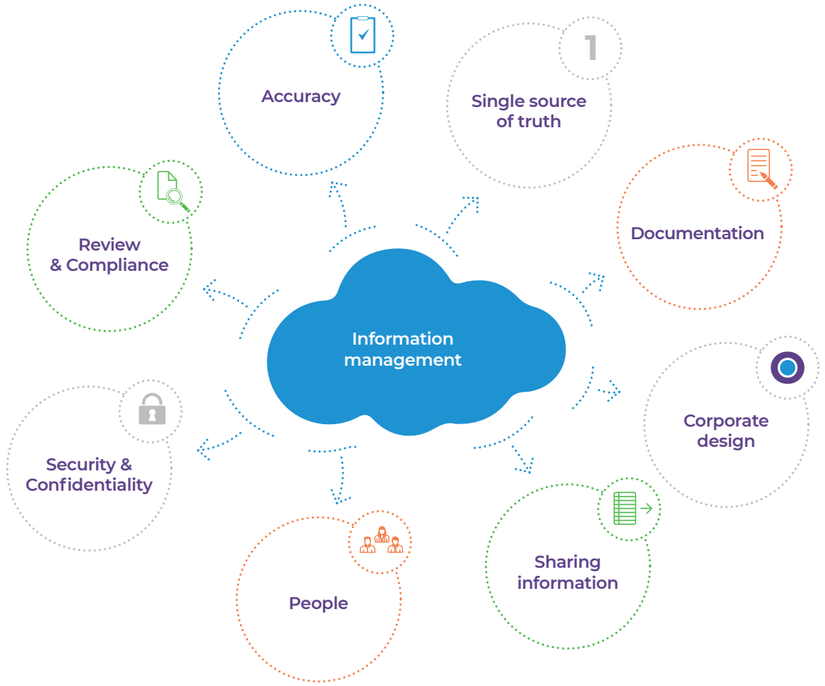
The coronavirus pandemic and the resulting lockdowns have forced many organisations into undergoing an accelerated digital transformation. Hybrid work (office work vs remote working) has started to become the new norm. This new situation stressed more than ever the importance of efficient communication, access to reliable information, knowledge sharing and collaboration across the organisation. Knowledge derived from information is indeed the most strategic valuable resource that any organisation owns, and the efficient use of these critical resources is essential to ensure that it survives in uncertain times.

In this context, Coreso launched in 2020 the Information Management and Knowledge Management project. It aimed to implement the first Information Management and Knowledge Management foundations across the company.

In 2021, Coreso introduced an Information Management policy which will improve the organisational structure and standardise the way of working by:

- Modelling best practice in record and information management;
- Improving record management practices across the organisation and ensuring access to all critical information in most effective way;
- Defining clear roles and responsibilities for all employees to guarantee effective information management at Coreso and compliance with this policy.

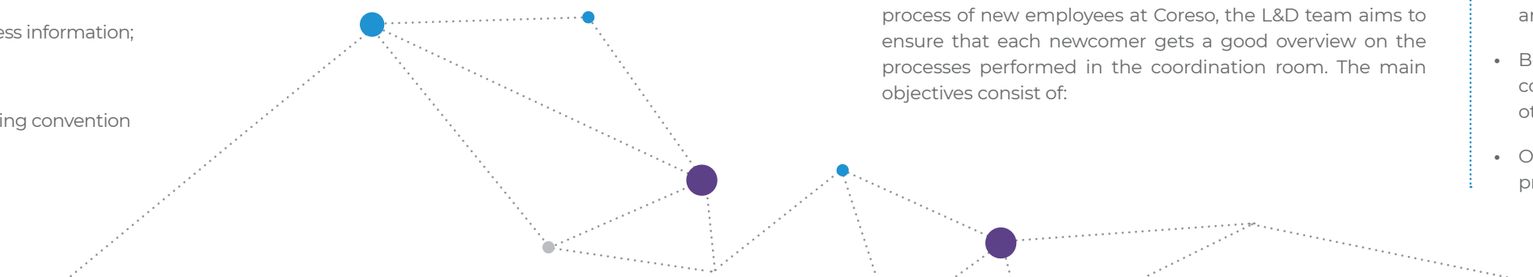
Lastly, this project delivered dedicated repositories for critical documentation, such as procedures, contracts, etc.



Coreso's employees are encouraged to use the state-of-the-art information technology as a main information management, knowledge sharing and collaboration tool. Additionally, the use of common taxonomy and metadata will:

- Improve the consistency of critical business information;
- Guarantee a single source of truth;
- Promote the usage of standardised naming convention across the organisation.

The challenge is therefore to facilitate the use of metadata to ensure a more efficient Information Management, which saves time in finding key business content and increases business productivity.



People & Culture

As Coreso evolves from a start-up to a small and medium enterprise, a clear need to internalise all activities related to our human capital was identified a few years ago. Coreso has consciously chosen a stepwise approach to support the construction of solid and sustainable processes designed to meet the needs of a growing company.

An important step has been reached in 2021 with the internalisation of activities relating to payroll, learning & development and recruitment. Today, five dedicated in-house HR specialists are responsible for managing these activities (recruitment and hiring, onboarding, training, and contract administration).

In addition to the HR staff, since 2020, our Communication Specialist is responsible for maintaining consistent communication with different target audiences, both internal and external, and both informal and formal. Additionally, our Office & Executive Assistant makes sure that all Coreso employees can work in the best possible conditions in the office and supports them by taking care of the administration.

In 2021, these seven specialists have come together as a new team. Although they come from different fields of expertise, they share a common goal: to create a culture in which the **people** working at Coreso feel respected and supported. Once this was clarified, the name of this team, "People & Culture", easily followed. The daily mission of the "People & Culture" team is to support the development of skills, to foster collaborators' growth while promoting a spirit of openness and exchange.

Learning & Development

Since January 2021, the Learning & Development (L&D) team has been developing, with the objective to structure, harmonise and expand the training possibilities within the company. Indeed, constant changes in our business require us to tackle numerous needs.

Thanks to the transversal role of L&D, the team intends to capture the needs of the different departments of Coreso by seeking to:

- Improve Coreso's knowledge: Coreso needs to ensure that it continually improves its level of performance as business processes become increasingly complex. New tools and technological developments are needed in order for Coreso to respond in a timely and efficient manner to the expectations set out in European Legislation. Coreso has to be ready, which leads to quick changes in profile and competences requirements. To this end, Coreso needs to support its employees to help them acquire the necessary skills.
- Follow-up employee's career path: L&D being part of HR, the link between performance management and training needs is essential. Centralising training at the corporate level and tracking the career path of employees helps to address the best options for development.
- Understanding the needs of each department: the L&D Team must ensure that the training offer meets the needs of each department to support them in their growth and objectives. A first step was taken in 2021 with the implementation of training courses as well as soft skills trainings (organised both internally and externally).

With regard to the last point, the team intends to develop further soft skill training modules. In 2021, the focus was on "high-impact communication" and "feedback":

- As communication is key to successful collaboration, a certain level of communication skills is expected within the company. Consequently, high-impact communication training is delivered by an external company to improve the skills of Coreso's employees: five sessions were provided in 2021, and more will be planned in 2022.
- Giving feedback is a powerful way to improve performance at both individual and corporate levels. To integrate it into Coreso's company culture, all employees have attended a training session provided by our L&D team.

Videos of coordination room processes

In the framework of the standardisation of the onboarding process of new employees at Coreso, the L&D team aims to ensure that each newcomer gets a good overview on the processes performed in the coordination room. The main objectives consist of:

- Better understanding the daily work of Shift Engineers and the core business of Coreso;
- Better perceiving the interactions between the coordination room and the external parties (TSOs and other RSCs);
- Observing how specific processes are performed in practice.

For these purposes, several videos were created in 2021 to be used as a virtual visit of our coordination room. In these videos, Shift Engineers explain the processes and tools they use to perform the main RSC and future RCC services. “Shadow shifts” are also organised for colleagues involved in projects linked to operational processes, to provide them with more technical and in-depth explanations.

These videos were created in close collaboration with members of the Communication and Operations teams. They contribute to develop an appropriate onboarding training program through different channels and will also be part of the e-learning modules currently being developed.

Did you know ?

During a shadow shift, a newcomer follows an experienced Shift Engineer during one complete shift to understand in detail how daily shift duties are technically performed in the coordination room.

Training of Coreso Shift Engineers

The European electricity grid is constantly evolving with new developments to improve and ensure security of supply. It is therefore of utmost importance for Coreso to provide consistent and continuous training to its employees.

To this end, the L&D team has developed a training catalogue with approximately 60 training modules:

- Future Shift Engineers have to undergo a one-month theoretical training, followed by two months of shadow shift with experienced Shift Engineers.
- The L&D team also offers new colleagues in Operations offline sessions to ease and consolidate the learning process. These sessions enable the newcomers to study in detail the operational processes as well as the particularities of European electrical grids, away from the deadlines and shift bustle in the coordination room.

This training program is reinforced with appropriate assessments on different processes, focusing on the skills necessary to perform and deliver services according to Coreso standards. These evaluations are indeed considered as an essential part of the learning path, but also as evidence of the success of the training.

Continuous training is also key to updating the knowledge of the Operations team, while keeping them informed of changes in the European power system and its methodologies. Therefore, aligning the noteworthy parts of the different processes, identifying common criteria and expertise spreading form the foundations of the training program. To further improve these continuous training sessions, the Operations and L&D teams are working together to create a one-day tailored-made training course, which will be organised annually.

To conclude, the L&D team is working on a permanent improvement approach to ensure that the content is relevant and up to date with the changing environment, and meets the needs of the Shift Engineers. Coreso considers it fundamental to offer the best support to its Shift Engineers in their regional coordination mission.

Well-being survey

In October 2021, Coreso launched a survey on well-being at work. Employees were able to indicate how satisfied they are with specific aspects of work and how important they are to them. Based on the results, Coreso will be able to identify the possible areas for improvement with the aim of providing its employees with a safe environment that facilitates optimal performance.

This assessment was conducted by means of a short and simple questionnaire by an external provider specialised in prevention and protection at work.

The participation rate was 83% (i.e., 67 people out of 81 answered), which allows the result to be considered as truthful and valid. From the survey, it appears that specific areas could be improved to increase the well-being of Coreso employees. The complete results were shared in December 2021 and January 2022 with all employees.

As next step, a qualitative phase has been started. A workshop with representatives of each department will be hosted in Q2 2022 by an external provider specialised in prevention and protection at work to debrief the results, try to understand the risks and propose solutions. The results of this workshop will allow Coreso to build an action plan identifying short- and long-term actions to improve well-being. By organising similar surveys on a regular basis, Coreso will be able to evaluate differences and improvements.

CorNet

Coreso and TSCNET are two of six RSCs in Europe ensuring the coordination of TSOs activities within specific Coordinated Capacity Regions (CCRs). In addition to the areas where they operate alone, it should be noted that both companies perform their services for two CCRs: Core and Italy North. Related to those regions, the Article 77 of the System Operation Guidelines (SOGL) requires a coherent allocation of the tasks between the RSCs in the most effective and efficient way.

Considering this, in May 2017, Coreso and TSCNET agreed on the so-called Cooperation Framework Agreement where both parties agreed to set up an efficient cooperation structure and to set out corresponding cooperation principles.

In the meantime, the Clean Energy Package stipulates the transformation of RSCs into RCCs by 1 July 2022. Both Coreso and TSCNET will serve as RCC for the System Operation Region (SOR) “Central SOR”, with a clear allocation of tasks.

Following regulatory developments, Coreso and TSCNET launched an RSC Cooperation Programme in 2020, now referred to as **CorNet**. This Programme will develop and implement common services and processes as well as develop the tools required for further service development.

In doing so, CorNet seeks to find synergies, optimise costs and share know-how in order to implement the EU network codes in a timely, cost-efficient and effective manner, whilst providing a high-quality service for Coreso and TSCNET shareholders. It is also governed in way to apply all the latest principles of service-based design: standardisation, automation, open platforms, standard interfacing, reusable building blocks and process orchestration.

The Services to be delivered commonly for the Core and Italy North CCRs are Common Grid Model (CGM), Coordinated Security Analysis (CSA), Coordinated Capacity Calculation (CCC), Short-Term Adequacy (STA) and Outage Planning Coordination (OPC).

Based on state of art technology and an equitable share of the costs, CorNet aspires to create a common solution framework that can also be extended to other regions; and that can act as a growth platform for future services offering the flexibility required.

CorNet will provide, as a first step, the general platform and the services Coordinated Security Analysis (CSA) and Cost Sharing for the Core and Italy North CCRs. The platform is intended to be modular, so that central building blocks can subsequently be used for other services (CCC, STA and OPC), regions (SWE and Hansa) or TSOs (NGESO, EirGrid and SONI).

As an ambition, CorNet will be the common backbone for Coreso and TSCNET, upon which all services required by the European Regulations for the CCRs will be operated. For Coreso, it will be the future new asset, aiming to be the reference tool for the security of European electricity grid.

Timeline

The CorNet Programme will be implemented in four stages.

1. The **preparatory stage** has been concluded mid-September 2021 with the approval, from both sets of Shareholders, of the Cooperation & Cost Contribution Agreement (C&CCA), which provides the legal framework and formally establishes the CorNet Programme between Coreso and TSCNET.
2. The **tendering phase**, aimed at selecting the CorNet suppliers and partners to develop and support our ambition, started on 8 October 2021. It is expected to be closed in mid-2022 by contract signature with the required service providers. Implementation will begin immediately thereafter.
3. The **design and development of the service platform** with the first target to deliver the CSA and CGM services for Core, Italy North and SWE regions between mid-2022 (start of the development) and March 2026 (last expected go live CSA service for Italy North region).
4. Finally, the **onboarding of the other services** (CCC, OPC and STA) will be developed in 2022. An analysis will be conducted in conjunction with the Core, Italy North, Hansa and SWE regions with the opportunity to develop a pan-European CGMES migration roadmap for those services. The purpose is also to agree on the best implementation strategy to be followed.

To meet these ambitions, various prerequisites must be met outside of CorNet. The availability of the CGMES standard from ENTSO-E before Q3 2023, the harmonisation of central operating processes of Coreso and TSCNET (for example for service rotation), and the operational readiness of the new interfaces to the TSOs are particularly critical.

Key priorities

Stream 1: Cooperation & Cost Contribution Arrangement (Corporate Contract / Draft Vendor Contract / Rulings)

The first "Framework Agreement" established between Coreso and TSCNET entered into force in 2017. The complexity and extent of the cooperation, as well as the legal changes that have taken place since then, made this legal framework necessary for it to be replaced. The new agreement, known as the Cooperation & Cost Contribution Agreement (C&CCA) reflects the current collaboration and lays the foundation for future cooperation between Coreso and TSCNET. The C&CCA was validated by both TSCNET and Coreso Shareholders on 14 September 2021 and entered into force on 29 September 2021.

The purpose of the C&CCA is to define, among other things:

- Services, platform and tools upon which the CorNet Programme will be developed;
- Cost sharing & allocation of resources on an equitable (50:50) basis;
- Liability between Coreso/TSCNET, third parties & suppliers;
- Programme management activities;
- Representation and coordination in joint procurement;
- Intellectual property in respect of Coreso/TSCNET, suppliers & CorNet Programme and potential use of open-source software;
- Possibility to reuse the platform and tools for specific needs.

To avoid that the cooperation establishes a permanent residence for Coreso and TSCNET abroad, no profit may result from the cooperation. In addition, both RSCs should ensure the subsequent operation of the platform in a coordinated manner, but economically independent of each other.

For the above-mentioned considerations, the C&CCA exclusively regulates the development of the new service platform but is not limited in time to the current CorNet scope. This agreement is to be supplemented later with a further agreement on the operation of the new service platform.

With the signing, Coreso and TSCNET have established a consortium for the procurement and construction of the service platform from a legal point of view. This simplifies the procurement process as well as issues around obtaining licences compared to other forms of cooperation. No further formalities are required for the consortium, which will not set up a company or hire employees.

In March 2022, Coreso and TSCNET validated the Rules of Management, which complement the legal provisions of the C&CCA. The aim of the Rules is to successfully steer the consortium by ensuring good governance.

Stream 2 and 3: EU Tender process (Formal Tender Preparation) and Requirements (Tender related Requirements RSCs and TSOs)

The C&CCA not only clarifies the rights of Coreso and TSCNET to each other, as far as the development of the new service platform is concerned, but also the relationship with suppliers and partners in connection with this development.

Based on the C&CCA provisions, Coreso and TSCNET agreed on 14 September 2021 upon a common Product Policy in order to issue a European tender in line with EU rules.

For the preparation of the functional and technical tender documentation, Coreso and TSCNET initiated an intensive coordination work amongst Core, Italy North and SWE regions between Q2 and Q3 2021. This successful cooperation between Coreso, TSCNET and these regions, has established a stable and trustful framework: the cooperation results were validated by the respective Steering Groups and recognised by the Zurich Group, which is made up of Shareholder representatives from both Coreso & TSCNET.

Because the essential purpose of CorNet is to provide services for the secure supply of electricity in high quality and at the lowest possible cost for TSOs, a further intensive phase of transparent collaboration between Coreso, TSCNET and TSOs is expected: it concerns the design, development, and tests of the solution as well as the preparation of the go live(s) and the operational phase from mid-2022 until Q1 2026.

Did you know ?

The Zurich Group (ZG) is the name of the group of TSOs shareholders of TSCNET and Coreso which meet regularly to monitor the progress of the CorNet Programme. It acts as an advisory body, focusing on "how" things shall be implemented, such as common tooling. The ZG is composed of representatives from TSOs shareholders of both Coreso and TSCNET, as well as the Programme Management team and the Managing Directors of both RSCs.

TSCNET Perspective

CorNet is a strategically important programme for TSCNET, not only in terms of its deliverables, but also it demonstrates our commitment to work collaboratively with Coreso, and other stakeholders, in order to deliver effective and cost-efficient solutions for our customers starting with the 'go live' with the CSA (ROSC) Service for Core CCR in 2024.

Throughout 2021 CorNet has continued to gather momentum, with more than 50 employees from both Coreso & TSCNET actively involved in the programme. Despite the pandemic and travel restrictions in place, colleagues from Coreso and TSCNET have worked together seamlessly in a virtual environment, alongside various external service providers and representatives from the TSOs & CCRs to achieve some key milestones for the programme.

The approval of the Co-Operation & Cost Contribution Agreement (C&CCA) by the Shareholders of both TSCNET & Coreso has provided the framework for the CorNet Programme but the interaction, level of commitment, trust and transparency between colleagues has been instrumental to the progress made last year.

2022 will continue to be a challenging year for the Programme, the organisation will be further enhanced through the on-boarding of vendors from Q2 onwards, who will begin the development of the IT Platform & CSA (ROSC) Services. In addition to this, the roadmap for the other services (CCC, STA & OPC) also need to be finalised and attention will need to be focused on how the CorNet platform will be operated by the RSCs & TSOs to ensure seamless service operations of the services from 2024.

All eyes are on CorNet but with the full support and cooperation of Coreso, I am confident we will make the CorNet programme a success jointly contributing to security of continental European electricity transmission system.

Matt Evans • TSCNET Head of Co-Operation Programme

Contents

The company

Founded in 2008, Coreso (COoRdination of Electricity System Operators) encompasses nine European transmission system operators (covering more than 55% of the population of the European Union) which are also its shareholders. When Coreso launched its operations in February 2009, it was one of the first technical coordination centres in continental Europe to be shared by multiple electricity Transmission System Operators (TSOs).

Today, Coreso provides services that help to improve the safety of electricity transmission activities throughout continental Europe. Located in Brussels, around one hundred employees (mainly engineers) and internal consultants combine their expertise to ensure 24/7 availability to anticipate operation activities from the annual to the intraday timeframe.

Composition of management bodies

Board of Directors

As at 31 December 2021, the Board of Directors is composed of the following members:

- Mr Sebastien Henry, director and Chairman of the Board of Directors (as of 21 October 2021);
- Mr Tomás Domínguez Autrán, Director and Vice-Chairman of the Board of Directors (as of 18 June 2021);
- Mr Olivier Arrivé, *director*;
- Mr Dirk Biermann, *director*;
- Mr Mauro Caprabianca, *director*;
- Mr Enrico Maria Carlini, *director*;
- Mr Emilio Cerezo Diez, *director*;
- Ms Maria José Clara, *director*;
- Mr Patrick De Leener, *director*;
- Mr Rodney Doyle, *director*.
- Ms Pascale Fonck, *director*;
- Ms Isabelle Haigh, *director (as of 15 April 2021)*;
- Mr Fintan Slye, *director*.

None of the directorships are remunerated and all will expire immediately after the 2024 Ordinary General Meeting that will be asked to approve the annual accounts as at 31 December 2023.

The Board of Directors met eight times in 2021. During these meetings, technical, financial, economic, legal and strategic issues were discussed.

Daily management responsibilities

Mr Jean-François Gahungu was appointed Chief Executive Officer, effective from 1 November 2016.

Mr Jan Van Roost was appointed Chief Operating Officer, effective from 1 August 2017.

Auditors

The Ordinary General Meeting of 15 April 2021 reappointed EY Bedrijfsrevisoren/Réviseurs d'Entreprises BV/SRL and BDO Bedrijfsrevisoren/Réviseurs d'Entreprises BV/SRL as the company's auditors for a term of three years, expiring at the 2024 Ordinary General Meeting that will be asked to approve the annual accounts for the year ending 31 December 2023. EY Bedrijfsrevisoren/Réviseurs d'Entreprises BV/SRL is represented by Paul Eelen and BDO Bedrijfsrevisoren/Réviseurs d'Entreprises BV/SRL by Félix Fank for the exercise of their mandate.

Each auditor's remuneration is €6,900 per year, to be indexed annually in line with the cost-of-living index.

Main events during the year

Context

The mission of Coreso is to proactively support TSOs to ensure the security of electricity supply on a European regional basis. Since interconnected European electrical systems are complex, Coreso's coordination role is essential to ensure a more efficient and safe transmission grid.

Coreso focuses its coordination activities, and thus provides the greatest added value, between the year-ahead (one year before real time) and intraday (a few hours before real time) timeframes. Coreso, like the other RSCs (Regional Security Coordinators), is a service provider of nationally regulated TSOs. Coreso services are governed by European regulations (3rd and 4th energy packages). In accordance with these regulations, Coreso currently implements the regulated services described below:

- Improved Common Grid Models;
- Coordinated Security Analysis;
- Coordinated Capacity Calculation;
- Short-Term Adequacy;
- Maintenance Outages Planning Coordination;
- Support in Emergency and Recovery situations;
- Risk Preparedness.

Coreso therefore collaborates with the TSOs and other RSCs to:

- Provide the national TSO control centres with forecasts about the security of systems;
- Perform operational planning activities;
- Carry out security analyses that simulate numerous scenarios (changes in flows on the grid, incidents, modification of electricity consumption/production forecasts, etc.);
- Propose preventive/remedial actions;
- Coordinate exchanges between the different national control centres, which remain responsible for implementing these actions in their respective systems.

The development of renewable energies, which are by nature intermittent, and the increase in cross-border exchanges within the European electricity market make electricity flows increasingly variable. Coreso has demonstrated and continues every day to demonstrate a significant level of reliability and expertise in the area of coordinating the operation activities of electricity transmission grids.

Its added value in terms of proactive identification of risk situations on the electrical system has become essential insofar as certain risks can only be detected by having an overview (beyond the national framework of each individual transmission grid).

Operational services: the five mandatory services

Improved delivery of Common Grid Models (CGM[1])

The aim of this service is to provide a view of electricity flows at the continental scale via the construction of a model of the European electricity grid.

Ultimately, this service will make available all the data necessary for the services derived from the Network Codes, and mentioned later in this document (coordinated capacity calculations, coordinated security analysis, coordination of interruption and short-term adequacy planning). The intention is to apply the service to all time scales (from year-ahead to intraday) and for all geographical levels (from regional to pan-European level). In the meantime, until it is fully implemented, alternative data and data exchange protocols continue to be used so as not to slow down the development of other coordination activities.

This service is an iterative process of data exchange[2] and manipulation consisting of two main steps:

- The creation of an IGM by each European TSO;
- The collection and merger of all these IGMs by Coreso to form a pan-European CGM.

[1]Defined as such in the methodologies

[2]Data exchanges are supported by the Operational Planning Data Environment

After reaching a first major milestone in 2020 (OPDE platform[3] that can be used for the exchange of IGMs and CGMs), 2021 was mainly marked by the effective launch of the CGM service in December 2021 (participation of all European TSOs and RSCs in the publication/merger of files). In addition to technical preparation (development of IT infrastructure, completion of internal training, drafting of procedures), Coreso anticipated this major milestone through an audit campaign conducted at European level, aimed at ensuring the proper level of preparation by all players. Lastly, Coreso also provided support to its own shareholders by organising several technical workshops (verification of operational procedures, testing of data exchange procedures, etc.) throughout 2021.

Coordinated Security Analysis

The purpose of this service is to detect and resolve potential violations of the rules applicable to the operational security of the grid. This service is provided for daily and intraday periods.

In practical terms, using specially-developed calculation tools, Coreso performs simulations to enable recommendations for preventive and curative actions to be issued to TSOs. They can then use them to resolve the constraints identified. In case of violation of operational security limits on cross-border grid components, close coordination between the TSOs and RSCs is essential to ensure implementation of the most effective and economically efficient actions.

In 2021, major progress was made in implementing the programme of cooperation with TSCNET entitled CorNet (described later in the document) and implementing the ICS (Increased Coordination Solution) process at the level of the "Core" Capacity Calculation Region (territory covering a geographical area extending from Romania to France).

In addition to these two major advances, 2021 also focused on improving the robustness of existing processes and tools.

Coordinated Capacity Calculation

Coordinated Capacity Calculation (CCC) plays an important role in the European interconnected system. Indeed, the increase in electricity exchanges within the European electricity market combined with the growing presence of renewable energy are contributing to increasing the variability of flows on the grids. In order to support this development and ensure the security of the electricity system, thorough preparation and proper predictions are necessary. This is the role played by Coreso as nominated Capacity Calculation Coordinator for three regions (CORE, SWE and Italy North) in Europe.

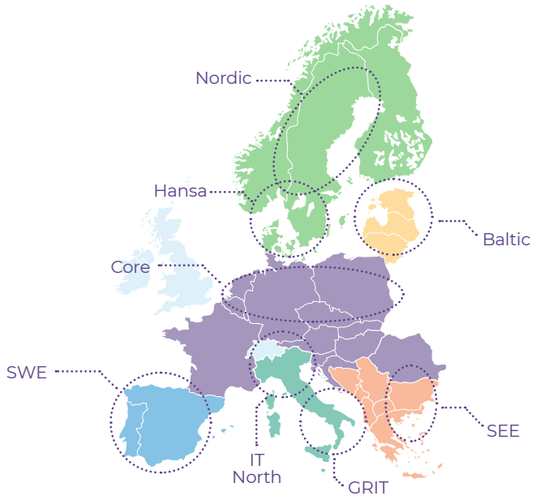
This service is aimed at:

- Applying regional coordinated methodologies (approved by the national regulators present in each region) to compute parameters defining available cross-zonal capacity (either Net Transfer Capacity (NTC), or Flow Based (FB) parameters), based on CGM and input data from TSOs. The previously mentioned methodologies aim to optimise cross-zonal capacities while ensuring coordinated security.

[3]Operational Planning Data Environment

- Including improvement proposals to increase computation quality (such as coordination of net positions of each IGM, if part of the regional methodology), and/or to optimise available capacity by using non-costly Remedial Actions (if part of the regional methodology).

The RSCs are officially nominated as Capacity Calculation Coordinators by the TSOs of each Capacity Calculation Region (CCR: Core, Italy North, South West Europe) to perform these activities.



This CCC service is required for the following timeframes: day-ahead, intraday and long-term capacities (annual and monthly).

Coreso thus performs calculations of daily and intraday capacity at the "Italy North" region scale , "CWE zone" (Central West Europe) and "SWE zone" (South West Europe).

2021 was also marked by numerous advances, including in particular:

- Start of the testing phase of the intraday process at "Core" region scale;
- Start of the long-term capacity service in the "Italy North" area;
- The implementation of specific requirements in the Clean Energy Package for the intraday and daily processes in the "Italy North" area.

Short-Term Adequacy

The main purpose of this process is to assess the risk of imbalance between electricity supply and demand. Indeed, the increase in exchange capacities between countries and the development of renewable energies reinforces the need to apprehend the challenge of covering consumption (i.e., electricity demand) with sufficient electricity production[4] on a continental scale. If, at any given time, electricity production is insufficient in one zone, the potential help from other zones depends on the overall availability of electricity and the capacity of the grid to transmit it from surplus zones to deficit zones.

Coreso has played and continues to play a leading role in the development of this service (methodologies and associated tools).

Based on the hourly forecasts for the coming week (D-1 to D-7), the Regional Security Coordinators (RSCs) carry out "Electricity production/Electricity consumption" adequacy assessments at the pan-European level and then at the regional level (a region is a geographical scale covering several national territories) to detect situations presenting a risk of imbalance:

- **First step**, assessment at European level

  > Each Transmission System Operator (TSO) provides daily information (expected total load, availability of electricity generating modules and operational security limits).

  > The RSC integrates the data in the STA industrial tool[5] (also called pan-European or inter-regional tool) developed specifically for this service.

  > The RSC carries out daily calculations for the next 7 days in order to confirm – or not – the risk of supply/demand imbalance.

- **Second step**, assessment at regional level

  > A regional assessment may be carried out following the results of the interregional assessment (if the risk is confirmed) or at the request of the TSO.

  > The RSC carries out an adequacy assessment in the zone concerned and delivers its results (level of imbalance, actions to be taken) to the associated TSOs to reduce the risks.

2021 was particularly marked by the implementation of the regional STA process. In case of an adequacy issue at pan-European (inter-regional) level, this process ensures that more in-depth analyses can be carried out, by focusing on the impacted TSOs and their neighbours, but also on coordinating the best possible solution.

Outage Planning Coordination

The main purpose of this process is to determine inconsistencies and incompatibilities in the planning of maintenance operations at the European level. This service, supplied with the year-ahead and week-ahead timeframes, thus pursues the following objectives:

- Identifying any incompatibilities in the planning of scheduled unavailability of assets (grid components, production facilities, consumption units) whose availability has a cross-border impact.

[4]The underlying reasons for this are the large-scale and intermittent presence (or absence) of renewable energy and the increasingly uncertain profitability of conventional generating facilities.

[5]Short-Term Adequacy

- Limiting the potential repercussions on the European grid and production by adequate coordination of planned outages timing.
- Proposing solutions to address inconsistencies and incompatibilities
  - Non-costly remedial actions;
  - Adaptations of unavailability and outages planning (firstly on grid components, secondly on other components if no solution is available).
- Coordinating findings and Remedial Action proposals with adjacent RSCs.

Following the launch of the pan-European process in 2020, 2021 was particularly marked by:

- The activation of new functionalities in the IT tools used to carry out the coordination process.
- The start of planning coordination at the annual scale with the delivery of the first seasonal pan-European grid model in 2022.

COVID-19 adaptation

Coreso is vigilant regarding the health situation related to the COVID-19 pandemic.

Activities have been switched as much as possible towards telework and strict rules have been implemented in office spaces to ensure appropriate distancing and cleaning.

While the COVID-19 pandemic had a major impact on work organisation, its impact on the activities and provision of services by Coreso remained minor.

Outlook

Provision of the five mandatory services

Coreso is in a major phase of implementing the "five mandatory services" defined by the Network Codes and has a dual role:

- Preparation for the total implementation of the five mandatory services (project management, development of IT tools, deployment of IT solutions, etc.),
- Contribution to the development of procedures and methodologies in connection with ENTSO-E and the RCCs (therefore for all associated TSOs).

EU legislation has strengthened the role of RSCs and describes their roles and responsibilities in the Network Codes:

- System Operation Guideline[6];
- Guideline on capacity allocation and congestion management[7];
- Guideline on forward capacity allocation[8] and regulation on electricity emergency and restoration[9];
- New services defined as part of the Clean Energy Package[10].

Clean Energy Package

On 1 January 2020, a new regulation of the European Parliament and of the Council on the internal market for electricity came into force. This Regulation is part of the legislative package on which the European institutions have been working for the last few years, better known as the "Clean Energy for all Europeans Package" (CEP). The Clean Energy Package foresees further services to be provided by the Regional Coordination Centres (RCCs).

Further to the activities already underway in 2020, Coreso has continued to contribute, alongside the European TSOs, towards drafting explanatory notes and methodologies. The latter describe the practical aspects of the implementation of the Regional Coordination Centres (governance, financing, internal rules, etc.). These documents were presented to the National Regulatory Authorities for approval. In January 2021, the National Regulators of the "Central SOR" region approved the proposal for "Central RCC Establishment Provisions" submitted by the 19 TSOs of the Central SOR. The objective of this proposal is to establish RCCs for the Central SOR region based on existing Coreso and TSCNET RSCs.

Furthermore, in order to implement the requirements of the European regulations[11], Coreso and its German counterpart TSCNET have organised themselves into a consortium. This is on the basis of a formal cooperation and cost contribution agreement[12] in order to operate a cooperation programme called CorNet. The objective is to harmonise operational processes and (where duplication is not justified for reasons of efficiency or by the need to ensure service continuity) to develop, deploy and/or use common tools. Coreso and TSCNET will therefore be able, over the coming years, to fulfil their roles and responsibilities towards their respective shareholders in an economical and efficient manner while assuming the RCC role required by the "Clean Energy" Package.

In the long term, in addition to the existing advisory role, the RCCs will have broader responsibilities to coordinate the actions of the TSOs. Indeed, for certain specific services, the RCCs will issue recommendations whose application will have to be followed up and tracked. Projects relating to the development of methodologies, agreements on cross-border and interregional harmonisation, inter-TSO and inter-RCC alignment were initiated in 2021 and will need to be fully operational from 2024. The Clean Energy Package will, in this regard, require inter-RCC coordination to be managed through a three-pronged cooperation process: (1) operating procedures, (2) a procedure for sharing analysis and consultations, (3) a procedure for adopting and reviewing coordinated actions and recommendations.

Ultimately, in addition to the five basic tasks mentioned above, the RCCs will have to carry out new tasks for which proposals already exist or are still being drawn up.

New RCC tasks	
Sizing of reserve capacity	Supporting inter-TSOs settlement (*)
Procurement of balancing capacity	Supporting Ten-Year Network Development Plan
Training and certification of RCC staff	Maximum entry capacity mechanisms
Post-operation/disturbances analysis and reporting	Regional restoration (*)
(*) at request of TSOs	

Subsidiaries

The company has no subsidiaries.

Events after the end of the year

No events likely to impact the financial statements as at 31 December 2021 have occurred since the end of the financial year.

Notes to the annual accounts

Introduction

Key figures

In thousands €	2021	2020
EBITDA*	5,219.7	4,272.9
EBIT*	1,169.7	924.9
Net result (before tax)	1,132.1	887.6
Net result (after tax)	728.4	546.0
Solvency ratio	35.21%	27.83%
Liquidity ratio	54.47 %	45.54 %

*EBIT = earnings before interest and taxes
*EBITDA = EBIT + amounts written off/depreciation
Solvency = equity/total assets
Liquidity = current assets/short-term liabilities

Balance sheet

Assets

In thousands €	2021	2020
Intangible fixed assets	6,049.9	6,427.9
Property, plant and equipment	2,160.0	2,592.7
Non-current assets	**8,209.9**	**9,020.6**
Trade debtors	1,869.4	2,051.1
Other amounts receivable	897.1	985.9
Cash & cash equivalents	1,350.7	1,167.0
Deferred charges	360.1	213.0
Current assets	**4,477.3**	**4,417.0**
Total assets	**12,687.2**	**13,437.6**

Equity and liabilities

In thousands €	2021	2020
Capital	1,000.0	1,000.0
Reserves	100.0	100.0
Retained earnings	3,367.4	2,639.0
Equity	**4,467.4**	**3,739.0**
Current Financial debts	3,350.0	3,200.0
Trade debts	2,791.9	4,651.4
Other current debts	1.804.4	1,575.2
Accrued charges/ deferred income	273.5	272.0
Liabilities	**8,219.8**	**9,698.6**
Equity and liabilities	**12,687.2**	**13,437.6**

Comments

Non-current assets

Fixed assets include the following:

In thousands €	2021	2020
Intangible fixed assets	14,820.4	11,812.2
Depreciation intangible assets	(8,770.5)	(5,384.3)
Property, plant and equipment	9,150.3	8,879.3
Depreciation tangible assets	(6,990.3)	(6,286.6)
Total non-current assets	**8,209.9**	**9,020.6**

[6]Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation

[7]Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management

[8]Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocation

[9]Commission Regulation (EU) 2017/2196 of 24 November 2017 establishing a network code on electricity emergency and restoration

[10]Commission Regulations (EU) 2019/941-944 of 5 June 2019

[11]Article 77 of Regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation requires that, when several RSCs are appointed in a certain capacity calculation region, the TSOs shall (i) determine a coherent allocation of tasks between the RSCs, (ii) demonstrate that the proposed setup of the RSC and the allocation of tasks is efficient, effective and consistent, and (iii) determine an effective coordination and decision making process to resolve conflicting positions between the RSCs.

[12]Consortium Cooperation & Cost Contribution Arrangement (C&CCA) signed on 29 September 2021

An amount of €3,279k was invested in 2021, of which €2,968k in software and €271k in hardware and other tangible assets.

The net book value of fixed assets was €8,210k and includes cumulative depreciation at year-end 2021 totalling €15,761k.

The following depreciation rates are applied by the company

Intangible fixed assets	minimum 20%
Tangible fixed assets	
Leashold improvements	10%
Tangible assets (energy-flow monitoring tool)	14.29 – 33.33%
IT equipement	20 – 33.33%

Most of fixed assets are depreciated on a 3-year basis.

Current assets

Trade debtors

Trade receivables totalled €1,869k compared to €2,051k at year-end 2020.

Other amounts receivable

"Other amounts receivable" (€897k) consists mainly of recoverable taxes and VAT and reimbursable social security contributions.

Cash at bank

At year-end, cash and cash equivalents amounted to €1,351k compared with €1,167k at year-end 2020.

Deferred charges and accrued income

This item comprises operating expenses to be deferred to the accounting year 2022 (€360k).

Equity

As at 31 December 2021, issued share capital amounted to €1,000k, represented by 15,210 shares, and was fully paid up when Coreso was created.

The legal reserve (€100k) amounts to 10% of issued share capital and is fully constituted.

The profit for the year (€728k) has been carried forward, bringing the company's total cumulative result to €3,367k.

Equity amounted to €4,467k after appropriation of the 2021 result.

Current liabilities

Current financial liabilities

At the end of 2021, financial short-term liabilities amounted to €3,350k. Coreso utilises a €8,000k credit facility consisting of short-term advances (between 90 and 365 days). This agreement is not limited in time and the interest rate is composed of the eurozone interbank rate + a margin of 0.6% per year for short-term advances.

Trade debts

"Trade debts" at year-end 2021 totalled €2,792k. They relate to invoices not yet due totalling €574k and invoices to be received totalling €2,206k.

Other current debts

The other current debts mainly include social liabilities which cover a number of provisions such as holiday allowances, bonuses and staff insurance. The total amount for this item is €1,804k.

Deferred charges and accrued income

This item mainly comprises accrued charges totalling €274k.

Income statement

In thousands €	2021	2020
Service fees	24,563.8	19,423.7
Other operating income	1,164.7	665.9
Operating income	**25,728.5**	**20,089.6**
Services and other goods	(11,115.9)	(7,448.6)
Personnel expenses	(9,392.9)	(8,368.2)
Depreciation	(4,050.0)	(3,347.9)
Other operating expenses	0.0	0.0
Operating expenses	**(24,558.8)**	**(19,164.7)**
Operating income	**1,169.7**	**924.9**
Financial result	0.0	0.1
Financial charges	(37.6)	(37.4)
Taxes	**(403.7)**	**(341.6)**
Net result	**728.4**	**546.0**

Operating income

In thousands €	2021	2020
Service fees	24,563.8	19,423.7
Other operating income	1,164.7	665.9
Total	**25,728.5**	**20,089.6**

The service fees relate to a number of analysis services for the grid, as described in chapters 3.2 to 3.7 of this annual report and are based on the "cost-plus" mechanism (operational service fees).

Other operating income mainly includes withholding tax rebates in 2021 and the reinvoicing of expenses following activities as part of cooperation with its German counterpart.

Services and other goods

Services and other goods totalled €11,116k for 2021 (€7,449k in 2020) and relate mainly to the costs of IT maintenance and consultants and rents. The increase is due to the increased activities of Coreso.

Personnel expenses

Remuneration and social security costs are broken down as follows:

In thousands €	2021	2020
Remuneration	7,058.2	6,317.6
Social security & pension funds costs	2,176.3	1,958.8
Other expenses	158.4	91.8
Total	**9,392.9**	**8,368.2**

The increase is mainly due to the increase in full-time equivalents (+10 FTE in 2021).

Depreciation

Depreciation of property, plant and equipment totalled €4,050k and is calculated according to the valuation rules approved by the Board of Directors, as indicated in the annual accounts.

Financial income

A net financial charge of €38k was recorded in 2021, mainly due to interest on financial liabilities.

Taxes

Profit before tax amounted to €1,132k. After considering non-deductible expenses and adjustments, Coreso's corporate income tax was €404k in 2021.

Net profit

In 2021, Coreso realised a net profit after tax of €728k.

Profit for the financial year available for appropriation

At the Ordinary General meeting to be held on April 2022, the Board of Directors will propose the following appropriation:

In thousands €	2021	2020
Total recognised income and expenses	728.5	546.0
Profit carried forward from the previous year	2,638.9	2,092.9
Appropriation to the legal reserve	0.0	0.0
Distribution of the dividends	0.0	0.0
Result to be carried forward	**3,367.4**	**2,638.9**

Description of the risks and uncertainties facing the company

Financial risks

Last winter's periods of lockdown and economic downturn were followed by a strong recovery in demand. This has led to a scarcity of raw materials, energy, and human resources. This in turn led to a significant ramp in the price of goods and transport costs, which is having a major impact on the overall inflation rate.

This inflation is having a major financial impact on personnel expenses.

Coreso's financing requirements are being covered by the contributions of its shareholders. To meet its requirements, Coreso prepares a budget and business plan and reviews it in due course with its shareholders, who are also the main beneficiaries of coordination services. In the event of unforeseen financing requirements, Coreso can appeal to its shareholders to pay up extra cash at very short notice.

Since its shareholders are also exposed to inherent financial risks, there is a residual financial risk for Coreso if any of its shareholders default. However, Coreso's residual risk remains very low given the nature of its shareholding.

It should be noted that 2022 will mark an important milestone for Coreso with the launch of a major "CorNet" project in collaboration with another RSC, TSCNET, for the development of a common services platform, a major project both strategically and financially.

Furthermore, from a regulatory point of view, the RSCs are required to review their mode of governance vis-à-vis non-EU countries to limit their influence on the implementation of the European electricity policy. It should be remembered that National Grid is a major longstanding shareholder of Coreso and holds 15.8% of Coreso stocks. Discussions are ongoing to adapt Coreso's governance, while maintaining the presence of National Grid in its shareholding.

Data quality risks

In its role as a coordinator of Transmission System Operators (TSOs), Coreso performs analyses of cross-border electricity flows, advises TSOs on congestion management, and contributes to Security of Supply (SoS) operations. To perform these tasks as effectively as possible, Coreso relies heavily on data from all the TSOs concerned and on this data being complete, validated according to the agreed acceptance criteria, consistent, accurate and delivered on time. Initiatives are underway within ENTSO-E to put in place a structural framework for the provision of harmonised qualitative data by TSOs. Coreso is actively involved in this.

ICT[13] risks

Coreso is also highly dependent on the continuity of its ICT infrastructure to deliver its services in appropriate time.

The management of part of the ICT infrastructure, including software applications and their hosting and data storage, are outsourced to external suppliers and service providers. A single supplier acts as the first line of support for troubleshooting any ICT issues. All contracts with ICT suppliers include long-term support guarantees and maintenance services for all critical ICT components. To improve its performance, Coreso has completed a European call for tenders to renew the service contract for the Maintenance in Operational Condition of its IT infrastructure and services. The transition to this new partner will take place during 2022 and is being carefully prepared.

Seamless redundant systems also ensure continuity of power supply to ICT infrastructure.

Coreso takes appropriate measures to revise, update and back up its ICT processes, hardware, software and network protection (for example, failover mechanisms) on an ongoing basis to the maximum extent permitted by technical and financial considerations.

As part of the continuous improvement effort pursued by Coreso, the implementation of an information security management system (ISMS) was initiated in order to manage aspects relating to information security in IT operational activities, and in particular to control cyber risks.

Data security

Coreso collects and stores sensitive data, its own business data and that of its business partners. Coreso is subject to several privacy and data protection rules and regulations, including, as of May 25 2019, the General Data Protection Regulation (EU Regulation 2016/679 of April 27, 2016). In addition to this, Coreso endeavours to comply with the rules associated with the ISO 27001 standard. Despite all precautions taken, it is not possible to rule out all the risks of important system hardware and software failures, failure of compliance processes, computer viruses, malware, cyber-attacks, accidents or security breaches.

Any such events could impair the ability of Coreso to provide all or part of its services and may result in a breach of its legal and/or contractual obligations. This could, in turn, result in legal claims or proceedings, questioning of the contractual liability, of the liability under any other data protection laws, criminal, civil and/or administrative sanctions, disruption to the operations of Coreso, or damage to the reputation of Coreso, and could, in general, adversely impact Coreso's activities.

Coreso continuously adapts its processes, with a focus on increased resilience. Coreso also puts in place new processes to ensure compliance.

[13]Information and Communication Technologies.

HR risks

Coreso's strength lies in the quality of its personnel. In this area, the company is exposed to various risks, including risks arising from the inadequacy of skill sets, the constraints associated with the shifts of work teams inherent in its monitoring activities, and staff turnover.

Coreso relies on the pool of experts provided by its shareholders to fill any sudden gaps in human resources and has drawn up plans for joint training with the engineers employed by its TSOs.

In addition, Coreso has started an analysis to determine which skills are missing within Coreso to enable it to establish priorities for future recruitment. Required skillsets vary from purely operational knowledge and specialisations to general project management profiles with financial know-how. To meet future challenges, Coreso will maintain the quality of its staff when hiring new personnel by maintaining a good balance between direct recruitment and recruitment via shareholders in order to preserve the stability and expertise of shareholders.

Due to a change in the regime, applicable from 1 January 2022 to expatriates, the opportunities for using this status for staff coming from abroad seem more limited than in the past. Previously, Coreso could request the application of the expatriate regime for a significant portion of staff coming from abroad. From 2022, the conditions are stricter than before, excluding a significant proportion of staff and including only senior managers. As a result, Coreso is losing a major asset for recruiting foreign executives and experts. Coreso must review the balance between direct recruitment and recruitment via shareholders. Coreso risks facing significant turnover of its staff and therefore risks losing a lot of knowledge and expertise. Analysis is ongoing to mitigate this risk and to assess the compensatory measures that could be offered to affected employees.

Pandemic risk (COVID-19)

Coreso has been affected by the COVID-19 pandemic. This had an impact on its ability to carry out its activities. However, Coreso succeeded in minimising the impact of this crisis.

2021 was characterised by the development of the vaccine and the roll out of the vaccination campaign.

Business continuity plans are up to date. These include resilience planning for critical functions. For its activities, Coreso has promoted the use of teleworking for the administrative functions. Coreso has also integrated health-related measures for its personnel whose presence is required in the office to assure its mission.

Regulatory risks

The growth in international electricity exchanges following the liberalisation of the European electricity market, combined with the need to ensure overall security of supply in Europe, led to a need for increased cooperation and coordination among European TSOs and the creation of the RSCs.

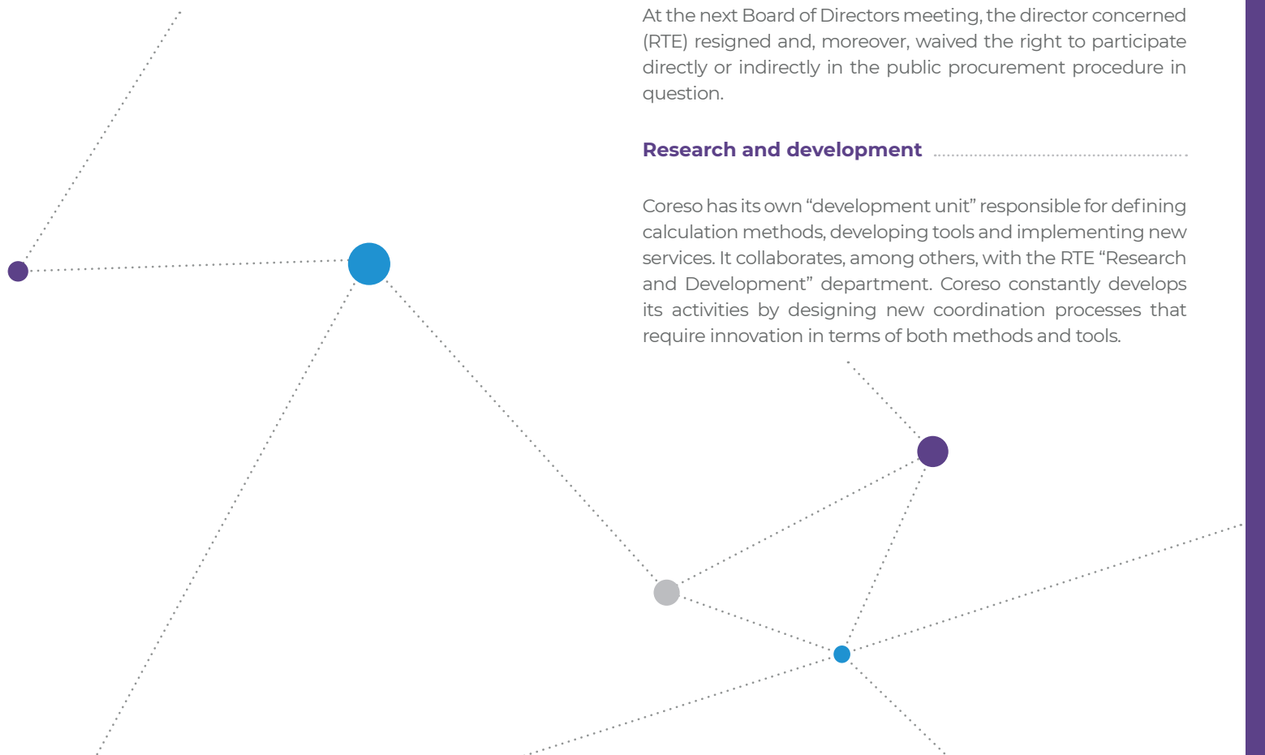
The need for greater coordination is now widely acknowledged. In fact, coordination between TSOs is now enshrined in EU legislation (Network Codes and "Clean Energy" package adopted in 2020). The roles and responsibilities of TSOs and CSRs are defined in these EU regulations.

In 2020, Coreso and other RSCs proactively collaborated with TSOs to design and build appropriate solutions to propose the operational details and methodologies for new RSC activities. TSOs are responsible for proposing these operational solutions and methodologies for RSC activities to the national regulators for approval. The uncertainties around the approval deadlines and the precise definition of the methodologies, may significantly impact Coreso's roadmap and implementation schedule.

Unplanned and/or inconvenient changes or misinterpretations in regulatory or policy mechanisms could conflict with Coreso's existing and envisioned strategy causing financial and organisational impacts.

Other risks

Coreso realises that there may be other risks of which the company is unaware, or that risks currently deemed negligible may become more significant in the future.



Conflict of interest

On 14 September 2021, the Company's Board of Directors approved the product policy drawn up as part of the call for tenders launched by the Company under the "CorNet" programme. A director declared that he may have a conflict of interest, within the meaning of Article 7:96 of the Belgian Companies Code, regarding this decision.

In the minutes of the meeting, the Board of Directors described the nature of the decision, and the financial consequences for the company and justified the decision taken as follows:

"After deliberating and considering that application of the CorNet Product Policy allows for implementation of the procurement linked to the CorNet Programme and is therefore in the interest of the Company, and considering, moreover, that its implementation is in line with its corporate object, the Company's Board of Directors unanimously approved the CorNet Product Policy, attached to this document in Annex 3, it being understood that RTE, which may have a potential conflict of interest with regard to this decision, did not take part in the deliberations of the Board of Directors or in the vote on this item on the agenda and that Olivier Arrivé abstained from voting.

The Board of Directors also noted that the aforementioned decision currently has no financial consequences for the Company. However, the awarding decision and the conclusion of the procurement contract(s) resulting from the procurement procedure under the CorNet Programme will have financial consequences for the Company, namely the payment of services, as provided for in the procurement contract(s) that will be concluded after the awarding of the tender. These financial consequences will be validated through the budget approval process."

At the next Board of Directors meeting, the director concerned (RTE) resigned and, moreover, waived the right to participate directly or indirectly in the public procurement procedure in question.

Research and development

Coreso has its own "development unit" responsible for defining calculation methods, developing tools and implementing new services. It collaborates, among others, with the RTE "Research and Development" department. Coreso constantly develops its activities by designing new coordination processes that require innovation in terms of both methods and tools.

Glossary

50Hertz: One of the German TSOs.
Visit the website at **www.50hertz.com**

ACER: Agency for Cooperation of Energy Regulators.
Visit the website at **www.acer.europa.eu**

AoA: Articles of Association.

ASC: Application Security Centre.

ATC: Available Transfer Capacity.

Baltic RSC: The RSC of the Baltic region.
Visit the website at **www.baltic-rsc.eu**

BMA: Boundary data Management Application.

BoD: Board of Directors.

C&CCA: Cooperation & Cost Contribution Agreement.

CACM: Capacity Allocation and Congestion Management.

CC: Capacity Calculation.

CCC: Coordinated Capacity Calculation.

CCM: Capacity Calculation Methodology.

CCR: Capacity Calculation Region.

CEP: Clean Energy Package.
Visit the website at **www.entsoe.eu/cep/**

CGM: Common Grid Model.

CGMA: Common Grid Model Alignment.

CGMES: Common Grid Model Exchange Standard.

CGS: Critical Grid Situation.

CNEC: Critical Network Element and Contingency.

CSA: Coordinated Security Analysis.

CWE: Central Western Europe.

DA: Day-Ahead.

DACF: Day-Ahead Congestion Forecast.

EirGrid: The Irish TSO.
Visit the website at **www.eirgridgroup.com**

Elia: The Belgian TSO.
Visit the website at **www.elia.be**

ENTSO-E: European Network of Transmission System Operators for Electricity.
Visit the website at **www.entsoe.eu**

FB: Flow-Based.

FCA: Forward Capacity Allocation.

HVDC: High-Voltage Direct Current.

ICS: Improved Coordination Solution.

ID: IntraDay.

IDCF: IntraDay Congestion Forecast.

IGM: Individual Grid Model.

IN: Italy North.

ISMS: Information Security Management System.

IU: Ireland - United Kingdom.

JAO: Joint Allocation Office.
Visit the website at **www.jao.eu**

KPI: Key Performance Indicator.

L&D: Learning & Development.

LT: Long-Term.

MA: Month-Ahead.

MSP: Managed Service Provider.

NGESO: National Grid Electricy System Operator.
The United Kingdom TSO.
Visit the website at **www.nationalgrideso.com**

NPF: Net Position Forecast.

NRA: National Regulatory Authority.

NTC: Net Transfer Capacity.

Nordic RSC: The Nordic region RSC.
Visit the website at **www.nordic-rsc.net**

OPC: Outage Planning Coordination.

OPDE: Operational Planning Data Environment.

OPDM: Operational Planning Data Management.

OPI: Outage Planning Incompatibilities.

Pan-EU: Pan-European.

PCN: Physical Communication Network.

PEA: Post Event Analysis.

PEVF: Pan-European Verification Function.

PTDF: Power Transfer Distribution Factor.

RA: Remedial Action.

RAO: Remedial Action Optimizer.

RAOC: Relevant Asset Outage Coordination.

RCC: Regional Coordination Centre.

REE: Red Eléctrica de España.
The Spanish TSO.
Visit the website at **www.ree.es**

REN: Redes Energéticas Nacionais.
The Portuguese TSO.
Visit the website at **www.ren.pt**

ROSC: Regional Operational Security Coordination.

RSC: Regional Security Coordinator.

RTE : Réseau de Transport d'Électricité.
The French TSO.
Visit the website at **www.rte-france.com**

SA: Security Analysis.

SEleNe CC: The Southeast Electricity Network Coordination Center RSC based in Thessaloniki.

SCC: Security Coordination Center.
The South Eastern European region RSC.
Visit the website at **www.scc-rsci.com**

SOC: System Operation Committee.

SOGL: System Operation Guidelines.

SONI: System Operator of Northern Ireland.
The Northern Ireland TSO.
Visit the website at **www.soni.ltd.uk**

SOR: System Operation Regions.

STA: Short-Term Adequacy.

SWE: South Western Europe.

Terna: The Italian TSO.
Visit the website at **www.terna.it**

TLI: Tie-Lines Inconsistencies.

TSCNET Services: The Munich-based RSC.
Visit the website at **www.tscnet.eu**

ToR: Terms of Reference.

TP: (ENTSO-E) Transparency platform.

TSO: Transmission System Operator.

UCT Def: UCT Data Exchange Format.

WA: Week-Ahead.

WOPT: Weekly Outage Planning Teleconference.

YA: Year-Ahead.

YOPT: Yearly Outage Planning Teleconference.

ZG: Zurich Group.

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