



coresg

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

Yearly Operational Review 2019

Interconnected Europe and Green Transition: Six Regional Security Coordinators working together to coordinate electricity flows for all European Transmission System Operators.

By intervening from one year ahead to a few hours before dispatch, constituting common grid models, providing proactive analyses guaranteeing a more effective management of electricity exchanges and forecasting tense situations. The overview presented by Regional Security Coordinators enhances the Transmission System Operators vision and offers an invaluable layer of system security towards all European energy consumers.

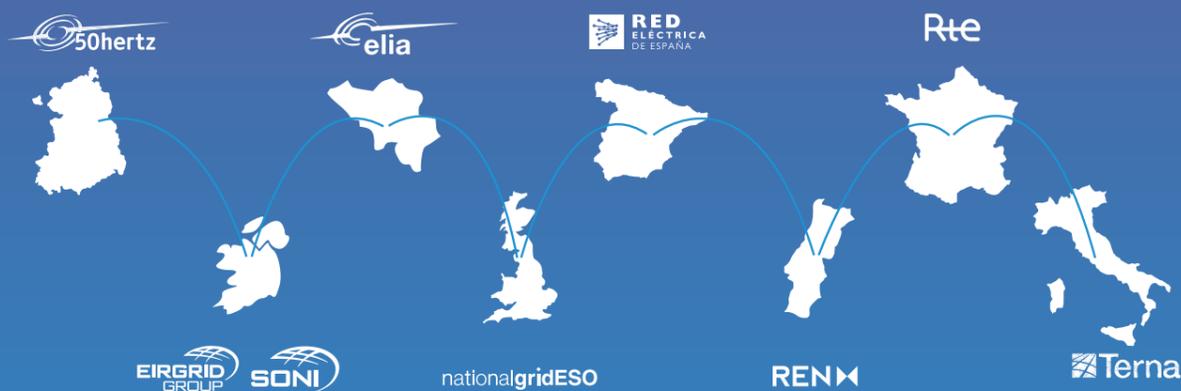
Regional Security Coordinators (RSCs) are service providers to Transmission System Operators (TSOs). They develop their service provisions to make the grid operational coordinated activities more efficient. They perform analyses, propose solutions and coordinate agreements to proactively deal with constraints.

RSCs provide recommendations through complementary activities (not redundant with TSOs activities) offering a real opportunity to mitigate the risks that TSOs face.

EDITORIAL

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Dear Reader,

The need for regional coordination of Transmission System Operators on a European scale is now recognised.

The increasing contribution of intermittent renewable energy sources combined with the increase in market-based cross-border flows is making physical flows much more difficult to predict while electricity flows can go from Finland to Portugal. Consequently, TSOs have recognised an increased need for more coordination and thus for Regional Cooperation.

Coreso (CooRdination of Electricity System Operators) is one of the six Regional Security Coordinators (RSCs). In coordination with the other RSCs, its mission consists in coordinating electricity flows in Europe for all TSOs. From two shareholders and six staff members in early 2009, Coreso grew to nine shareholders and 85 experts by the end of 2019. Coreso is a multicultural workplace employing people recognized for their expertise, commitment and efficiency.

2019 may have been one of the most demanding years in our young history due to the many changes that took place to improve our business efficiency. All levels of the company have been faced with the challenges encountered in 2019. Indeed, as we are all aware of growing expectations, we worked hard on the efficient implementation of our service provision:

- New processes were launched in 3 different European regions and for different timeframes.
- Significant progress in major projects related to the implementation of mandatory services (Common Grid Model, Coordinated Security Analysis, Coordinated Capacity Calculation, Short-Term Adequacy, Outage Planning Coordination, Emergency and Restoration) or linked to the standardisation of our activities.
- Initiation of numerous internal projects to enhance daily operations.
- In cooperation with other RSCs, the "RSCs Working Table" organisation was improved by implementing an external PMO and a closer collaboration with the ENTSO-E RSC Project.

Coreso and its staff are at the forefront of upcoming challenges and will therefore seize the unique opportunity to participate in the creation of relevant processes and structures to support European TSOs.

2020 will certainly be a year which will mark and reinforce the durability of Regional Coordination activities since major milestones will have to be reached to fully develop the mandatory services.

This annual report presents our main achievements in 2019. We hope you will find the information useful and enjoy reading it!

Jean-François Gahungu
CEO

Coreso is appointed Coordinated Capacity Calculator for Core region and South-Western Europe.

On 15 April 2019, Coreso and TSCNET Services GmbH were nominated as Coordinated Capacity Calculator (CCC) for Core Capacity Calculations Region (CCR).
On 19 June 2019, Coreso was nominated as CCC for SWE CCR.



"Given the size and the complexity of the Core region, a strong and efficient cooperation between Coreso and TSCNET Services GmbH is a key success factor for the proper functioning of European electricity markets. In this respect, the nomination of both RSC's as coordinated capacity calculators is yet another important step forward. I'm confident that our RSC's will continue their positive contribution to our challenges as they will evolve and grow further in the coming years.."

Filip Carton, Head of National Control Centre at Elia

"REN is a Coreso shareholder since November 2015. From 2016, in the SWE region, we have been developing detailed methodologies, in close technical cooperation with REN, REE, RTE and Coreso, for the Regional Security Coordinators functions applicable to our region. In 2018, the "day ahead Capacity Calculation methodology" was approved by SWE National Regulatory Authorities (NRA). The nomination of Coreso as the official capacity calculator for SWE is the last logical step of this process. Everything is being prepared to successfully "go live" with the new calculation process at the start of 2020. That will be an important milestone to commemorate.



Albino Marques, Head of Electricity System Operator at REN

"The appointment by the 15 TSOs of the Core region of Coreso, together with TSCNET Services GmbH, as Capacity Calculation Coordinator (CCC) of the widest CCR in Europe is a clear recognition of the experience and expertise of Coreso in terms of Capacity Calculation processes and tools. It also demonstrates the capacity of Coreso to provide services with added value to TSOs outside of its shareholders community.

Mathieu PIERZO, Head of EU market integration at RTE

New processes in 3 new regions

New services :



April 2019 - South Western Europe (SWE) Security Analysis (SA)

November 2019 : Italy North IntraDay (ID) Capacity Calculation (CC)

December 2019 : National Grid ESO (NGESO) SA (CC)

EISec 2019 in Copenhagen

On 8 October, Nordic RSC hosted the RSC Conference together with ENTSO-E. A strong tradition initiated by TSCNET Services GmbH in 2017 and continued by Coreso in 2018.

"The conference featured 32 speakers during the day and more than 230 people participated from the fields of industry, policy and academia. This allowed for inspirational and thought-provoking input into speeches and panels as well as lively discussions in the parallel sessions during the afternoon. The mix of plenary and parallel sessions gave participants the opportunity to dive deeply into topics of their choice and interact. Thanks to the speakers, participants and in particular to ENTSO-E and RSCs for all the support in planning this successful event, and we look forward to the next one in Tallinn in 2020. Did you miss the conference? Don't worry, we recorded it for you!"

Recordings, slides and conclusions from parallel sessions can be found on the conference website: <https://rsc-conference.com/material/>

Louise Nøhr Strange Nørring, Business Analyst, Nordic RSC



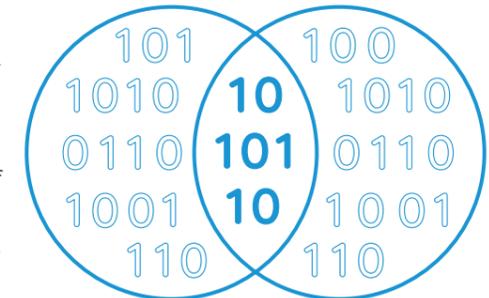
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OCT

CGMES: November 2019 milestone

"During 2019, several key milestones were achieved. In addition to completing the roll of Batch 1 for the Physical Communication Network (where TenneT-G, TenneT-NL, 50 Hertz, PSE and CEPS were connected to an Operational Planning Data Environment (OPDE) connectivity layer that allows secure communication), the Common Grid Model (CGM) ICT delivery team also delivered Release 1.2 which included upgrades to the platform and a new Acceptance Environment. This made it possible for TSOs and RSCs to run a Basic CGM Build Process which was successfully tested in November 2019. Progress was achieved based on business requirements for several key business applications, engagement with TSOs in IOP testing increased and work on standards & rules for data exchange continues. The Programme will continue to enable a transition from a Basic to a Full CGM Build Process for TSOs and RSCs, finalising business requirements and ICT delivery of upgrades and the roll-out of the Physical Communications Network."

Common Grid Model (CGM) programme director Derek Lawler (ENTSO-E)

NOV
2019



Organization of the TWEET#4 by Coreso

27
JUN

28
JUN

This year, on 27 and 28 June 2019, Coreso organized and welcomed the 4th edition of the TWEET: TWEET stands for Tournament and Workshop of European Electricity Transportation at Brussels. This was a good opportunity to bring together Transmission System Operators (TSOs) and Regional Security Coordinators (RSCs) to discuss current and future challenges and share a convivial moment on the field. This event took place on Thursday and Friday. After the football tournament, won by RTE Lille (congratulations!), participants attended a presentation about European challenges. This event ended with a visit of the European Commission.

"I would like to very warmly thank Coreso for, on the one hand, continuing this now customary inter-TSO tournament and, on the other hand, for giving it a nickname: Tweet! The organisation and hosting were just perfect, and the pressure is on RTE now because Tweet 4 has set the bar high and Tweet 5 will have to be even better in Paris in June 2020."

Khalid Abdallaoui, RTE commercial director -
- Tweet 4 participant (and one of the organisers
of the first TWEET edition)

"The launch of the name TWEET by Coreso was the forerunner of a well-organised and planned tournament with interesting workshops, visits and a new football formula, indoor with boarding! Finally, to end TWEET#4, we were invited to the European Commission and had dinner at one of the famous landmarks of Brussels, the Atomium! Coreso really sets the standard high for the next TWEET#5..."

Tom Luyts, Insurance Department - Elia



Clean Energy package

The Clean Energy Package (CEP) came into force on 5 July 2019. It requires Regional Coordination Centers (RCCs) to be built on the positive experience of RSCs. Under the CEP, the standard RSC services will be transferred to RCCs. The services that TSOs will identify in the future as necessary for regional coordination - such as the management of critical grid situations - and new tasks identified in the CEP will also become part of the RCCs' portfolio, while other tasks mentioned in the CEP will only be part of the RCCs' portfolio if delegated by the TSOs.

5
JUL

Did you know ?

From RSC to RCC, July 2022

RSCs will evolve into RCCs by mid-2022 as per the CEP. This implies a series of evolutions regarding organisation, governance rules and procedures.

ENTSO-E

to get more information about CEP:
www.entsoe.eu/cep/

EU Commission

<https://ec.europa.eu/energy/en/topics/energy-strategy/clean-energy-all-europeans>



Coreso transformation process

PMO Implementation

Key milestones achieved in 2019 in the PMO implementation (Portfolio Management):

- Co-development, with the support of a consultant expert, of a methodology specifically adapted to **Regional Security Coordinators (RSCs)** to manage project life cycle, allocate resources and prioritise projects
- Implementation of an improved reporting and dashboard process
- Implementation of an internal project steering comitology to follow and make the right decisions, make arbitrations and facilitate the prioritisation of projects



Prevention at Coreso

(Belgian law from 4 August 1996 related to well-being at work)

The Risks Analysis carried out in **May 2019** led to the building of the **Yearly Action Plan and the Global Prevention Plan**. Coreso is eager to fulfil legal requirements in terms of risk prevention at work. Moreover, the Health Assessment process for shift workers was initiated.

Training at Coreso

A structured **Operational Training Team** was **set up in 2019**. Main achievement was the launch of actions dedicated to the professionalization of operators through trainings "Train the Trainer" & "Shift Leader".



Operations Department Reorganisation

Since the creation of Coreso, Operations Engineer's missions (Operations back-office Support) have considerably accumulated (shift planning, training organisation, procedure validation, debugging tools, monitoring of process quality, etc.). As a result, the continuous growth of Coreso and its operational activities has required a structural reorganisation of the roles, responsibilities and missions of the Operations Engineer.

In **2018**, we split operators into **2 teams** and introduced the **shift leader role (team B)**.

- **Team A** focused on D-1 / Outage Planning Coordination / Short-Term Adequacy
- **Team B** focused on Capacity Calculation / IntraDay activities

The development continued into **2019** with

1. The introduction of **new middle management functions**

Team Leader A and Team Leader B

Training team
(including Prevention Adviser)

Operational Process Manager (OPM)

2. The creation of the Operation Staff Support (OSS team) representing the combination of **Operational Duty team and Daily Run team** (operations support during office hours)

Did you know ?

The main mission of the **OPM function** is to ensure **the continuity and the quality of the processes and services we deliver to our stakeholders.**

- OPM manages the current as well as the prospective execution of the tasks in the coordination room.
- OPM also ensures proper coherency between service development and what will be applied in operations.
- OPM represents an important interface between operational business needs and IT solutions.



New organisation for the Service Development

Service Manager functions were implemented to manage end-to-end services and reinforce transversal interactions:

- Capacity Calculation-related services
- Coordinated Security Analysis-related services (including redispatching and countertrading)
- CGM Services & Common Information Model (CIM) Standard
- Pan European services as STA, OPC, Risk Awareness, Emergency & Restoration, ...

The team is also supported by a Power System Optimisation Expert who oversees "Power System Optimisation Methods" such as Remedial action optimisation, Net Position Forecasting, Base Case Improvement, etc.



First end-to-end budget process with involvement of middle managers

Different roadmaps to implement the mandatory services related to the Network Codes and the CEP (Clean Energy Package) were established and the business needs for 2020 within the departments (Operations, Service Development and IT) have been listed. This exercise has been vital to estimate the resource requirements for our 2020 goals.

Expansion of our premises

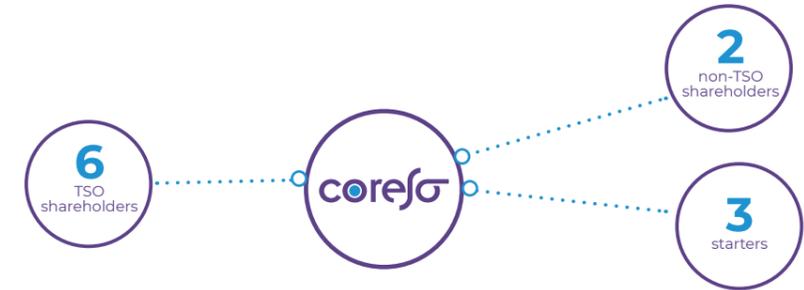
Coreso is growing. Therefore, we needed additional space to accommodate all employees. The expansion project started **in November 2018 and ended on 7 October 2019** with the provision of open spaces, meeting rooms and a brand new cafeteria. Feedback regarding moving to the 2nd floor: *“Generally, I feel the transformation to the 2nd floor has been a success. It has a nice look and feel to it and it is quite roomy.”*

“I feel the transformation to the 2nd floor has been a success...”



Trained operators

This year, eleven operators joined Coreso from various origins (six Coreso TSO shareholders, two non-TSO shareholders and three starters). All of them took part in a five-month course.



Key Figures from the Security Analysis Service Across Regions

	D-1 Stress Level CWE	D-1 Stress Level CEE	D-1 Stress Level Italy North	D-1 Stress Level SWE
GREEN No critical constraints	177	314	145	108
ORANGE Stressed situation or coordination necessary	154	44	168	92
RED Stressed situation and close coordination necessary	33	6	51	79
Estimated number of coordinated Remedial Actions (RAs)	935	100	1095	1026

More information about Remedial Actions in the chapter “Service 2 CSA”

- Channel
- SWE
- CWE
- Core
- Italy North



Technical Complexity

More than 5 terabytes of information passed through our data pipelines.

40 x W

the current total size of the English Wikipedia

More than 3 million files were processed.

100 x

the number of artworks on display at the Louvre

More than 400 devices support these pipelines.

A network as complex as

the subway system in New York City

Number of Running Processes

In 2019, Coreso managed to run a certain number of service processes in the following Capacity Calculations Regions or on the PAN European level.

SA (Security Analysis)*	CC (Capacity Calculation)	OPC (Outage Planning Coordination)	STA (Short-Term Adequacy)
D-1 CWE/CEE	DA CWE	Week-Ahead	Week-Ahead
D-1 Italy North	DA Italy North	Month-Ahead	
D-1 SWE	DA SWE**	Year-Ahead	
D-1 NGESO**	ID Italy North		
ID CWE	ID CWE potential capacity increase		
ID Italy North			

* SA vs CSA: Since 2009, the SA services in Coreso have been set up bilaterally with the TSO shareholders. With the implementation of the CSA program, the SA services will gradually evolve onto the SOGL compliant CSA service.
** Process using a CGMES format model

DA/D-1: Day-Ahead - ID: IntraDay

Volume of Renewable Energy in some European countries

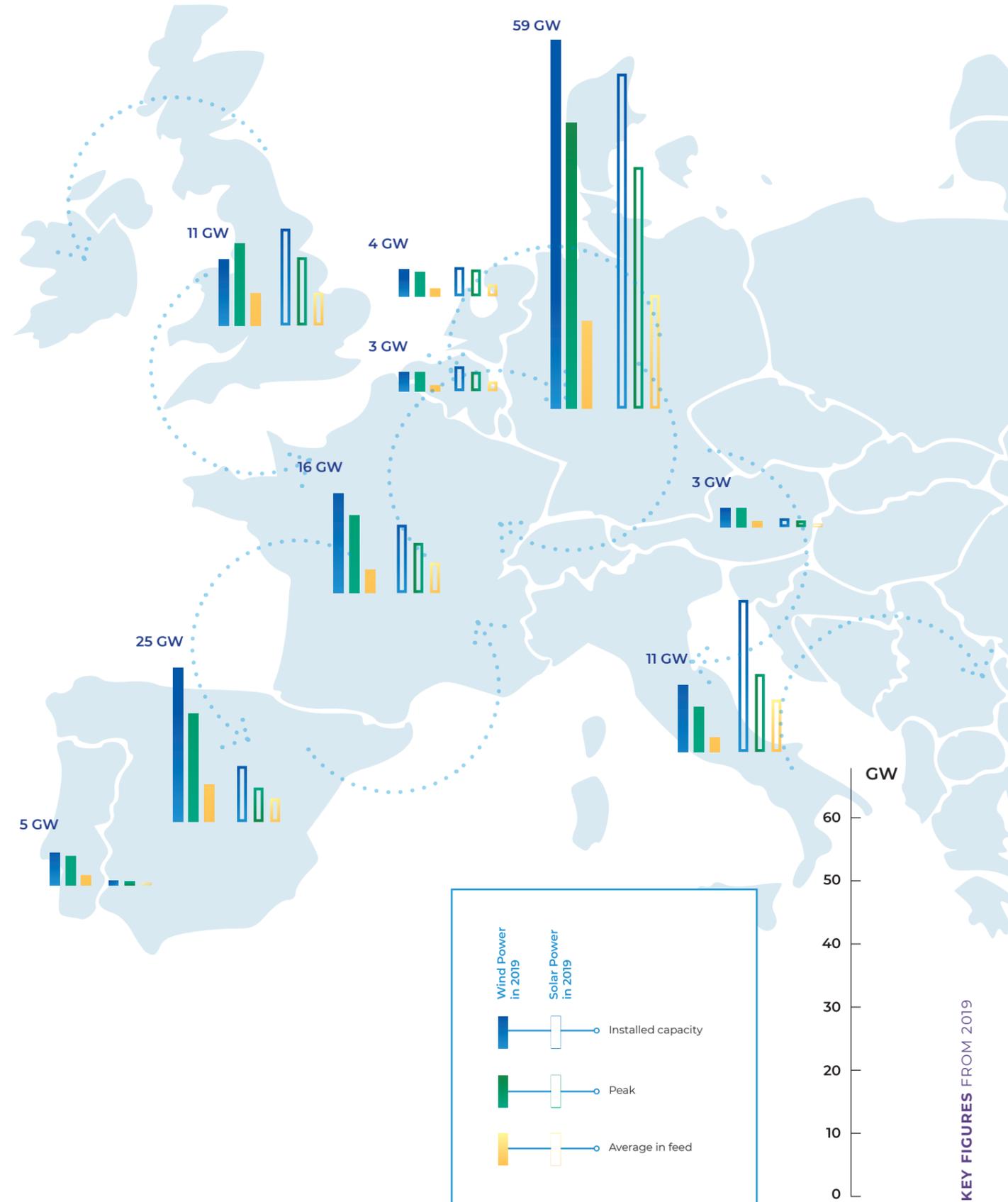
Wind Power in 2019

Country	Installed Wind Potential	Wind peak	Date	Average in feed
DE	59 GW	46 GW	04/03/19 1 p.m.	14 GW
NL	4 GW	4 GW	08/02/19 10 p.m.	1 GW
BE	3 GW	3 GW	08/12/19 9 a.m.	1 GW
FR	16 GW	12 GW	09/12/19 3 a.m.	4 GW
AT	3 GW	3 GW	02/01/19 1 p.m.	1 GW
IT	11 GW	7 GW	22/12/19 5 p.m.	2 GW
UK	11 GW	13 GW	08/12/19 12:00	5 GW
ES	25 GW	17 GW	03/11/19 3 p.m.	6 GW
PT	5 GW	5 GW	14/11/19 4 p.m.	2 GW

Solar Power in 2019

Country	Installed Solar Potential	Solar peak	Date	Average in feed
DE	45 GW	33 GW	21/04/19 1 p.m.	15 GW
NL	4 GW	4 GW	21/09/19 1 p.m.	2 GW
BE	3 GW	3 GW	20/04/19 1 p.m.	1 GW
FR	9 GW	7 GW	13/05/19 2 p.m.	4 GW
AT	1 GW	1 GW	28/06/19 1 p.m.	0,5 GW
IT	21 GW	11 GW	27/04/19 1 p.m.	7 GW
UK	13 GW	9 GW	21/04/19 2 p.m.	4 GW
ES	8 GW	5 GW	16/08/19 2 p.m.	3 GW
PT	0,6 GW	0,5 GW	20/03/19 2 p.m.	0,5 GW

Volume of Renewable Energy in some European countries



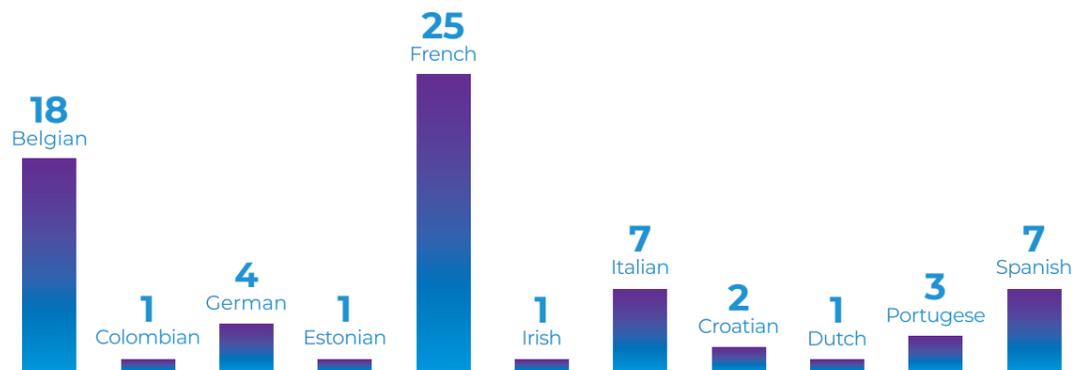
Disclaimer: The data displayed concerns renewable production forecasts and may be prone to forecasting errors, it only serves as an indication.

Increase Employees and Internships

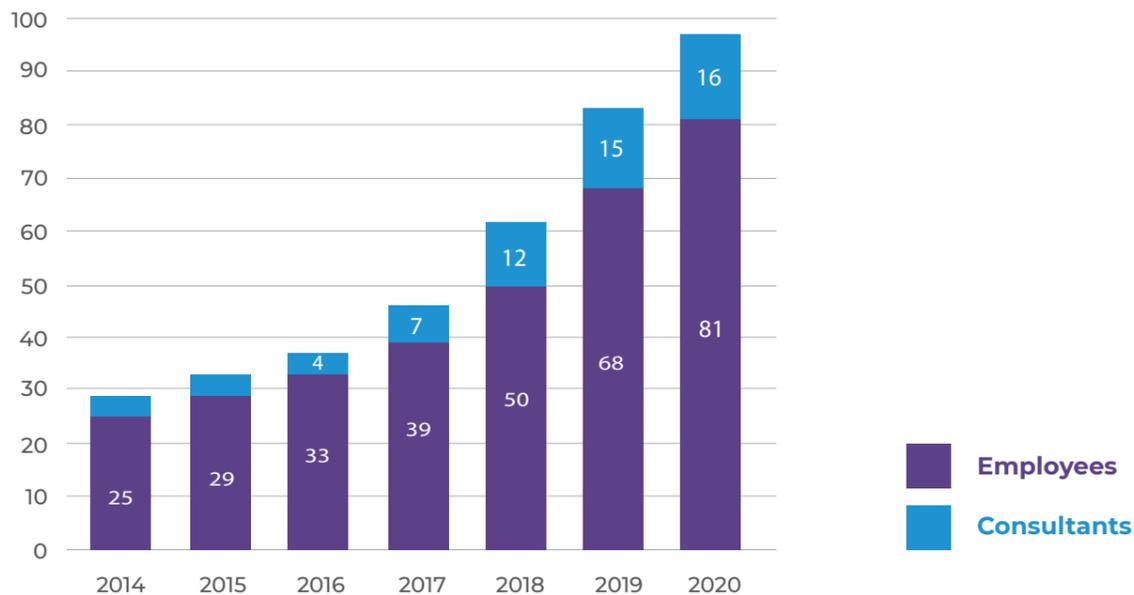
End of 2018: 50 internal employees
End of 2019: 68 internal employees — An increase of **18** people.

In 2019, Coreso welcomed and helped 12 interns to develop within our different services. Internship candidates mainly come from abroad given that they usually have the obligation to carry out an internship in an EU country as part of their studies. As a result, most of our interns come to Coreso after having completed an internship at one of our shareholders. In total, we had around 39 months of internships in 2019.

Number of Nationalities in Coreso in 2019



Number of New Employees / Number of Consultants



Number of Hours for Operator Activities

2018: 28,690 hours
2019: 33,538 hours — This is a **14.5%** increase from 2018.

This can be explained by the growth in operational activities.

Regulation and Compliance in Europe

Background

The power system security was the trigger for Elia and RTE to set up Coreso in 2008. Over time, it has become essential not only to contribute in ensuring operational security, but also to ensure market needs are met. Indeed, "as markets and operations are getting closer by the day: electricity is traded closer to real time, markets are more volatile, generation is more variable, and cross border and long-distance transmissions are on the rise. This calls for tightening the ties between markets and physics to guarantee a high level of supply security for Europeans."¹

The year 2019 marked a decade of enhancing the regional coordination of European Transmission System Operators (TSOs). From voluntary initiatives such as Regional Security Coordinator Initiatives (RSCIs) to mandatory Regional Security Coordinators (RSCs) and later to a regulated Regional Coordination Centers (RCCs), the regional security coordination (RSC) has become a key role in the European energy landscape.

The Role of EU Legislations

European legislation amplifies the evolution of RSCs' role. The Third Energy Package including the network codes set-up in the first regulatory framework of the mandatory services to be provided by RSCs: Common Grid Model (CGM), Coordinated Security Analysis (CSA), Outage Planning Coordination (OPC), Short Term Adequacy forecast (STA), and Coordinated Capacity Calculation (CCC). There is also a service for organisational support which is the Consistency Check of TSOs' System Defense and Restoration Plans.

The "5+" services requested by the Network Codes and TSOs will be delivered in different timeframes. Furthermore, TSO regional coordination in system operations and markets is organised by around ten Capacity Calculation Regions (CCRs), five synchronous areas (SAs) as well as the five Regional Security Coordinators (RSCs). Coreso is involved in five CCRs (Core, SWE, Italy North, Channel and Ireland - United Kingdom (IU)) and three synchronous areas (Ireland, UK and Continental Europe). End of 2019, Coreso is officially appointed as the Coordinated Capacity Calculator (CCC) in two CCRs (Core and SWE).

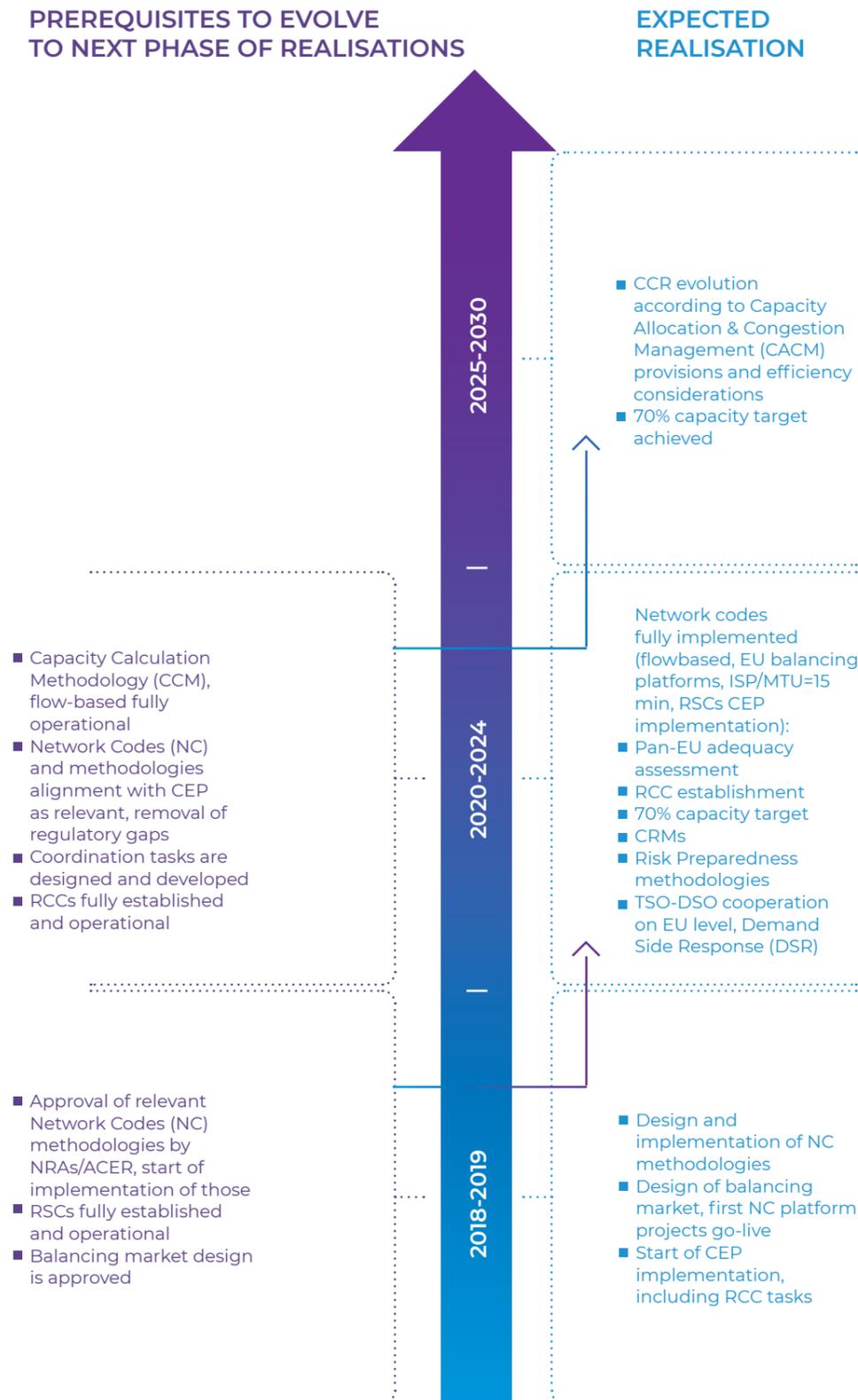
In the CEP framework, RCCs shall provide additional services. The new tasks (services) identified in the CEP will be carried out by RCCs, while other tasks will be carried out by RCCs only if TSOs delegate the tasks to RCCs. ENTSO-E analyses the different tasks that RSCs need to deliver under CEP. Indeed, some of the additional tasks may require the development of methodologies.

Furthermore, TSOs can request additional services from RSCs or RCCs that are not included in the network codes or CEP when they identify future needs such as the management of critical grid situations.

Service	Network code	
CGM delivery	CACM	For Day-Ahead and IntraDay
	SOGL	For Year-Ahead, Week-Ahead and Day-Ahead and IntraDay
Capacity Calculation	FCA	For Long-Term
	CACM	For Day-Ahead and IntraDay
	FCA	For Long-Term
CSA	SOGL	Day-Ahead and IntraDay
OPC	SOGL	Weekly-Ahead, Monthly-Ahead and Yearly-Ahead
STA	SOGL	Weekly-Ahead

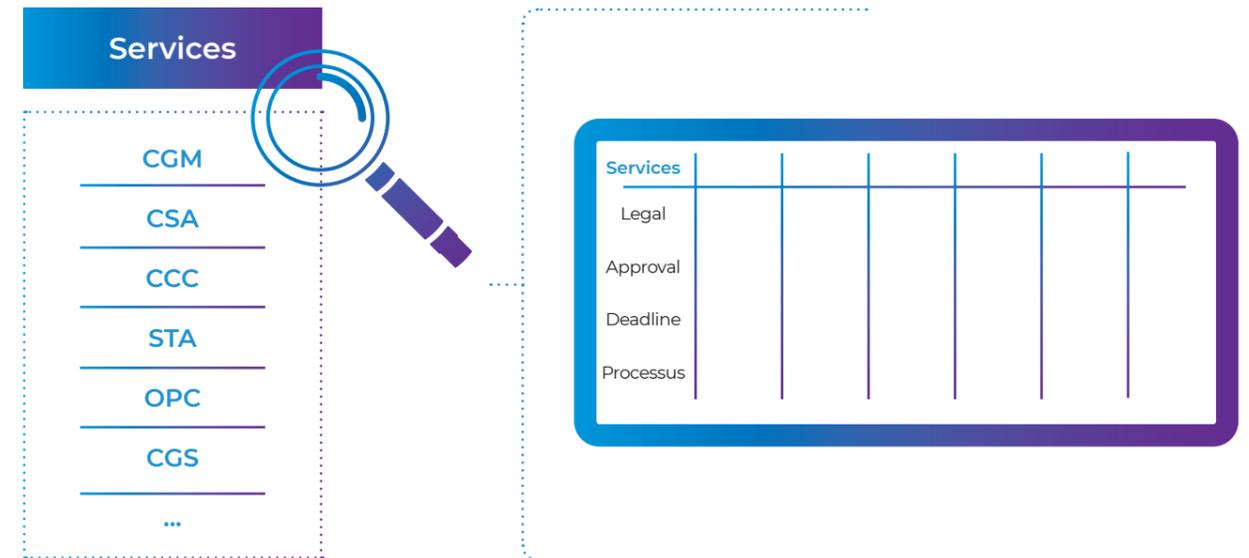
¹ Source: "Enhanced TSO Regional Coordination for Europe Act locally, coordinate regionally, think European", ENTSO-E's report, 2019.

ENTSO-E estimates the implementation of network codes and CEP by RSC in the following timeline.¹



Monitoring the Implementation of Network Codes

In 2019, Coreso initiated the setup of an internal high-level dashboard to monitor the implementation of all mandatory services in accordance with EU regulations.



Clean Energy Package Challenges

Coordinated Actions/Recommendations

Each RCC will have procedures in place to issue coordinated actions/recommendations based on a cooperative approach. Coordinated actions and recommendations are based on the application of the pre-agreed methodologies, terms and conditions that have been developed in Network Codes and Electricity regulation in CEP.



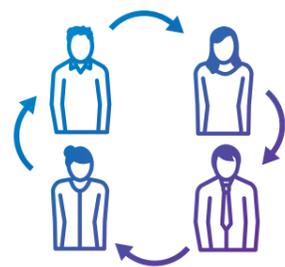
¹"Enhanced TSO Regional Coordination for Europe Act locally, coordinate regionally, think European", ENTSO-E's report, 2019

Collaboration between TSCNET Services GmbH

2019 has been a year where new steps have been taken in the collaboration between TSCNET Services GmbH and Coreso .

Besides the development of services together, such as Italy North IntraDay Capacity Calculation, the cooperation framework has also been put into motion. Several management team joint workshops took place in 2019 with the purpose to build a common plan for service development in 2020.

RSC Working Table set up a “RSC Master Plan” to support the ENTSO-E RSC Project



Strong coordination



Communication cockpit

RSC Working Table aims to ensure alignment between RSCs and provide support to ENTSO-E RSC Project. In 2019, RSC Working Table set up this common plan to coordinate the preparation of specific deliverables (implementation timelines, monitoring of services implementation, technical alignment,...) under ENTSO-E RSC Project.

RSC Master Plan Initiation supported by Umlaut Energy GmbH

“The regional security coordinators (RSCs) Baltic RSC, Coreso, Nordic RSC, SCC and TSCNET Services GmbH are generally young and dynamic organisations situated in an increasingly complex environment affected by multiple existing and new legal requirements coming from European Network Codes as well as the Clean Energy Package.

In 2019, Coreso and other RSCs initiated the so-called RSC Master Plan in order to face common challenges proactively. The RSC Master Plan is a collaborative platform for RSCs to jointly leverage synergies, improving their performance and enlarging their footprint in the regional coordination of European transmission system operations securing a stable and efficient electricity supply.

The RSC Master Plan supports the RSCs’ successful navigation in a complex environment and adds momentum for an efficient and sustainable collaboration together and with their stakeholders. We believe the RSC Master Plan is a valuable platform for the future development of all RSCs and we are proud to have supported this initiation.” –Umlaut Energy GmbH

The Essential Ground Layer for Coordination

An efficient, large-scale exchange of detailed grid data between all European TSOs plays a crucial role in all services provided by RSCs. A dedicated telecommunication network enables TSOs to provide RSCs with their most updated grid data. Then RSCs are in the position to monitor the quality of the data provided and convert it into a unique common grid model. Finally, each RSC uses this model as reference for all services provided and makes it available for all TSOs and other RSCs.

Did you know ?

STEP 1

Each TSO delivers a dataset which includes their best detailed forecasts. This dataset is called “Individual Grid Model”.

STEP 2

Then, the Regional Security Coordinators merge these Individual Grid Models into a Common Grid Model to get an overview of the interconnected European grid.

About the Common Grid Model Exchange Standard (CGMES) programme

The purpose is to define an improved exchange standard capable of integrating a large number of grid details. The exchange standard is combined with the setup of a new infrastructure developed by ENTSO-E to support the massive amount of data exchanged (i.e. the Operational Platform for Data Exchange (OPDE)) .

Role of the Common Grid Model Exchange Standard (CGMES) “Business Lead Manager”

This key role within the CGM programme management team aims to enable the ENTSO-E to run a programme to gain insight into RSC and TSO business activities. It has been fulfilled by Coreso since October 2018.

The Business Lead Manager (BLM) core responsibility is to take ownership of all CGM programme business-related activities, i.e. drafting business requirements as well as the necessary implementation guide that are required to ensure a smooth CGM building process in operations.



Basic CGM Capability Milestone

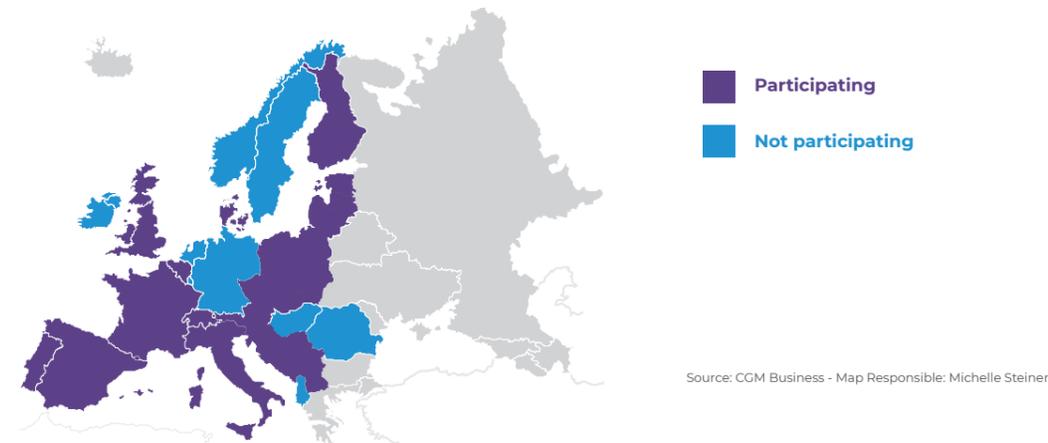
Since September 2019, the ‘Basic CGM Capability’ milestone has been achieved.

This big step forward is mainly about ensuring that the Operational Planning Data Environment (OPDE) platform makes it possible to run the CGM building process based on a minimum set of requirements.

The success of this milestone has been demonstrated in a test that lasted three consecutive days and involved 20+ TSOs and the RSCs. For the TSOs, the purpose of the test was to publish Individual Grid Models (IGM) in the OPDE. For the RSCs, the objective was twofold. At first, it was about downloading and merging those “IGM” into a CGM. Secondly, it was to publish the merged CGM into the OPDE. This first large-scale proof of concept helped us sharpen our understanding of what the full process will look like and identify where there is room for improvement. This proof of concept can be further used to start the implementation of a Common Information Model (CIM) based process.

Basic CGM Build Process - End 2019 status

- Objective to achieve a first D-1 model merge for the 3 days in a row considering alternating current flows on a scope expanding to the largest possible interconnected model inside Europe
- Participation of 22 TSOs and 3 RSCs in the Basic CGM Build test**
- Involvement of the business SPOCs to test and improve the current status of the system and Business Requirement specifications
- TSO engagement and willingness to participate in the 3-days testing was quite high



Common Grid Model Plan

Bearing in mind the achievements of the 'Basic Merge Capability', there are still multiple aspects that need to be improved and implemented to achieve a full CGM building process in operations.

There are two main streams of activities:

- OPDE application** improvement by defining business requirements and key performance indicators.
- Improving Data Quality** by elaborating on an extensive documentation to guide the TSOs and RSCs into providing higher quality input files. Indeed, to reach a level of interoperability regarding IGM and CGM shared among 40+ parties, the latter must be compliant with an agreed set of rules.

The core objective for 2020 is to prepare the necessary material so that a trial period can start in 2021.

CGM programme timeline:



From a TSO/RSC perspective, work will be ongoing to implement the required changes into the various tools so that proper data can be entered into the OPDE as of 2021 and onwards.

With regards to the Common Information Model (CIM) based processes implementation, from a Coreso perspective, the option would be to implement these processes or services straight away based on the CIM format data for any project having major delivery milestones in 2021 and onwards. Indeed, this approach would lower the overall costs compared to a multiple step implementation based initially on the UCT format data and a migration of this process to rely on CIM-based data.

Operational Services

Service 2 : Coordinated Security Analysis

Identifying Operational Risks and Coordinating Solutions

Grid incidents in one area may have major consequences for neighbouring zones, requiring TSOs to regionally coordinate the security calculations.



Coordinated Security Analysis (CSA) Methodologies (SOGL 76)

The CSA methodologies (SOGL 76) were submitted to NRAs in December 2019. Coreso advised its shareholders in Core, Italy North, Channel, SWE and Ireland-UK. Besides the key topics between the regions and the ENTSO-E RSC Project, Coreso anticipated operational risks and provided technical insights into complex regulatory topics, such as the Inter CCR, Inter RSC and Allocation of Tasks.

The SOGL 76 methodologies will enable the evolution of the current Security Analysis process onto the Coordinated Security Analysis service, as shown in "CSA Programme: Towards an EU European Wide Operational Coordination".

SA to CSA Evolution

In 2019, Coreso was able to provide D-1 (Day-Ahead, i.e. one day before real time) Security Analysis and coordination services every day for the eleventh consecutive year. Since 2009, the SA services in Coreso have been set up bilaterally with the TSO shareholders. With the implementation of the CSA program, the SA services will gradually evolve onto the SOGL compliant CSA service.

	SA (Current)	CSA (Future)
TIMING	High-level timing defined (merging, Daily Operational Planning Teleconference (DOPT))	Strict and clear timing defined at Pan-Europe level
PROCESS	D-1: 1 run (subject to model improvements) ID: 2 runs (+on demand), not synchronised	D-1: 2 runs - ID: 3 runs synchronised at Pan-Eur. level (+on demand)
FORMAT	UCTE-DEF	CGMES
RA COORDINATION	Availability and coordination during process RA acceptance based on previous acceptance, live coordination with TSOs	List of available RAs from TSOs Effective and economically efficient RAs Criteria for RA coordination
OBS. AREA	Interest and observability areas defined with shareholders	Defined based on influence factors within a common range for all TSOs
STUDIES	Thermal only	Thermal, voltage and dynamic
TASK ALLOCATION	Parallel model, cover own shareholders	Rotational model, cover whole Core Geographical Region (CGR)

Remedial Action

Did you know ?

In 2019, Coreso coordinated more than 3000 Remedial Actions across four regions (CWE, CEE, Italy North and SWE).



What is a Remedial Action?

When Coreso runs the security assessment for the European electricity network, during a Day-Ahead or IntraDay process, constraints may be detected. A constraint represents a flow that is above the capacity of a circuit. As a result, the flow needs to be reduced to an acceptable level. This may be achieved by using various measures, such as changing the way the circuits are connected (switching and/or topological changes in substations), controlling flows on the circuits through PSTs (Phase-Shifter Transformers) or rescheduling power between generators (redispatching). All these measures are Remedial Actions.



Coreso supervises the constraints that are cross-border relevant (i.e. affecting more than one TSO) and coordinates Remedial Actions to solve them. These may be a single measure in one TSO network or multiple measures in multiple TSO networks. In any case, coordination between the TSOs is needed so that the most economically and electrically efficient Remedial Action can be agreed upon, for the benefit of the European consumer.



South-Western Europe (SWE) Security Analysis and NGESO (Channel) Security Analysis Implementation

- The implementation of the South-Western Europe (SWE) Security Analysis and NGESO (Channel).
- Security Analysis has led Coreso to tackle new challenges and new opportunities:
 - New grid network and operational rules to study and build expertise.
 - New service for REN, REE and NGESO. Additionally the first Security analysis service for the Great Britain synchronised area.
 - The NGESO Security Analysis is the first SA service for which Coreso is using the CGMES format.
 - The development has served an important contribution towards the CGMES project and allows the operations to increase their experience with the format.
 - First step in the move towards a Coordinated Security Analysis service for Channel and SWE.

CWE: Grid Evolution (e.g. Nemo) + Coordinated Redispatching

The European Electrical network is continuously evolving with new interconnections, new HVDC links, reinforced important lines and the expansion of renewable energy in Europe. With the new interconnection NEMOlink (between the United Kingdom and Belgium), the development of offshore wind power in the North of Belgium, we are increasingly confronted with high flows crossing countries which occasionally leads to the activation of some coordinated redispatching. Coreso plays a key role in the coordination of remedial actions and the redispatching to ensure the security of the grid.

Did you know ?

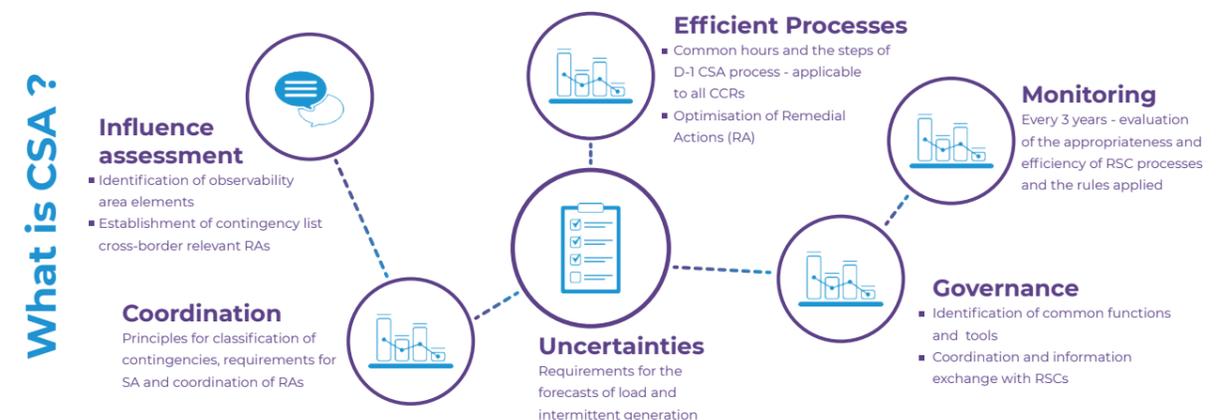
High-Voltage Direct Current or HVDC links are typically used to transfer energy between synchronous areas or to dispatch massive energy from one point to another in the alternating current grid. They provide added flexibility in terms of grid operations with new remedial action options and increase the import/export capability of bidding zones.



Italy North: Unusual Electricity Export from Italy led more Coordination from Coreso

During the last months of 2019, a situation of exports from Italy to Slovenia was observed. This export of energy created an unusual flow pattern and required close coordination between Coreso, TSCNET Services GmbH and the TSOs in the Italy North region.

CSA Programme: Towards a European Wide Operational Coordination



The CSA service secures the electricity supply across Europe by establishing structured processes across Europe and enhancing transparency through extended reporting. Data will play a key role in this new service: besides the already shared IGMs, the TSOs will also share structured data on monitored elements, contingencies and remedial actions. This data, utilised by new tools, will enable the Digital Transformation of the Security Analysis service in Coreso, to offer an efficient and transparent service to their shareholders across all five CCRs. Coreso and TSCNET Services GmbH are scoping the CSA Programme together with TSO shareholders, ENTSO-E and at a CCR level.

Experimentation of the Redispatching and Countertrading Methodology

Following the request for amendments by the NRAs to the Redispatching and Countertrading (RDCT) methodology in the Core CCR, Coreso and TSCNET Services GmbH played a key role in the ongoing Experimentation Project, by testing and analysing the new methodology on past situations. In 2020, the Core TSOs will gather results and draft a report with the main conclusions to support possible amendments to the Core RD&CT methodology.

CSA in the RSC Conference

Coreso represented the future CSA service at the RSC Conference in Copenhagen in October 2019.

Operational Services

Service 3 : Coordinated Capacity Calculation

Optimising Cross-Border Energy Transfer Capacities

In a society with increasing renewable integration, decreasing conventional production and a strengthened open market structure, cross-border energy exchanges play a crucial role in the daily management of the interconnected energy system. The import and export of energy enable an efficient use of the available generation resources, increase the European economic welfare and may be crucial to maintaining supply security in the event of local scarcity.

Did you know ?

STEP 1 Regional Security Coordinators (RSCs) calculate the cross-border capacities which can be allocated to the market to exchange electricity between countries.

STEP 2 It contributes to optimise cross-border capacities while ensuring coordinated security.



Coordinated Capacity Calculator

The appointment of a Coordinated Capacity Calculator (CCC) is required by Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a Guideline on Capacity Allocation and Congestion Management (“CACM regulation”). Article 27.2 says: “no later than four months after the decision on the Capacity Calculation methodologies [...], all the TSOs in each CCR shall jointly set up the coordinated capacity calculators and establish rules governing their operations.”

Coordinated Capacity Calculator is defined as **“the entity or entities with the task of calculating transmission capacity, at a regional level or above.”**

The Coordinated Capacity Calculators Nomination within the Core Region

On 15 April, the Core TSOs appointed Coreso and TSCNET Services GmbH as the CCCs for the Day-Ahead and IntraDay Capacity Calculation of the Core CCR. The CCCs will also take on the tasks of the coordinated capacity calculator for long-term capacities in the Core CCR.

Additional nomination for Coreso as Coordinated Capacity Calculator in South-West Europe

On 19 June, TSOs from South-West Europe (SWE) area appointed Coreso as the Coordinated Capacity Calculator for the Day-Ahead, IntraDay and Long-Term Capacity Calculation for the SWE CCR.



Day-Ahead Capacity Calculation South-West Europe

On Monday 15 July, the SWE CCR started an External Parallel Run for the computation of Day-Ahead capacity. The so-called External Parallel Run is the period used by TSOs and RSCs to experiment the real Capacity Calculation process with both industrialised solutions, and each company’s operators. In addition, during this period, the results are published for the interested external parties such as regulators and market parties.

The implementation of the Capacity Calculation process in this CCR is the first using the Common Information Model (CIM) format. The Day-Ahead Capacity Calculation (DA CC) process performs the calculations for 4 hours and then, those results are extrapolated to 24 hours of the day.

As part of the process, TSOs are able to validate the results provided by Coreso and to consider latest information appearing since the beginning of the computation process. Results from the calculation are published by TSOs ex-post on a weekly basis to facilitate the transition of market parties from weekly to daily calculations.

The External Parallel Run lasted from July 2019 till January 2020. The Go-Live took place on 27 January 2020.

Core Long-Term Capacity Calculation (LTCC)

During 2019, Coreso and TSCNET Services GmbH have supported TSOs with the design of a Coordinated Long-Term Capacity Calculation, compliant with the Forward Capacity allocation Guidelines. A large number of experimentations and analyses have been done to allow TSOs to fine-tune the methodology and to feed reports for NRAs and European Commission.

The support to TSOs will continue upon a submission of the approval package at the end of Q1 2020.

Italy North IntraDay Capacity Calculation

This new process was launched on 26 November. Outcomes from this new service are bilateral capacities for the last 8 hours of the current day, from France, Switzerland, Austria and Slovenia towards Italy. The values computed in IntraDay are an update of Day-Ahead capacities. This latter is a process delivered by Coreso since 2016.

This major step finalised a project which our shareholders RTE and TERNA contributed to, with ELES, APG and Swissgrid as TSCNET Services GmbH shareholders. After two years of drafting working on the Capacity Calculation methodology and the high-level business process, offline and online experimentations, the fruitful cooperation has led to a new service provision to the Italy North Capacity Calculation Region. Indeed, this process is operated by both RSCs, with parts done in parallel and other tasks following a rotational schedule.

Central West Europe upgrade of the process

Multiple NEMO Arrangements (MNA)

Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a Guideline on Capacity Allocation and Congestion Management (“CACM regulation”) described the ‘Nominated Electricity Market Operator (NEMO)’ as Market Operators in national or regional markets to perform in cooperation with TSOs single DA and ID coupling (Art 7). In addition, a “NEMO” is an entity designated by the competent authority to perform tasks related to single Day-Ahead or single IntraDay coupling (Art 2).

On the one hand, Coreso was involved in the technical side to build the new IT infrastructure link between Coreso as hosting entity and the NEMOs. On the other hand, the operational procedure of CWE common system operator (Coreso role) was adapted to integrate the new regional market.

The Go lives of Multiple NEMO Arrangements (MNA) in CWE bidding zones occurred on 2 July 2019. By introducing MNA, the Single Day-Ahead Coupling is accessible to more than one NEMO (Nominated Electricity Market Operator) per bidding zone.

Germany and Austria Bidding Zone Border Included in CWE IntraDay Process:

On 11 July, the bidding zone border DE-AT was added to the CWE increase/decrease IntraDay Capacity Calculation process. After adding a bidding zone border between Germany and Austria in 2018 for the Day-Ahead (DA) market, the DE-AT bidding zone border is now part of the CWE IntraDay process. This means that increased IntraDay capacity values (on top of the Day-Ahead leftover capacities) can be provided for this DE-AT border in case the daily evaluation process of TSOs shows that such IntraDay capacities do not endanger the network security.



Operational Services Service 4 : Short Term Adequacy

Ensuring the Security of the Electricity Supply by Anticipating Lack of Adequacy Situations

European countries are currently and increasingly faced with the challenge of responding to load – i.e. demand – with sufficient electricity generation. The underlying reasons for this are the strong and intermittent presence (or absence) of renewable energy and the increasingly uncertain profitability of conventional generating facilities.

If energy is not present - at any given time - in a certain country, potential help from other countries is dependent on the overall availability of electrical energy and the grid capacity to transmit it to the country in need of energy.

Did you know ?

STEP 1

RSCs check if generation can meet demand at a European level to detect potential adequacy issues.

STEP 2

In case of adequacy issues, they coordinate mitigating actions to prevent scarcity on the European grid.

Short-Term Adequacy “Regional”

The goal of Cross-Regional STA is to detect a potential adequacy crisis at a European level.

Generation	Imports/Exports	Load
=	=	=
Known information: Capacities Planned Outages	Known information: Network availability Planned Outages	Known information: Demand profiles Demand side response
+	+	+
Uncertainties: Wind generation Solar generation Forced outages	Uncertainly: Forced Outages	Uncertainly: Weather conditions

The Regional STA goal is to propose actions to solve or mitigate adequacy problems detected during the Pan-European process. TSOs and RSCs from the problem zone would coordinate and propose a solution. Experiments were performed by the RSCs in collaboration with the TSOs in December 2019. The feedback from TSOs and RSCs concerning the experiments was positive. The process will be implemented during the summer of 2020.

Short-Term Adequacy daily “rolling window” preparation

From 2020, the Short-Term Adequacy “Pan-European” process will be daily performed with an industrial tool. In 2019, this process was operated on a weekly basis. This will make calculations with updated data possible which is necessary, considering the volatility of weather dependent generation types.

Operational Services

Service 5 : Outage Planning Coordination

Preserving the reliability of the interconnected power system by assessing outage compatibility. Planning each individual outage is the TSOs responsibility. However, since local actions in one area can have significant and possibly problematic effect on neighbouring areas, there is a strong need to share the information among all inflicted parties and to assess the overall compatibility of these outages. This role is defined by the ENTSO-E as Outage Planning Coordination and is one of the RSC's mandatory services for the European TSOs.

Did you know ?

STEP 1 Regional Security Coordinators analyse TSOs & market participants planned maintenance.

STEP 2 They evaluate whether the outages planned by TSOs & market participants will create inconsistencies.

Outage Planning Coordination Regional Layer for Channel and SWE

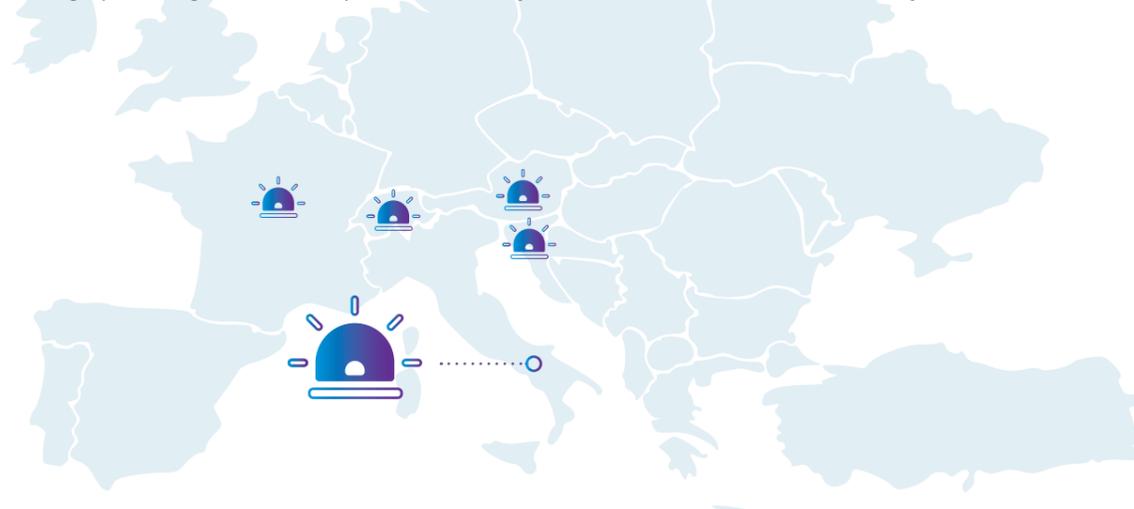
We have extended the Year-Ahead and Week-Ahead processes with a security analysis in the SWE region. National Grid ESO and SONI/Eirgrid area now part of OPC process by providing data for the Tie Line Inconsistency (first step of the process).

Outage Planning Coordination Year-Ahead

This year was the second time Coreso performed a yearly OPC process. This is a fantastic opportunity to detect some constraints for 2020 for SWE, CWE and Italy North areas.

Outage Planning Coordination Month-Ahead

The official Go-Live for the OPC Month-Ahead was in October. This fully automatic process is very complimentary to the OPC Year-Ahead in case some TSOs need to update their outage planning. It has been performed every month for the last months of the year.



Operational Services

Services + : Critical Grid Situation / Emergency & Restoration

Coordinating Proposals for Mitigation Measures in Critical Situations

When faced with a tense situation, communication and alignment are essential as the consequences of these events could extend further than simply the TSO control area. RSCs role is to propagate information to all TSOs and lead the coordination by conducting studies and proposing mitigation measures such as the review of cross-border capacities, topological remedial actions and load flow redispatching.



Did you know ?

STEP 1 Regional Security Coordinators review TSOs' restoration plans for consistency.

STEP 2 They provide a technical report summarising the analysis.

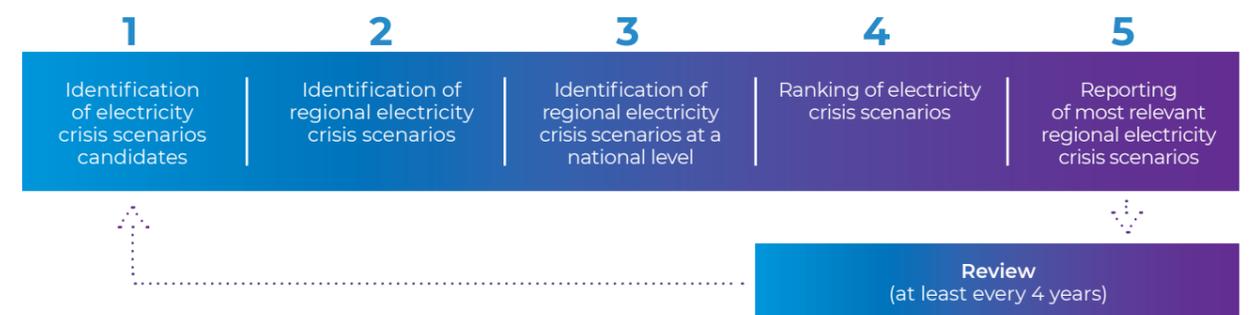
Emergency Restoration Report

Coreso delivered a coordination report in August 2019. This report is a high-level documentation consisting of: inter-TSO assistance and coordination in a state of emergency, frequency management procedures, assistance for active power procedures, and a top-down re-energisation strategy.

The final report will be sent by TSOs to their respective NRAs in February 2020.

Risk Preparedness Plan

Coreso actively participated in the working group for the Risk Preparedness Plan whose aim is to create regional crisis scenarios and to evaluate each of them in order to rank them. In 2019, methodology was written and it was approved at the beginning of 2020. From March 2020 to September 2020, this methodology will be implemented. Find the main steps of this process below:



Critical Grid Situation (CGS) Process, The Next Steps

Since 2017, in collaboration with other RSCs, TSOs and ENTSO-E, Coreso has been actively involved in CGS service development. After setting up a CGS communication process in December 2017, this process was triggered and used for the first time (by Elia) for adequacy issues during the winter of 2018. Following this event, several parties have felt the need to review and fine-tune the process.

Additionally, a strong link is being established with STA and OPC services. Indeed, STA and OPC output could be one of the triggers (by a RSC) for a CGS process in the future.

A Project Group CGS was reopened in 2019 to tackle the aforementioned challenges.

IT Service Solutions

« As changes in the energy market required faster actions in collaboration with a greater number of players, this impacts the complexity of the IT landscape of Coreso. It is obvious that a more complex set up requires better-defined security procedures and control. This is one of the reasons why our partners request that we comply with their security requirements and Coreso is preparing for an IOS27001 certification. »

Geert Maurissen Coreso's Information Security Officer

At the end of 2018, Coreso received stipulations from the **ENTSO-E Minimum Viable Solution (MVS) Security Plan** (document based on the ISO27001 framework to prove RSC's readiness).

Coreso completed its internal self-assessment early 2019 and initiated an internal action plan to implement its new Information Security Management System (ISMS).

Customer Award 2019

Coreso was awarded the **Customer Award 2019** by one of our suppliers and their consultants that recognized that Coreso's company culture makes it a great company to work in, with a lot of [#challenges](#) and [#growthopportunities](#). It is also a place where they can enjoy interaction with great people within a [#multicultural](#) environment.

Main Successes and Future Challenges Encountered by a Growing IT Team Over the Last Year

A lot of the work that an IT team goes under the radar. Nevertheless, this work is very important to allow business continuity for all the services Coreso delivers to its customers.

It would take too long to list them all but some of them are worth mentioning:



Definition of the bases of our Software Development Cycle allowing Coreso to impose standards to our suppliers whilst building a working standard for internal projects.



Definition of the bases for our Hosting Strategy by preparing for hybrid but secure clouds that allow us to be much more agile while reducing capital costs.



Finalization of technical implementations, upgrades and improvements at an infrastructure level to warrant the longevity of services and processes.



Extension of premises to add more working spaces with state-of-the-art equipment to create a better place to work.



Redesign of our Data Archival Framework which increased the number of data assets on our radar from 40% to 72%. Insights into data assets increase the insights from all teams as to where our data is coming from and where our information is flowing into.

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1. THE COMPANY

Coordination of Electricity System Operators (Coreso) founded in 2008, encompasses nine European operators 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).

Coreso provides services to secure energy transmission for over 55% of the population of the European Union. Located in Brussels, about sixty engineers combine their expertise 24 hours a day, 7 days a week to anticipate the operation both in the short term and the long term.

2. COMPOSITION OF MANAGEMENT BODIES

2.1. Board of Directors

On 31 December 2019, the Board of Directors had the following members:

- Mr Enrico Maria Carlini, **Chairman of the Board of Directors** (as of 25 October 2019);
- Mr Fintan Slye, **director and Vice-Chairman of the Board of Directors**;
- Mr Duncan Burt, **director**;
- Mr Dirk Biermann, **director**;
- RTE Réseau de Transport d'électricité SA, with Mr Sébastien Henry as its permanent representative, **director**;
- Mr Olivier Arrivé, **director**;
- Mr Mauro Caprabianca, **director**, (as of 25 October 2019);
- Mr Patrick De Leener, **director**;
- Ms Maria José Clara, **director**;
- Ms Pascale Fonck, **director**;
- Mr Tomás Domínguez Autrán, **director**;
- Mr Emilio Cerezo Diez, **director**;
- Mr Robin Mc Cormick, **director**.

None of the directorships are remunerated and all (except Mr McCormick, whose term will expire immediately after the 2020 Ordinary General Meeting that will be asked to approve the annual accounts for the financial year ending on 31 December 2019) will expire immediately after the 2021 Ordinary General Meeting that will be asked to approve the annual accounts as at 31 December 2020.

Mr Francesco Zanuzzi resigned as a director with effect as from 25 October 2019.

The Board of Directors met six times in 2019 (on 1 February, 11 April, 5 May, 21 June, 25 October and 13 December 2019) and discussed technical, financial, economic and strategic issues.

2.2. 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.

2.3. Auditors

The Ordinary General Meeting of 19 April 2018 appointed KPMG Réviseurs d'Entreprises SCCRL and Ernst & Young Réviseurs d'Entreprises SCCRL as the company's auditors for a term of three years, expiring at the Ordinary General Meeting to approve the annual accounts for the year ending 31 December 2020. KPMG Réviseurs d'Entreprises SCCRL is represented by Alexis Palm and Ernst & Young Réviseurs d'Entreprises is represented by Patrick Rottiers.

The auditors' remuneration is €13,430.00 per year, to be indexed annually in line with the consumer price index.

3. MAIN EVENTS DURING THE YEAR

3.1. Context

The mission of Coreso is to proactively support TSOs to ensure security of electricity supply on a European regional basis. Coreso focuses its coordination activities and thus provides the highest added value from a year ahead until Intraday (few hours before real time). Coreso, as the other RSCs, is a service provider of nationally regulated TSOs. Coreso services are driven by European regulations (3rd and 4th energy packages). According to these regulations, Coreso is currently implementing regulated services described below:

- Improved Individual Grid Model / Common Grid Model
- Coordinated Security Analysis
- Coordinated Capacity Calculation
- Short Term Adequacy
- Outage Planning Coordination
- Emergency and Restoration
- Risk Preparedness

Accordingly, Coreso collaborates with the TSOs and other RSCs to:

- provide the control centers with forecasts about the security of systems,
- perform operational planning activities,
- conduct security analyses which simulate numerous scenarios,
- suggest remedial actions and coordinates exchanges between national control centers, 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. In this area, Coreso has demonstrated and continues every day to demonstrate a significant level of reliability and expertise.

Its added value in terms of proactive identification of situations likely to present a risk to the electrical system is now essential. Indeed, risks can only be detected by building an overview beyond the national framework of each individual transport network.

3.2. Operational services: the 5 mandatory services

3.2.1. Improved Individual Grid Models (IGM) & Common Grid Models (CGM) delivery

This service consists in an iterative process starting from the collection of IGMs shared by TSOs on the Operational Planning Data Environment (OPDE) and aiming at delivering to all pan-European TSOs and RSCs, CGMs adequate for the other services for all necessary timeframes as specified in their description. This service includes (at least for the timeframes from year-ahead to intraday):

- Checking quality and plausibility of IGMs provided by TSOs and facilitating their improvement to meet the criteria of quality and plausibility.
- Merging of IGMs into CGM.
- CGM model improvement based on the CGM methodology pursuant to GL CACM Art 17 and on agreed procedure pursuant to draft NC OPS Art 12 and 15. Examples of model improvements are given in the description of the following services.

In September 2019, in relation with the CACM article 17 implementation of improved CGM model, the 'Basic CGM capability' milestone has been achieved. The goal was mainly to ensure that the Operational Planning Data Environment (OPDE) platform allows to run the CGM building process based on a minimum set of requirements.

The success of this milestone has been demonstrated during a 3 days test involving 20+ TSOs and the RSCs. The TSOs published their IGM on the OPDE platform. The RSCs downloaded and merged those IGM into a CGM and published the merged CGM into OPDE. Based on this first large-scale proof of concept, the content of the CGM file as well as the CGM building process are known and can be further used to start a CIM based process implementation.

3.2.2. Coordinated Security Analysis

This service aims at:

- Identifying risks of operational security limit violations in any part of the regional area (mainly triggered by cross-border interdependencies) by applying a common Security Analysis methodology agreed by TSOs, checking robustness of results against uncertainties (e.g. study of variants with different level of RES generation).
- Finding relevant Remedial Actions (cross-border relevant ones).
- Coordinating findings and Remedial Actions proposal with other adjacent RSCs.
- This service is requested for at least the following timeframes:
 - Day-ahead: systematic.
 - Intraday: systematic for the timestamps regionally agreed.

3.2.3. Coordinated Capacity Calculation

This service aims at:

- Applying approved regional coordinated methodologies to compute parameters defining available capacity (Net Transfer Capacity (NTC) or Flow Based (FB) parameters), based on CGM. The previously mentioned methodologies aim at optimizing cross-border capacities while ensuring coordinated security.
- Including improvement proposals to increase computation quality (such as coordination of net positions of each IGM, if part of the regional methodology) and/or available capacity (such as Phase Shift Transformer (PST) coordination and proposal of at least non-costly Remedial Actions if part of the regional methodology).
- This service includes possible coordination between RSCs for alignment/improvement of hypotheses between CCRs.
- This service is requested for at least the following timeframes: Day-Ahead and Intraday capacity.
- In 2019, Coreso performed D-2, D-1 Capacity Calculation for the north Italian border (Central Southern Europe zone), for the Southern-Western Europe, for the Central-Western Europe zones.

- The TSOs of the Core region have appointed Coreso and TSCNET as Coordinated Capacity Calculators. Furthermore, TSOs of Southern Western Europe have appointed Coreso as Coordinated Capacity Calculator.

3.2.4 Short Term Adequacy

European countries are currently and increasingly faced with the challenge of responding to load – i.e. demand – with sufficient electricity generation. The underlying reasons for this is the strong and intermittent presence (or absence) of renewable energy and the increasingly uncertain profitability of conventional generating facilities.

If energy is not present – at any given time – in a country, potential help from other countries depends on the overall availability of electrical energy and the grid capacity to transmit it to the country in need of energy.

Coreso has a leading role in the development of the service on a pan-European level involving the 5 European Regional Coordination Centres (RCCs).

3.2.5 Outage Planning Coordination

This service aims at:

- Identifying outage incompatibilities between relevant assets (grid elements, generators, loads) whose availability status has cross-border impact and limiting an European consequence of necessary outages in grid and production by relevant coordination of planned outages timing.
- Proposing solutions to relieve these incompatibilities: at least non-costly remedial actions, adaptations of availability and outages' planning (firstly on grid elements, secondly on other elements if no solution is available).
- Coordinating findings and Remedial Actions proposals with other adjacent RSCs.

This service is requested for the year-ahead and week-ahead timeframe. Updates are done up to week-ahead based on TSOs request for planning modification or significant changes on expected operational conditions.

3.3. RSC Master Plan

Aiming to coordinate the preparation of specific deliverables and a navigational tool, the 5 RSCs have agreed on a masterplan. This will support the RSCs, ENTSO-E, RSC Shareholders and other stakeholders in understanding the complexity of the activities in RSCs and their environment. It is foreseen that, with the implementation of the Clean Energy Package, this complexity will only increase. The Master Plan also provides efficiency by sharing tasks among the 5 RSCs in order to avoid duplication of efforts.

For 2019, the RSC masterplan fields were translated in a concrete action plan for concrete actions as for example the CEP impact assessment, the operational SLA for STA/OPC, and service delivery matrix.

3.4. Coreso transformation process

This year new middle management functions have been implemented. Focusing on team leadership and operational process management, as well as service development. These functions will reinforce the continuity and the quality of the services as well as a better implementation of their developments. A special focus was also put on training with the creation of the training officer and safety at work with a new prevention adviser – compliant to legislation. Further work is foreseen in the domain of project management and resource management.

4. OUTLOOK

4.1. Provision of the five services

Coreso is currently in the final phase - estimated to last another 2 years - of implementing in the 'five services' defined by the European TSOs to be performed by RSCs. EU legislation has reinforced the role of RSC and described roles and responsibilities of RSCs through Network Codes: System Operation Guideline¹, guideline on Capacity Allocation & Congestion Management², forward capacity allocation³, and Emergency and Restoration⁴. In addition, Coreso will implement further services in the framework of the Clean Energy Package⁵.

¹ Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation

² Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management

³ Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocation

⁴ Commission Regulation (EU) 2017/2196 of 24 November 2017 establishing a network code on electricity emergency and restoration

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

4.2. Clean Energy Package

As from 1 January 2020, a new Regulation of the European Parliament and of the Council on the internal market for electricity will be applicable. This Regulation is part of the legislative package on which the European institutions have been working on for the last years, better known as the 'Clean Energy for all Europeans Package (CEP)'. The Clean Energy Package foresees further services to be performed by RSCs/RCCs. ENTSO-E currently analyses the new services and assesses the need to propose new methodologies.

5. SUBSIDIARIES

The company has no subsidiaries.

6. EVENTS AFTER THE END OF THE YEAR

In the context of the Covid-19 crisis, Coreso as, Regional Security Center (RSC), providing mainly services to TSO's, including its shareholders which are acting in regulatory framework and to other RSC's, does not expect that the financial performance of the company would be heavily affected by this crisis.

7. NOTES TO THE ANNUAL ACCOUNTS

7.1. Introduction

7.1.1. Key figures

IN THOUSAND €	2019	2018
EBITDA*	3 087,3	2 030,8
EBIT*	824,4	612,3
Net result (before tax)	792,3	603,5
Net result (after tax)	430,4	344,6
Solvency ratio	27,58 %	33,15 %
Liquidity ratio	43,52 %	52,50 %

Solvency = equity/total assets

Liquidity = current assets/short-term liabilities

*EBIT = earnings before interest and taxes

*EBITDA = EBIT + amounts written off/depreciation

7.2. Balance sheet

7.2.1. Assets

IN THOUSAND €	2019	2018
Intangible fixed assets	5 412,1	3 154,0
Property, plant and equipment	2 515,4	2 254,4
Non-current assets	7 927,5	5 408,4
Trade & receivables	3 124,1	2 658,7
Cash & cash equivalents	328,1	207,2
Deferred charges	195,8	91,5
Current assets	3 647,9	2 957,4
Total assets	11 575,4	8 365,8

7.2.2. Equity and liabilities

IN THOUSAND €	2019	2018
Capital	1 000,0	1 000,0
Reserves	100,0	88,1
Retained earnings	2 092,9	1 674,4
Equity	3 192,9	2 762,5
Current liabilities	8 110,0	5 472,8
Accrued charges/ deferred income	272,5	130,5
Liabilities	8 382,5	5 603,3
Equity & liabilities	11 575,4	8 365,8

7.2.3. Equity and liabilities

7.2.3.1. Fixed assets

Fixed assets include the following:

IN THOUSAND €	2019	2018
Intangible assets	8 166,8	4 397,6
Depreciation intangible assets	(2 754,7)	(1 243,6)
Tangible assets	8 083,6	7 071,0
Depreciation tangible assets	(5 568,2)	(4 816,5)
TOTAL FIXED ASSETS	7 927,5	5 408,4

An amount of 4 781,9k € was invested in 2019, of which 3 769,2k € in software and 1 012,6k € in hardware and other tangible asset.

The net book value of fixed assets was 7 927,5k € and includes cumulative depreciations at year-end 2019 totalling 8 322,9k €.

7.2.3.2. Current assets

Trade and other receivables totalled 3 124k € compared to 2 659k € end of 2018.

'Other amounts receivable' consists mainly of recoverable taxes and VAT and reimbursable social security contributions.

At year-end the cash and cash equivalents amount to 328k € compared to 207k € end of 2018.

7.2.3.3. Deferred charges and accrued income

This item comprises operating expenses to be deferred to accounting year 2019 (196k €).

7.2.3.4. Equity

As at 31 December 2019, share capital totalled 1 000k €, represented by 15,210 shares and was fully paid up at the time Coreso was set up.

A portion of the distributable profit has been attributed to the legal reserve (12k €), bringing it to 10% of subscribed capital (100k €). The legal reserve is now fully constituted.

The remaining profit has been carried forward bringing the total reported result to 2 092k €.

Equity amounted to 3 193k € after appropriation of the 2019 result.

7.2.3.5. Debts

End of 2019, financial short-term liabilities amounted to 3 000k €.

'Trade debts' at year-end 2019 totalled 3 605k €. They relate to invoices not yet due totalling 546k € and invoices to be received totalling 2 998k €.

Social security liabilities cover many provisions such as holiday allowances, bonuses and personnel insurance. The total amount for this item is 1 428k €.

An amount of 77k € is recorded under 'Tax debts' and relates to corporate income tax payable on the results of accounting years 2018 and 2019.

7.2.3.6. Accrued charges and deferred income

This item mainly comprises accrued charges totalling 272k €.

7.3. Income Statement

IN THOUSAND €	2019	2018
Service fees	17 313,3	12 858,9
Other operating income	346,6	841,4
Operating Income	17 659,9	13 700,3
Services and other goods	(6 778,2)	(6 097,3)
Remuneration, social security	(7 794,4)	(5 571,7)
Amortisation	(2 262,9)	(1 418,4)
Other charges	0,0	(0,5)
Operating Charges	(16 835,4)	(13 088,0)
Operating result	824,4	612,3
Financial result	0,0	0,7
Financial charges	(32,1)	(9,5)
Taxes	(361,9)	(258,9)
Net Result	430,4	344,5

7.3.1. Operating Income

Operating income can be subdivided as follows :

IN THOUSAND €	2019	2018
Service fees	17 313,3	12 858,9
Other operating income	346,6	841,4
Total	17 659,9	13 700,3

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

Other operating income' encompasses mainly recovery of withholding tax.

7.3.2. Services and other goods

Services and other goods totalled 6 778k € in 2019 (6 097k € in 2018) and relate mainly to the costs of IT maintenance and consultants and rents. The increase is due to the increased activities of Coreso.

7.3.3. Personnel expenses

Remuneration and social security costs are broken down as follows:

IN THOUSAND €	2019	2018
Remuneration	5 921,5	4 228,5
Social security costs	1 799,5	1 284,3
Other social security expenses	73,4	58,8
Total	7 794,4	5 571,7

The increase is partly due to the increase in full-time equivalents from 35,3 in 2018 to 44,7 in 2019.

7.3.4. Depreciation

Depreciation of property, plant and equipment totalled 2 263k€ and is calculated according to the valuation rules approved by the Board of Directors, as indicated in the annual accounts.

7.3.5. Financial result

A net financial charge of 32k € is recorded in 2019, mainly due to interests related to the financial liabilities.

7.3.6. Taxes

Profit before tax amounts to 792k €. After applying notional interest and considering disallowed costs, Coreso's corporate income tax amount for 2019 is 362k €.

7.3.7. Net profit

In 2019, Coreso realized a net profit after tax of 430k €.

7.4. Appropriation Account

At the Ordinary General meeting to be held on 2 April 2020, le Board of Directors will propose the following appropriation :

IN THOUSAND €	2019	2018
Profit of the accounting year	430,4	344,6
Profit carried forward from the previous year	1 674,4	1 347,1
Appropriation to the legal reserve	11,9	17,2
Distribution of the dividend	0,0	0,0
Result to be carried forward	2 092,9	1 674,4

7.5. Financial Instruments

Coreso does not use financial instruments.

8. DESCRIPTION OF THE RISKS AND UNCERTAINTIES FACING THE COMPANY

8.1. Financial risks

Coreso's funding needs are met by the contributions of its shareholders. To meet its needs, Coreso draws up a budget and a business plan and reviews it in appropriate time with its shareholders, which are also its main customers. In the event of unforeseen funding needs, Coreso can appeal to its shareholders for the release of 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 when its shareholders are considered.

8.2. 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.

8.3. ICT⁶ risks

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

The management of the ICT infrastructure, including software applications and their hosting and data storage, are being 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 providers include guarantees on long-term support and maintenance services for all critical ICT components.

The power supply of ICT infrastructure is also backed up by uninterruptible power supply systems in Brussels and Lomme (France).

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

8.4. Data security

Coreso collects and stores sensitive data, its own business data and that of their business partners. Coreso is subject to several privacy and data protection rules and regulations, including, as of 25 May 2018, the General Data Protection Regulation (EU Regulation 2016/679 of 27 April 2016). Despite all precautions taken, important system hardware and software failures, failure of compliance processes, computer viruses, malware, cyber-attacks, accidents or security breaches could still occur.

⁶Information and Communication Technologies.

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

Coreso continuously adapts its processes and is putting in place new processes to ensure compliance.

8.5. HR risks

Coreso's strength lies in the quality of its staff, exposing the company to various risks, i.e. inadequate skill sets, the strain of work shifts inherent to Coreso's monitoring activities, and FTE 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.

To cope with future challenges, Coreso will need to maintain the quality of its staff. This year some 20 external hires joined Coreso. A balance will have to be maintained between direct recruitment and secondments. To keep a balance between stability and shareholders expertise. Required skillset evolve from pure operational, and expertise to general projects management profiles with financial acumen.

8.6. Regulatory risks

The consolidation of international power 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 and the coordination between TSOs is formalized in EU legislation (Network Codes and Clean Energy Package adopted in 2019). The roles and responsibilities of TSOs and RSCs are defined in those EU legislations.

TSOs are due to propose the operating details and methodologies of RSCs activities. These need to be approved by the regulators. These definitions, as well as the uncertainty around the approval timeline, may impact significantly Coreso roadmap and implementation planning. In order to mitigate this risk, Coreso and other RSCs proactively collaborate with TSOs to build appropriate solutions.

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

8.7. 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.

9. RESEARCH & DEVELOPMENT

To define calculation methodologies, develop tools and implement new services, Coreso has its own "Development Unit" and collaborates, among other partners, with 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/en

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

CC: Capacity Calculation.

CEE: Central Eastern Europe.

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

CGMA: Common Grid Model Alignment platform is an OPDE application. CGMA provides reference net positions and HVDC reference schedules for those timestamps prior to Day-Ahead, for which no market schedules are available.

CGM: Common Grid Model.

CGM ICT Delivery team: Within the CGM Program of ENTSO-e, the team responsible for delivering the data exchange platform, systems and IT infrastructure.

CGMES standard: Common Grid Model Exchange Standard.

CIM: Common Information Model.

CWE: Central Western Europe.

D-1: Day-Ahead - term used for Security Analysis

D-2: Two days in advance of the target date.

DA: Day-Ahead - term used for Capacity Calculation

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

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

EISec conference: Electrical Security Coordination Conference.

EMF: European Merging Function, an application used by RSC to achieve the merging of the IGMs.

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

HVDC: High-Voltage Direct Current.

ID: IntraDay.

IGM: Individual Grid Model.

IOP: Interoperability tests conducted on a monthly basis as part of the development process of CGMES.

IU: Ireland - United Kingdom.

M-1: Month-Ahead.

MVS: Minimum Viable Solution.

NEMO: Nominated Electricity Market Operator.

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

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

OPC: Outage Planning Coordination.

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

OPDM: Operational Planning Data Management, an OPDE application managing the exchange of data (upload/download of IGM and CGM) between TSOs/RSCs and OPDE.

OPM: Operational Planning Data Management is a set of distributed software components (all part of OPDE) to support the upload / download, storage and retrieval of grid models and other information.

QAS: Quality Assurance Service is an OPDE application centralising all data quality reports regarding IGM/CGM provided by TSOs and RSCs.

PEVf: Pan-European Verification Function, an OPDE application providing schedule exchanges in Day-Ahead and Intraday conform to the area, border or HVDC market schedules.

RAO: Remedial Action Optimisation.

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

REN: Redes Energéticas Nacionais
The Portuguese TSO.
Visit the website at www.ren.pt/en-GB

RES: Renewable Energy Sources.

RSC: Regional Security Coordinator.

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

SA: Security Analysis.

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

SMTA: Short- and Medium-Term Adequacy.

SOGL: System Operation Guidelines.

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

STA: Short Term Adequacy.

SWE: South Western Europe.

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

TSCNET Services: The Munich-based Regional Security Coordinator.
Visit the website at www.tscnet.eu

TSO: Transmission System Operator.

WOPT: Weekly Outage Planning Teleconference.

W-1: Week-Ahead.

Y-1: Year-Ahead.



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* COoRdination of Electricity
System Operators