Explanatory document to support the common regional coordinated operational security analysis methodology for Capacity Calculation Region Hansa in accordance with Article 76 and 77 of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation

18 October 2020

1. Introduction

The purpose of this document is to support the CCR Hansa ROSC Methodology and provide more in-depth explanations on the issues that are covered by the methodology.

2. Hansa CCR - the link between Core and Nordic CCRs

Hansa CCR is located between CCR Core and CCR Nordic, including the borders defined in accordance with the CCR decision. Except for the DK1-DE/LU and the DK1-NL borders, the CCR Hansa borders interconnect the synchronous areas of Central Europe and the Nordic countries. Hansa CCR borders consist out of HVDC interconnections and radial AC connections. On a high level the Hansa CCR facilitates as bridge functionality for coordination between the CCRs of Core and Nordic. The Hansa CCR TSOs' vision is that the Hansa CCR business process can be included to current Core and Nordic CCR business processes. In Figure 1, a high-level overview of Hansa CCR in relation to Core and Nordic CCR is given. The figure depicts CCR Hansa in relation to the adjacent CCRs Core and Nordic, as well as how TSOs and RSCs interact being members of two CCRs. Statnett is included in the figure as it is foreseen to be part of Hansa CCR in a near future. This will take place when Statnett is certified as a TSO and the CCR configuration is amended in 2020.

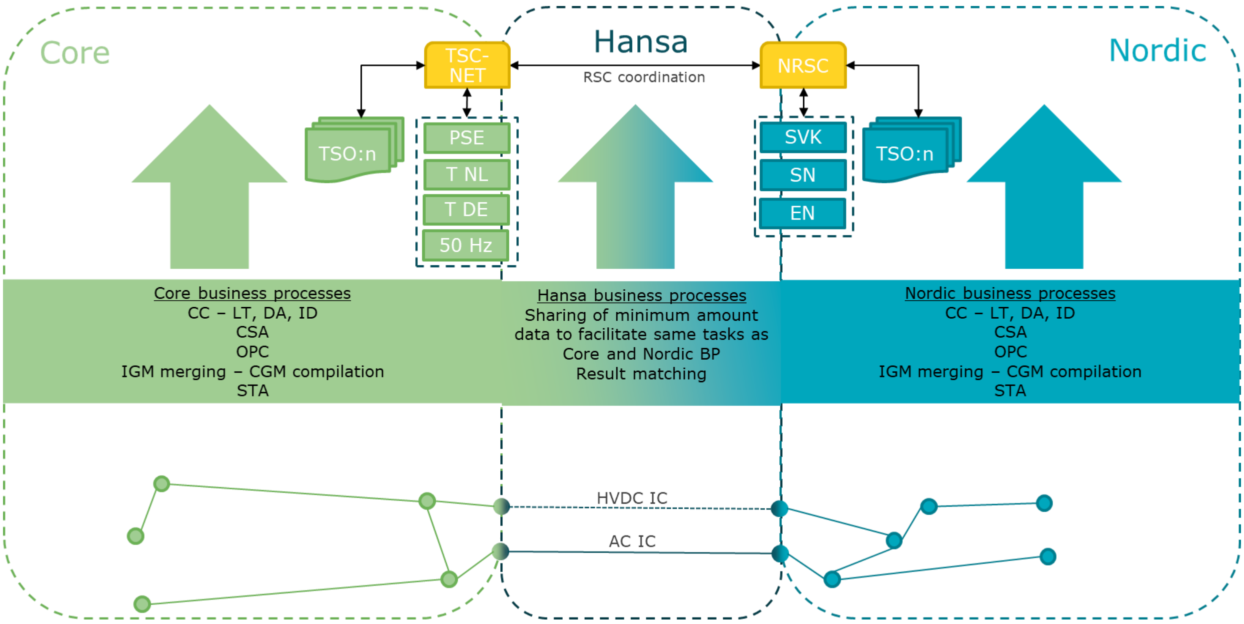


Figure 1 CCR Hansa relation to the adjacent CCRs Core and Nordic

3. Remedial actions in CCR Hansa – different market designs, agreements and mechanisms

There are different ways of providing remedial actions (RA) in CCR Hansa, consisting of different mechanisms, markets and agreements for the different control areas. The following section provides an overview of some the current mechanisms and agreements in place in each control area.

3.1 Denmark

Energinet, i.e. the Danish bidding zones in CCR Hansa, are part of the Nordic mFRR market – usually referred to as the Nordic Regulating Power Market (Nordic RPM). Balance Responsible Parties (BRPs) in the Nordics submit their bids for up- and downward regulation to the Nordic RPM on a voluntary basis, and TSOs combine the bids in a single merit order curve, from which they can activate the regulation in order to secure the physical balance of the power system and to relieve network congestions. If the bids are used to relieve internal network congestions, this is referred to as "special regulation" and functions as Countertrade. Towards the DK1-DE border Energinet uses RPM bids in DK1, and it is also considered to be used on the future DK1-NL border (Cobra).

Energinet does not have the possibility of conducting redispatch, as the location of the precise generation or load in the Danish system is not known, so all network congestions are relieved by using countertrade.

3.2 Norway

Statnett also uses the Nordic RPM for balancing purposes in the Norwegian bidding zone NO2, in the same way as Energinet. In addition, Statnett uses this market for redispatching. This is possible due to the geographical information connected to the Norwegian bids. Norwegian bids are marked by which substation group (stasjonsgruppe) the market participant is connected to. The bids in the Nordic RPM market are firm only 45 minutes prior to operations, and the volume and location of bids vary from one hour to the next. There are currently no mechanisms in place to secure redispatch bids in the planning phase.

3.3 Sweden

Svenska kraftnät also use the Nordic RPM for balancing purposes in the same way as Energinet and Statnett. At Svenska kraftnät's side of Swepol interconnector bids from the Nordic RPM are used when handling faults on the Swepol interconnector or if PSE requests resources for internal grid problems on the Polish side of the interconnector. Bids used for handling faults on the interconnector or for Polish grid problems are always seen as countertrade.

3.4 Poland

At PSE's side of the SwePol interconnector, RD and CT resources are activated within the Integrated Scheduling Process (ISP) run by PSE based on the volume of remedial measure (RD/CT) agreed with Svenska kraftnät. The ISP process is a bid-based security constraint unit commitment and economic dispatch, where balancing, reserve procurement and congestion management are co-optimised within one integrated process run by PSE just immediately after the day-ahead market closure and continues until real time. Commitment and operational set-points of all centrally controlled generation units in Poland are determined by PSE within the abovementioned ISP, minimising the global cost. The price used in the settlement of remedial measure reflects energy delivery/receipt cost of energy at the balancing market, i.e. it is based on the balancing market price and/or cost of activated resources when the location of resources is relevant to realise remedial measure.

3.5 The Netherlands

TenneT NL uses a nationally organised system for mFRR and aFRR bids. Within this system, a specific category of bids (so-called 'biedingen overige doeleinden') is introduced for, among others, redispatch purposes. In case of network congestions, a bid in the region at one side of the congestion is activated. A counterbid of the same magnitude is activated in any region other than the former region. The most economically efficient bids will be activated first in this system. The counteraction has a relatively large locational freedom, but pure countertrading is not used in the Netherlands. In case of an outage of NorNed, only the activation of bids in one direction is necessary to solve the imbalance the outage causes. In case no additional congestion occurs, there is no regional limitation necessary for these bids.

3.6 Germany

The German legal and regulatory framework allows German TSOs to incorporate significant grid users into redispatching. Planning data and redispatch potential are continuously submitted and updated from approximately D-1 14.00 until real time. From operational planning to close to real time, German TSOs have the possibility of ordering redispatching of specific generation units. This means the upward regulation and corresponding downward regulation while maintaining the overall energy balance. According to German law, curtailment of renewable energy sources is only allowed in exceptional cases in which no other measures, like redispatching or countertrading, are available or those measures are not effective.

As of October 2021, generation units of all energy sources greater than 100 kW can be used for redispatching and the law mentioned above will expire.

All CCR Hansa TSOs are currently considering if the future European Balancing platforms can be used for redispatch and countertrade, however this needs to be further investigated as the potential of these platforms depends on their design, gate opening and gate closure time, which are still under development by the European Balancing platforms projects.

4. Remedial actions in CCR Hansa – relevant resources utilised

CCR Hansa consists mainly out of bidding-zone borders between CCR Core and CCR Nordic which are HVDC interconnectors, except for the DE-DK connection. The natural remedial actions which can be offered in CCR Hansa are adjustments of active power flows through HVDC systems (in accordance with article 22 of the SO Regulation).

Changing the flow on a Hansa Interconnector can be an option for relieving congestion within the internal AC networks of one of the Hansa TSOs. This is not the scope of the regional optimisation in CCR Hansa but will have to be arranged as a cross-CCR action between CCR CORE, CCR Hansa and CCR Nordic. This is particularly relevant if a TSO cannot maintain the given Day Ahead (DA) capacities and this is known in the planning phase (just after the DA market results are received). If a TSO gives capacity with the intention of altering the flow on a Hansa interconnector after the DA market, separate agreements must be in place between the TSOs on both sides on the interconnector.

The HVDC lines of the CCR Hansa can both facilitate redispatching and countertrading actions between the Hansa TSOs and be used as remedial action itself. For both options the technical parameters, such as HVDC losses, ramping restrictions and other restrictions, should be respected. Next to this the impact to the connected AC networks should be taken into account when adjusting the active flows on HVDC interconnectors. When the HVDC lines are used to support redispatching and countertrading actions, at least two TSOs activate redispatching at both sides in either upward direction or downward direction. The active flows on the HVDC line will be adjusted accordingly to facilitate the redispatching action. In case of single countertrading, a marketplace may be involved. In this case market parties will trade the volumes in the intraday market requested by the TSO. The active flows of the HVDC interconnector will be adjusted accordingly based on the market outcome.

The HVDC interconnections can also be used as remedial action. An example of such remedial action is the so-called ‘DC Loop’. It is a simultaneous change of scheduled exchanges on at least two HVDC links of the same amount of power in opposite directions. Such changes of exchange schedules do not lead to any change of generation level in any control area involved, which means there is no need to increase or decrease any generation (no redispatching nor countertrading involved). The aim of this remedial action is not to affect the market capacity on the cross-border connections.

A DC Loop is already used across the Baltic Sea utilising Kontek and SwePol HVDC links.

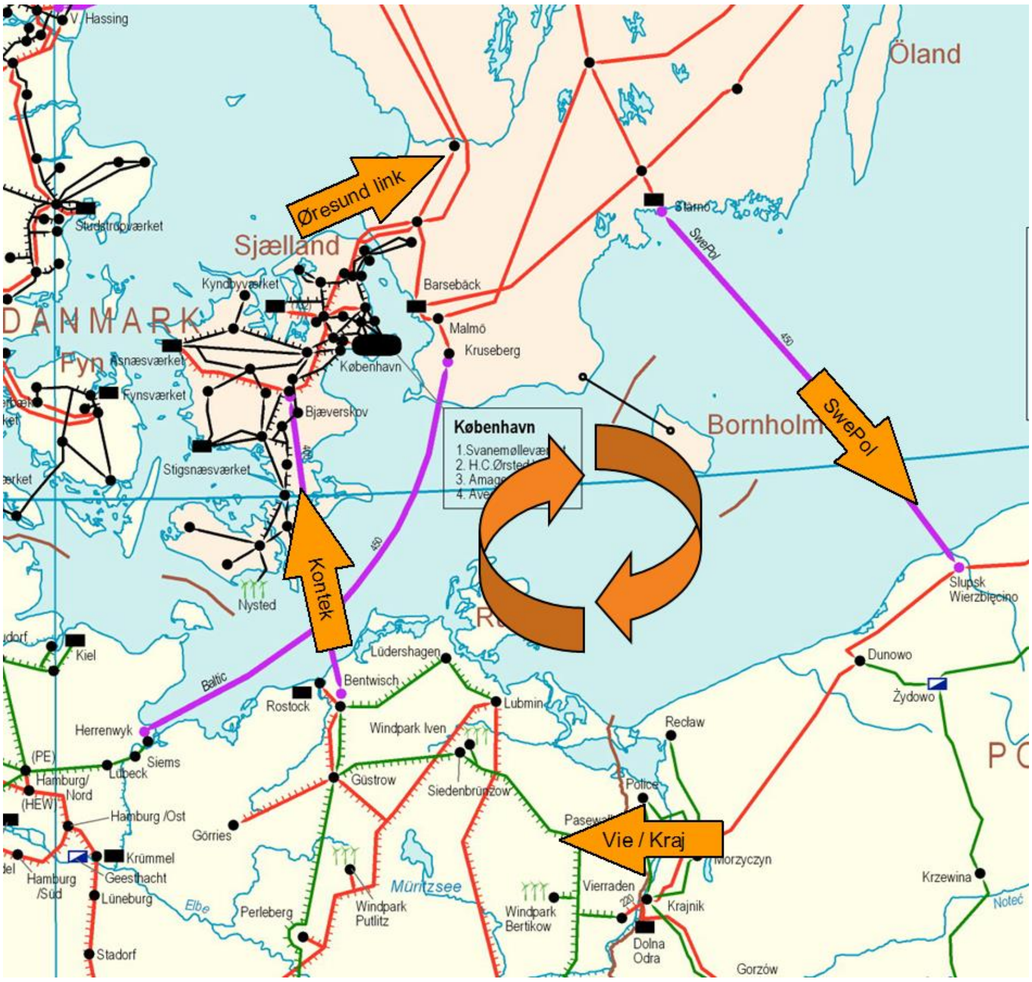


Figure 2 Connections involved in the DC Loop used currently across the Baltic Sea (clockwise DC loop)

Depending on the direction of the power-flow change, the DC Loop can be clockwise or counterclockwise. It relieves operational security limits on the German-Poland and Denmark-Sweden border as well as voltage problems on both sides of the interconnections. The maximum amount of power to be rescheduled in a closed loop is limited by the lowest free transmission capacity available on the affected profiles in a given time period. Due to the intraday market, the feasibility of the agreed and planned current DC loop flow schedule has to be verified on an hourly basis in the preparation frame of the next operational hour.

With the development of DC interconnections between countries in the Baltic Sea, the usage of the DC Loop can be extended with other connections also involving adjacent regions such as CCR Baltic.

5. Consistency with other Hansa methodologies

The Hansa ROSC Methodology follows the previous definitions of which network elements that are considered for CCR Hansa. This view is chosen to maintain consistency in the business processes for capacity allocation and operational security analysis as well as outage planning and adequacy assessment. Not maintaining consistency through the business process will create a cumbersome management and increase the risks in the business process.

XNE are therefore defined as the CNE in the CCM for DA/ID as well as LT CCM which are the interconnectors. The scope of CCR Hansa with regards to secured elements is as defined in Article 15 of Hansa ROSC Methodology the XNEs.

6. Possible interdependencies with EB Regulation

At the moment there is no direct dependency between Hansa ROSC and EB Regulation, but in the future there might be a dependency with Article 40 and Article 41 of EB Regulation, e.g. to take into account the results of the Cost-Benefit-Analysis in the ROSC process as the common reservation of balancing power impacts cross-zonal capacities and operational planning processes and consequently remedial actions.

7. Justification of selection of two RSCs for CCR Hansa

CCR Hansa appoints the Nordic RSC and TSCNET as the regional security coordinators to perform the tasks, according to SOGL Article 77(3). The consideration behind the appointment stems from the following aspects;

1. RSCs to be considered: An RSC is either a company or a joint office owned by its clients, the TSOs. It performs services for the TSOs, e.g. coordinated security assessment, capacity calculations, outage planning coordination, amongst others. Performing such critical services requires an RSC to be equipped with in-depth expertise in power system operation, IT tooling, and coordination skills with TSOs and neighbouring RSCs, etc. Currently, there are five RSCs in Europe available that CCR Hansa could appoint (see figure below).

Figure 3 RSCs in Europe

2. The Nordic RSC, owned by the Nordic TSOs including Energinet, provides services for the TSOs of CCR Nordic and Norway and is foreseen to be appointed as the regional security coordinator of CCR Nordic. Similarly, the four Central European (CE) TSOs in CCR Hansa and Energinet are currently being supported by TSCNET in providing various services, for instance in the TSC-wide DACF process. It is foreseen that TSCNET will be appointed as one of the regional security coordinators in CCR Core. The rest of the three RSCs either do not have an existing service arrangement with any of the Hansa TSOs or cannot be considered redundant in terms of the current existing services between the Hansa TSOs and TSCNET or the Nordic RSC.
3. CCR Hansa definition: Geographically, CCR Hansa is located between CCR Nordic and CCR Core and links the Nordic and CE synchronous areas. It is efficient for CCR Hansa to appoint its regional security coordinator considering the appointment of its neighbouring CCRs. This will mean that

the RSCs which today have an in-depth knowledge of the grid in a given geographical area will keep this focus and will not have to master new parts of the grid, which would take significant time.

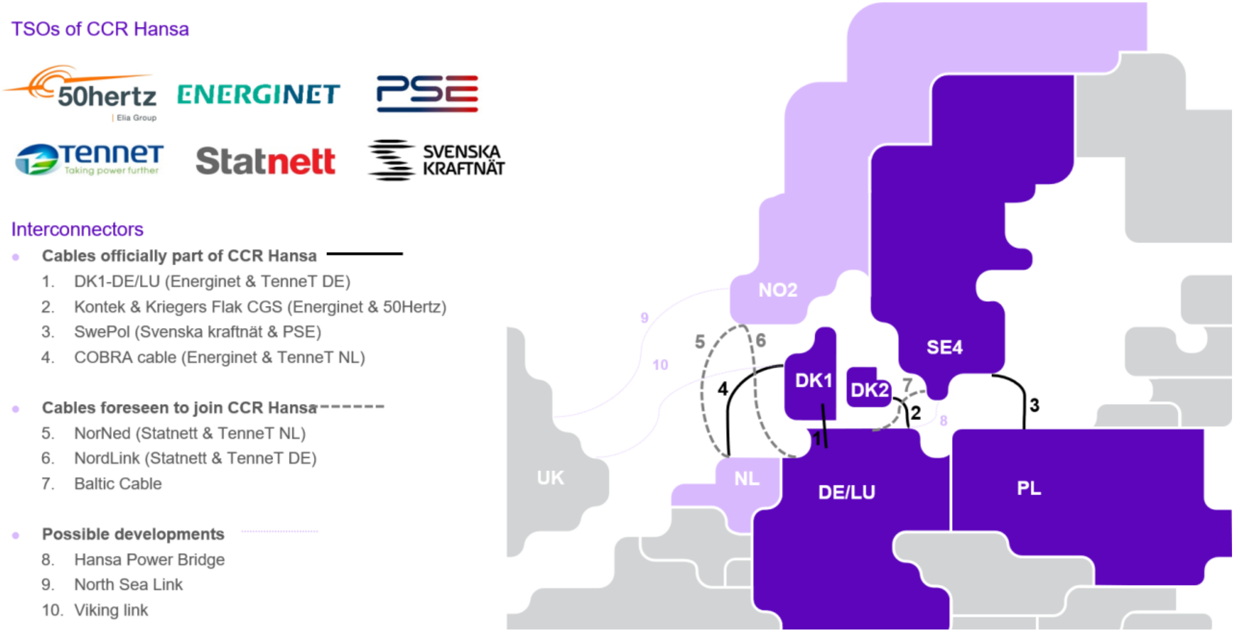


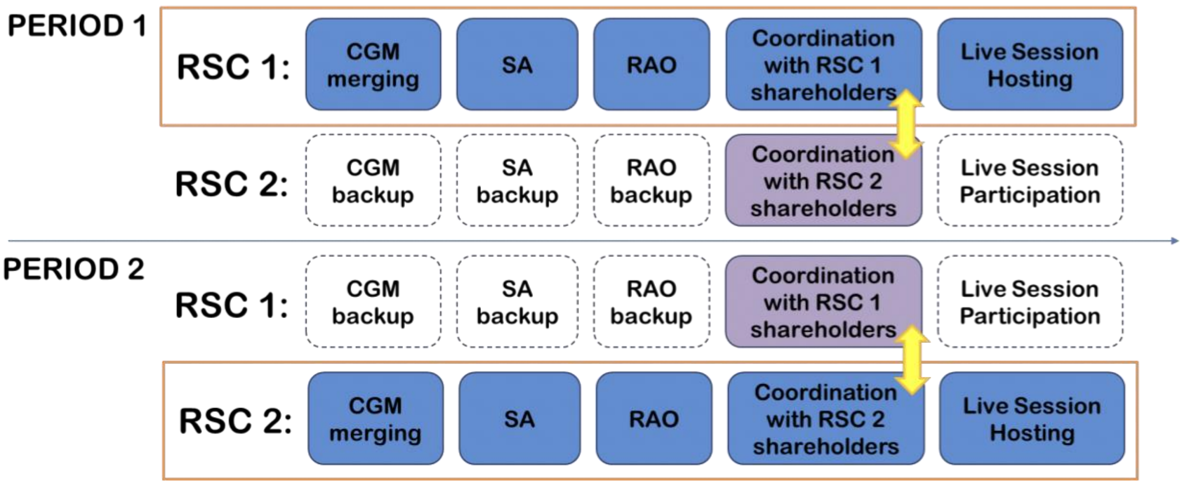
Figure 4 Current and future interconnections of CCR Hansa

4. Practical considerations (data security): The CCR Hansa TSOs consist of six TSOs, being three Nordic TSOs and four CE TSOs, with Energinet being part of both synchronous areas. The data security policy of these TSOs is not the same. Specifically, Swedish national security legislation requires Svenska kraftnät to only share its IGM if the 'Operational Planning Data Environment (OPDE) secret' level is fulfilled. OPDE Secret being the highest security level for the data exchange, defined by ENTSO-E. Other TSOs require 'OPDE confidential' security level, being the second most secure data exchange level. The IGMs of 'OPDE secret' TSOs are not allowed to be shared with other TSOs/RSCs that only require and are only equipped to handle lower security levels. The Nordic RSC aims at and is working towards achieving the highest 'OPDE secret' level, whereas TSCNET is equipped to handle the 'OPDE confidential'. In order to receive the 'OPDE secret' IGMs, all involved TSOs and RSCs must upgrade their security level to 'OPDE secret'. Such an upgrade is not planned for and is not foreseen to be in place before the go-live of operational data exchange, which is essential for all services that the RSCs need to perform. This leads to the conclusion that, for the foreseeable future, the IGMs of Svenska kraftnät cannot be shared outside the Nordic TSOs and the Nordic RSC.
5. The TSOs of CCR Core use a different format for the current exchange of IGMs than the TSOs of CCR Nordic. This is foreseen to be aligned during the implementation of CGMM. Before the implementation of CGMM it will be difficult share information through IGMs of different data structures as it is cumbersome to merge the two different file structures into a CGM.
6. In all development of CCR Hansa methodologies, the aim is to bridge the gaps between the methodologies in CCR Core and CCR Nordic. CCR Hansa does not want to duplicate work already done for these CCRs, but rather facilitate a close inter-CCR cooperation. Additionally, it will be efficient for the TSOs to avoid direct involvement with many RSCs. Bringing in a new RSC would complicate all processes and communication, increasing the risk of mistakes being made as well as duplicating setup cost. Adding new tasks for CCR Hansa will only represent a small extension of responsibility for Nordic RSC and TSCNET and will give each TSO one RSC as single point of contact.

Based on the considerations stated above, the CCR Hansa TSOs propose to appoint both Nordic RSC and TSCNET as the regional security coordinators, to jointly perform the tasks for the CCR Hansa TSOs.

8. Rotational principle

Regional operational security coordination will be carried out based on a Rotational Operating Model. In case of the **Rotational Operating Model**, two (or more) RSCs carry out a task on a rotational/alternating basis, while both (all) RSCs have a role in the process at each rotation period. The Leading RSC of a specific rotation period has the overall responsibility for the whole process, carries out the process and shares the output with the other RSC(s). For the parts of the process that require specific expertise on each TSO's grid and/or coordination/communication with the TSOs, the Backup RSC contributes with its expertise to support the Leading RSC, whenever needed. The Backup RSC has the overall responsibility to act as a redundant RSC for the Leading RSC whenever needed.



For the transition from the current situation to the target solution, the advantages of the involvement of two RSCs are the following:

- **Business change:** having both RSCs involved ensures smooth transition from current RSC-specific day-ahead congestion forecast (DACF) processes towards the regional ROSC processes. This optimizes the expertise needed, reduces the implementation risks and increases the transparency, saving cost both in the development stage and in operation.
- **Reduction of implementation risks**: minimizing the magnitude of change over a time period will also minimize costs for RSCs and TSOs, dividing the total costs over a longer period of time, as well as ensuring that the costs borne are justified and contribute towards the end target (reducing also the risks related to managing the budget in case of scope changes), as well as minimizing the risk for delays in the overall implementation project

The main advantages of using the rotational principle in the target solution are the following:

- **Resilience:** continuous backup by the Backup RSC ensures business continuity, minimizes/avoids delays in the CSA process in case the Lead RSC process fails; Backup RSC role reduces the risks of miscommunication and lack of coordination in case of stressed situations
- **Resourcing and high-level cost assessment**: common IT solutions of RSCs provide significant savings in the development phase and reduce the operational costs of the IT solutions.

- **Expertise:** RSCs need less time compared to other models to build and maintain expertise on the TSOs power network and operational rules that is required to fulfil the obligation of designing and optimizing sets of RAs, which will provide a significant saving on the training costs
- **Transparency:** through the Rotational Model, with both RSCs involved in the effective regional operational security coordination, the interoperability of tools and processes in one region and between different regions will be ensured. This will reassure that RSCs report on behalf of all TSOs and reinforce transparency and neutrality for the European consumer.

The advantage of the Rotational Model with Leading RSC is that it is also in line with Article 35(1) of Commission Regulation (EU) 2019/943 of 5 June 2019 (“Clean Energy Package”), meaning that no major changes in the process will be required for the proposal of establishment of RCCs due in June 2022. It is also important to note that RSCs will annually have to detect the issues reducing the effectiveness and efficiency of the processes, allowing to suggest improvements in processes and allocation of tasks between the RSCs, covering also the requirements of Article 77 of SO Regulation. These assessments will allow to identify possible inefficiencies early on.

9. National legislation

CCR Hansa encompasses bidding-zone borders for Denmark, Germany, the Netherlands, Poland and Sweden (Norway ratified the third package of energy legislation in 2019 and is expected to join the CCR during 2020). In order for the methodology to be implementable by the TSOs in their respective countries, the TSOs must adhere to the relevant national legislation independent of the European Energy legislation.

The Swedish Public Access to Information and Secrecy Act defines requirements for sharing of information vital for Sweden. The Swedish society is highly dependent on the supply of electrical energy. A consequence of this is that information regarding the transmission system is encompassed by the national security legislation.

Some of the data to be exchanged according to Hansa CCR ROSC may be subject to the Swedish Public Access to Information and Secrecy Act (2009:400). This may restrict the ability of Svenska kraftnät to exchange such data and that such data may only be exchanged with the Nordic RSC or other TSOs once certain conditions are met.

The provisions in article 10 of the ROSC are defined to ensure that national legislation is respected by all parties.

10. Response to consultation comments

The CCR Hansa ROSC methodology was available for public review from 17 October to 15 November on the ENTSO-E consultation platform. No comments were received from the public during the consultation.

11. Process for the interim solution

The high-level processes of Hansa interim solution, as foreseen based on current knowledge, is depicted in the following figures.

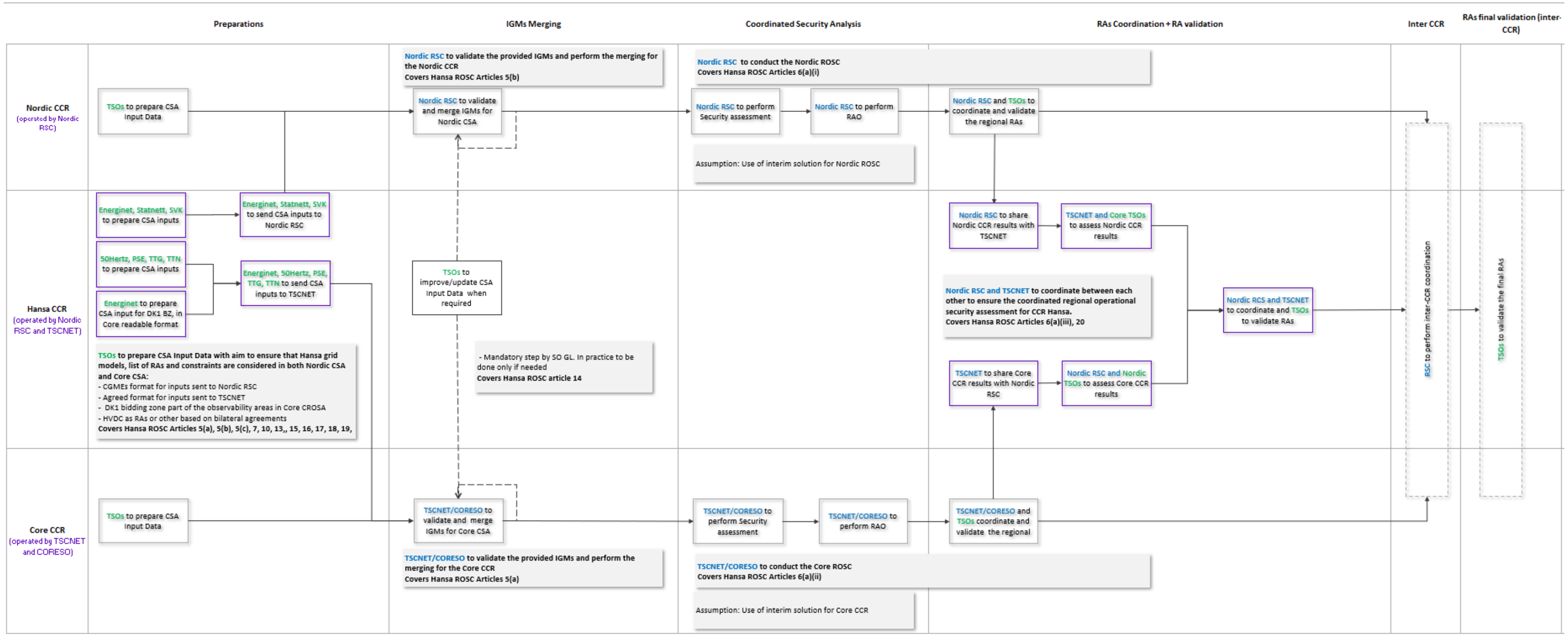


Figure 5 High-level process for Hansa interim solution