



# **NWE Day-Ahead Market Coupling Project**

**2<sup>nd</sup> Progress Report**

**October, 2012**



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## 1. Introduction

As announced when sending the 1<sup>st</sup> Progress Report, this was to be followed by a second report giving a further update of the progress in the NWE Price Coupling project.

This 2<sup>nd</sup> Progress Report provides a description or update of the following topics:

- Confirmation and changes of the design assumptions
- Detailed high level functional architecture of the NWE solution (updating the information provided in the 1<sup>st</sup> report) and the regional functional architecture variants.
- Shipping arrangements for the CWE-Nordic and GB borders
- Losses on DC cables in NWE Price Coupling
- Normal and backup procedures
- Fall back
- New governance arrangements
- Project Planning

Most subjects mentioned above still concern work in progress, so it is possible that changes may occur. If this is the case the next report will highlight these changes.



## 2. Confirmation of and changes to the design assumptions

### 2.1. Use of PCR Matcher and Broker as market coupling system for NWE.

The market coupling systems used in CWE, Nordic-Baltic and ITVC (via EMCC) will be replaced by the PCR Matcher and Broker (PMB) systems which will be implemented in each NWE PX IT system and operated by each NWE PX. This system embeds the PCR Algorithm developed by the NWE PXs together with OMIE and GME and is intended to be the algorithm used for European Price Coupling (EPC).

### 2.2. Re-use of systems and procedures of TSOs and PXs (except market coupling system and shipping arrangements)

All systems and procedures of TSOs and PXs currently used in the CWE and Nordic-Baltic regions are re-used as much as possible. It has become apparent however that some of these systems will need changes to adapt to the NWE solution.

So far the actual changes that need to be implemented to these systems are still under discussion. It is clear however, that the choice of shipping solution has an impact on the systems used.

### 2.3. CWE –Nordic physical and financial settlement

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### 2.4. GB virtual hub implementation and CWE – GB physical and financial settlement

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#### 2.4.1. CWE - GB physical and financial settlement

For the physical and financial settlement on the FR/GB border (IFA interconnection) and for the shipping on the GB/NL border (BritNed interconnection) the discussions on the final solution and its details are still ongoing.

#### 2.4.2. Intra GB physical and financial settlement



For the physical and financial settlement on the virtual infinite capacity, the discussions on the final solution and its details are still ongoing.



## 3. High level architecture of NWE Price Coupling (update)

### 3.1. High-Level architecture overview

The high-level architecture overview shown below is explained in the following sections of this chapter which are devoted to:

- The system components shown,
- The Agents (non-automated entity interacting with one or more systems and is represented in the diagram as abstract human figures) shown,
- The information produced and exchanged,
- The indicative sequence in which the information is produced and exchanged,
- A glossary, explaining the terms used in the diagram and the remaining text of this chapter, which is added in Annex 1.

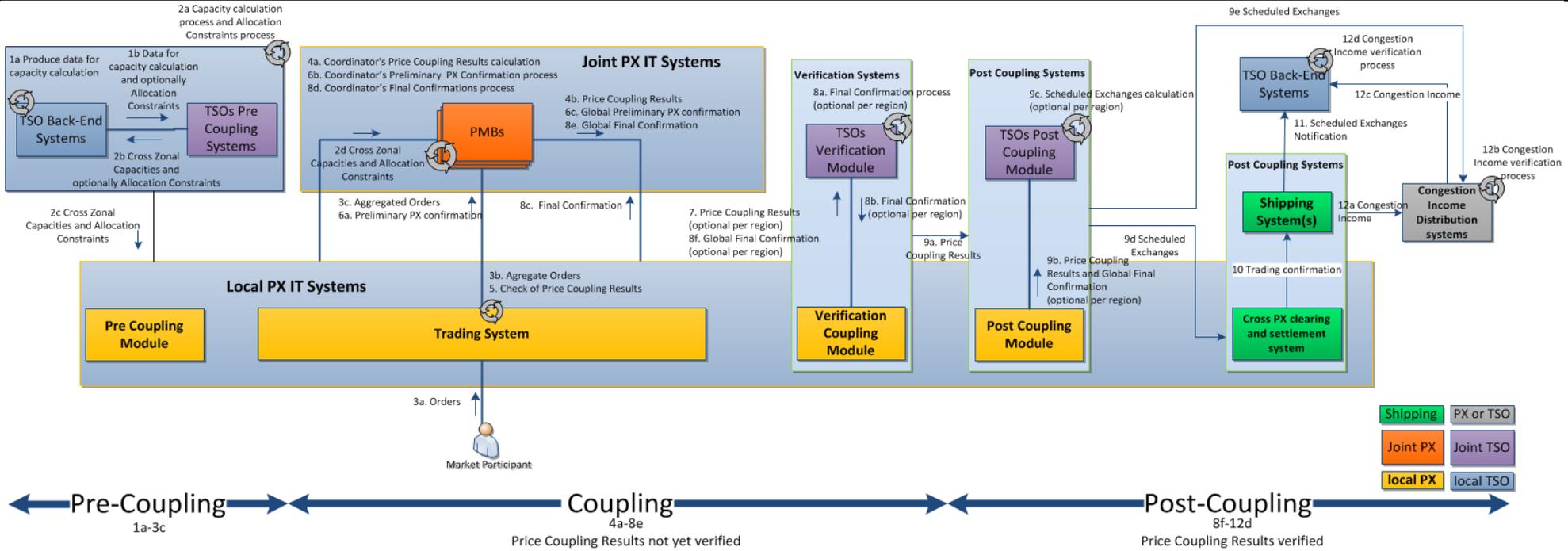


Figure 1 Overview on High Level Architecture of NWE Price Coupling



### 3.2. Systems

The list of systems below reflects the current design assumptions.

In the architecture diagram, the system components further called Price Coupling Components that are expected to play a role in the Price Coupling are indicated with rectangles. These components may either be existing systems adapted to the Price Coupling or systems to be newly built.

From an information perspective, a System can be thought of as a set of information processing functions, which can be considered a separate entity. The systems in this chapter consist of the maximum number of systems that must be available for the Price Coupling in NWE. For some regions a smaller number of systems will be necessary

The following Systems are distinguished.

- **The TSO Back End Systems:** The back-end systems of the TSOs involved in the individual areas are grouped together as the ‘TSO Back-End Systems’.
- **The TSO Pre Coupling Systems:** This consists of systems jointly owned or operated by several TSOs, which mainly produce Cross Zonal Capacities under a common grid model and a coordinated capacity calculation methodology. The existing TSOs Pre Coupling Systems for CWE, Nordic and GB regions will be adapted to allow the exchanges of data with the PX IT Systems in accordance with the PCR Architecture solution.
- **Local PX IT Systems:** Although the architecture can be different from one PX to the other, each Local PX IT System includes the following functions:
  - A Pre Coupling Module: receives the Cross Zonal Capacities and the Allocation Constraints from the TSOs and sends it to the PMB.
  - A Trading System: collects the Orders from the Market Participants for a Bidding Zone and provides them with their Individual Results. It is also responsible for checking and validating the Price Coupling Results provided by the Joint PX IT Systems (PMB). The checks are under local Power Exchange responsibility but merely consist in verifying that Price Coupling Results are compatible with the accepted Orders.
  - Verification Coupling Module : see Verification module
  - Post Coupling Module: see Post Coupling Systems
  - the ‘Cross-PX Clearing and settlement System’: see the Post Coupling Systems.
- **Joint PX IT Systems:** This consists of the PMB. The PMB is a system which embeds the PCR Algorithm and links the different PX IT Systems. This system is to be built and will be installed in each PX. This is a distributed system delivered within the PX based PCR project and consisting of Broker and Matcher components. Each participating PX runs at least one Broker as well as one Matcher. The Broker is the component responsible for input and output of information; the Matcher is the component running the coupling algorithm which calculates the NWE Price Coupling Results. On any given day, one of the PXs will assume the role of Coordinator, whereas others will assume the role of Hot Backup or Operator. The



PCR algorithm calculates the NWE Net Positions, Prices and Scheduled Exchanges on the non CWE interconnectors.

- **The Verification Systems:** This consists of
  - **The TSOs Verification Module** which checks the Net Positions and the Scheduled Exchanges calculated by the PMB. The existing TSOs Verification Module for CWE region will be adapted to check the Scheduled Exchanges calculated by the PMB.
  - **The Verification Coupling Module** which either handles communication between the PMB and the TSOs Verification Module or validates the Net Positions and the Scheduled Exchanges on behalf of the TSOs. When it handles communication between the PMB and the TSOs Verification Module, it provides the Price Coupling Results to the TSOs Verification Module and receives the Final Confirmation from the TSOs Verification Module and optionally provides the Global Final Confirmation to the TSOs Verification Module.
  
- **The Post Coupling Systems:** This consists of:
  - **The TSOs Post Coupling Module** which mainly produces the Scheduled Exchanges between the Bidding Zones as a result of the Price Coupling.
  - **The Post Coupling Module** which is responsible for distributing the Price Coupling Results that have been verified to the relevant Post Coupling systems.
  - **The ‘Cross-PX Clearing and settlement System’** which supports the shipping process. It is responsible for integrating the Scheduled Exchanges from the relevant Post Coupling Systems and providing the shipping entity with needed information. Its connection with the Trading System is considered as an internal process in the local PX IT Systems.
  - **The Congestion Income Distribution Systems (CID Systems)** which collect and check the Congestion Income and distribute the share of the Congestion Income for each TSO. The CID systems should remain as they were for the CWE and Nordic region. The CID systems for the Nordic-CWE links still need to be agreed. The CID systems for GB-CWE links still need to be agreed.

Systems are interconnected via Interfaces. Each Interface serves one or more information flows. The different information flows are defined in Annex 2.

### 3.3. Information produced and exchanged

The information produced and exchanged is represented in the diagram by arrows with a label. The small arrows point in the direction of the information flow. The circular arrows indicate information produced in processes internal to a System. The label indicates the contents of the piece of information transferred or produced. The sequence of production and transfer of information is shown in Annex 2 of this document.

The real frequency, timing and sequences will be defined in the procedures.



It should be stressed that only flows of information are shown in the diagram. Other flows, like energy and financial flows, are not taken into account.

### 3.4. Regional implementations CWE, Nordic ,GB

#### 3.4.1. CWE Region

This chapter contains the CWE high-level functional architecture and business process under the current NWE design assumption. CWE-GB (FR→GB), NL-NO and DE-DK1 Business processes which involve CWE systems (owned by TSOs, PXs, CCPs) are also included in this HLA.

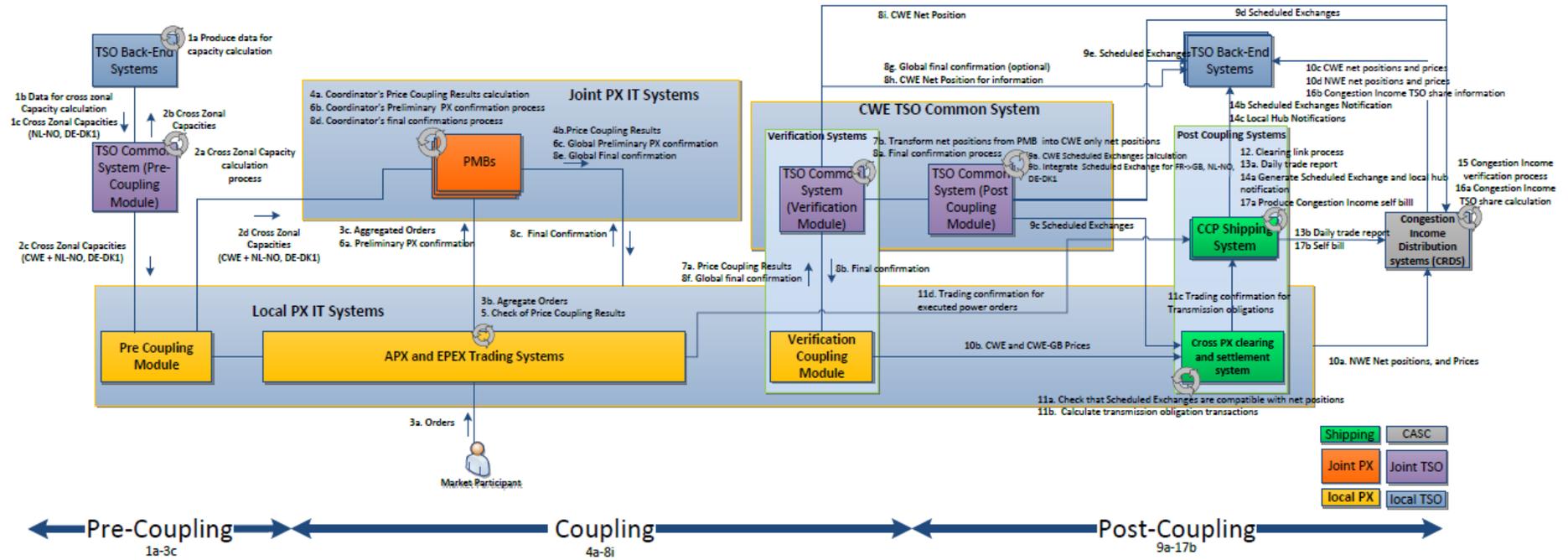


Figure 2 Overview on CWE High Level Architecture



The following Systems are distinguished in the CWE region:

- **The TSO Back End Systems**: The back-end systems of the TSOs involved in the individual areas are grouped together as the ‘TSO Back-End Systems’.
- **The TSOs Pre Coupling System**: is the CWE TSO Common System (pre coupling module) which produces the Cross Zonal Capacities currently under ATC methodology. It is expected that the CWE TSO Common System will move towards a Flow-Based methodology soon after the NWE PC launch.
- **The Local PX IT Systems** consists of:
  - Pre-Coupling Module are the APX and/or EPEX pre-coupling systems used to receive the Cross Zonal Capacities and Allocation Constraints from the CWE TSOs and send them to the Broker-module within the PMB system
  - The Trading System collects the Orders from the Market Participants for each Bidding Zone of CWE region and provides them the Individual Results. The Trading Systems used by the PXs involved (APX and EPEX) are represented as the ‘APX or EPEX Trading System’.
  - Verification Coupling Module : see Verification Systems
  - the ‘Cross-PX Clearing and settlement System’ : see the Post Coupling Systems.
- **The Joint PX IT Systems**: Refer to the description in the generic NWE HLA where it is described in detail.
- **The Verification Systems** consists of:
  - **The TSO Verification Module**. The TSO Verification Module is within the CWE TSO Common System. It validates the NWE Net Positions for the CWE Bidding Zones and the Scheduled Exchanges on the non-CWE interconnectors (when required by the relevant TSOs). This module also calculates the CWE Net Positions (derived from the NWE Net Positions and the non-CWE Scheduled Exchanges).
  - **The Verification Coupling Module** which is a local PX IT system (EPEX/APX) that
    - handles communication between the Broker-module of the PMB system of each PCR PX and the TSO Verification Module. In doing this, the Verification Coupling Module provides the Price Coupling Results to the TSO Verification Module and receives the Final Confirmation from the TSO Verification Module.
    - When all local Verification Coupling Modules have sent the Final Confirmation to the PMB Coordinator, the PMB Coordinator provides the Global Final Confirmation to the Verification Coupling Modules of the CWE PXs. This Global Final Confirmation is sent from the PXs to the TSO Verification Module.
- **The Post Coupling Systems** consists of :



- **The TSOs Post-Coupling Module.** The TSO Post-Coupling Module is within the CWE TSO Common System. It produces the Scheduled Exchanges between the CWE Bidding Zones as a result of the Price Coupling. This process is called the CWE bilateral exchange calculation (BEC). This module also integrates the Scheduled Exchanges for the respective interconnectors (CWE-GB (FR→GB), NL-NO, DE-DK1).
- **The ‘Cross-PX Clearing and settlement System’** which will support the shipping process. Its connection with the APX or EPEX Trading System is considered as an internal process in the APX or EPEX Local PX IT systems
- **The Congestion Income Distribution Systems (CID Systems)** which collect and check the Congestion Income and distribute the share of the Congestion Income for each TSO. This process is performed by the CRDS.
- **The CCP Systems** are the shipping systems of the CCPs which perform the clearing, settlement and nomination in the CWE region and CWE-GB (FR→GB) (APX ENDEX and ECC).

The sequence of production and transfer of information in the CWE region is shown in Annex 2 of this document.

#### 3.4.2. Nordic – Baltic region

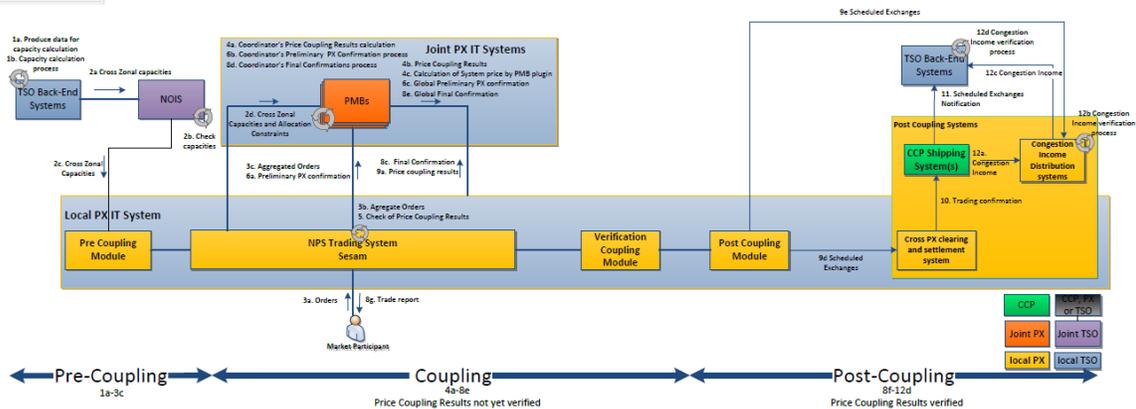
This chapter contains the high-level functional architecture (HLA) and business process for the Nordic-Baltic region based on the current NWE HLA design assumptions..

It structurally follows the generic NWE level HLA description in chapter 2, but instead of repeating all that is stated there the focus is to clarify the processes in the Nordic-Baltic setup that may differ from either the generic NWE level or other NWE sub-region HLA's.

For simplicity a few distinctions of what the term module refers to linked to specific processes are not included, due to not deemed of importance in this HLA description.

Furthermore, a description of NPS Systems for publication and distribution of NPS Elspot Market inputs (ex. Area-to-Area Capacities) as well as NPS Price Coupling results is also not described in this HLA, but will to the extent deemed needed be detailed in separate documents.

Finally, there may be minor adjustments made in the processes and modules applied for them before go-live of NWE Price Coupling.



**Figure 3 Overview on Nordic-Baltic High Level Architecture**

To be noted is that the HLA above does not display the details in place linked to backup and fall-back systems for the Nordic-Baltic sub-region in case of for example disturbances in data distribution between different Agents or in the case of decoupling from CWE.

In the architecture diagram, the system components further called Price Coupling Components that are expected to play a role in the Price Coupling are indicated with rectangles. These components may either be existing systems adapted to the Price Coupling or systems to be newly built.

The following systems are distinguished and relevant in Nordic-Baltic context.

- **The TSO Back End Systems:** The back-end systems of the TSOs involved in the individual areas are grouped together as the ‘TSO Back-End Systems’.
- **The TSO Pre Coupling Systems:** This consists of systems jointly owned or operated by several TSOs, which mainly produce Cross Zonal Capacities under a common grid model and a coordinated capacity calculation methodology. The existing TSO Pre Coupling Systems for Nordic-Baltic will to the extent needed be adapted to allow the exchanges of all the grid related input data expected from Nordic-Baltic TSOs towards NPS PX IT Systems in accordance with the PCR Architecture solution.
- **Local PX IT Systems:** NPS Local PX IT Systems includes the following functions related to the NWE Price Coupling:
  - NPS PX Pre Coupling Module: receives the Cross Zonal Capacities and the Allocation Constraints from the TSOs NOIS system, stores it locally in DB and in SESAM TS, and sends it to the PMB via the Broker Cloud, and based on MPLS, or as backup via Internet.
  - The NPS PX Trading System (TS) SESAM: It collects the Orders from the Market Participants from all Bidding Zones within NPS Elspot Market, and aggregated and anonymized Orders from PolPX Polish spot market, and provides the Elspot Members with their Individual Results and PolPX with aggregated results for Poland. Also it aggregates and sends in anonymized form all the Orders to the PMB system via the Broker Cloud. It is also responsible for converting Orders received in currencies other than EUR into



EUR before submitted to the PMB, and likewise after the Price Coupling via PMB is finished converting the results back to the given non-EUR currencies.

Finally, checking and validating the Price Coupling Results provided by the Joint PX IT Systems (PMB & embedded Algorithm, Euphemia) is facilitated in parts via the validations established in the Coordinator-Hot Backup-Operator setup between participating PXs and in parts via the portfolio allocation tool linked to NPS' TS, i.e. what in the picture is referred to as NPS Validation Module, which transposes the global Bid Area results into individual results per Participant per Time Period and Bid Area, and implicitly also confirms and prepares the Area-to-Area schedules (flows) within the given capacity limits.

- NPS Post Coupling Module: See Post Coupling Systems
  - NPS PX Clearing and Settlement system, named SETS, and its' link to 'Cross-PX Clearing and settlement System': see the Post Coupling Systems.
- **Joint PX IT Systems:** This consists of the PMB (PCR Matcher/Broker) and embeds the PCR Algorithm and is linked with relevant NPS PX IT Systems. NPS will in the rotating scheme agreed between NWE (PCR) PXs assume the role of Coordinator, and Hot Backup respectively, and in addition otherwise always be active as Operator for validation purposes, as well as for daily calculation of Nordic System Price which is made via a PMB Plug-In. In case of a decoupling from CWE NPS will perform Price Coupling for the Nordic-Baltic Market, including the link to Poland, and System Price Calculation, via the PMB Decoupling Plug-In that also embeds the PCR Algorithm and other PMB features but in isolated mode. The PCR algorithm calculates the NWE Bid Area Net Positions, Area Prices and Scheduled Exchanges (flows) on the interconnectors within Nordic-Baltic, and also Sweden-Poland, and between Nordic and CWE.
  - **The Post Coupling Systems:** This consists of in the Nordic-Baltic setup:
    - **The NPS Post Coupling Module** which is responsible for distributing the Price Coupling Results that have been verified to the relevant Post Coupling Systems.
    - **The 'Cross-PX Clearing and settlement System'** which is named SETS and which will support the shipping process between CCPs, as this will become the solution applied for the Nordic-CWE interconnectors instead of as today between EMCC and the respective CCP. It is responsible for integrating the Scheduled Exchanges from the relevant Post Coupling Systems and providing the shipping entity with needed information. Within the Nordic-Baltic region it is NPS that assumes the Shipping responsibility and then based on full physical and financial firmness given by relevant TSOs. Its connection with the Trading System is considered as an internal process in the NPS PX IT Systems.
    - **The Congestion Income Distribution Systems (CID Systems)** which collect and check the Congestion Income and distribute the share of the Congestion Income for each TSO is for Nordic-Baltic interconnectors in NPS Elspot Market facilitated via SETS, which will also be used, somewhat adjusted, by



NPS since the CCP solution has been chosen for the CWE-Nordic (“ITVC”) interconnectors.

The sequence of production and transfer of information in the Nordic-Baltic region is shown in Annex 2 of this document.

#### 3.4.3. GB region

The details for the architecture for the GB region as described under section 2.4 are still under discussion and will be included in the next report.



## 4. Shipping arrangements for the CWE-Nordic interconnections

### 4.1. Shipping arrangements for the CWE – Nordic borders

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#### 4.1.1. CCP shipping solution

The shipping solution comprises of distribution of the responsibility for settlement on the respective cables/interconnectors among the CCPs, where for each such cable/interconnector only one CCP performs the cross border shipping function by means of nominating the flows in both directions. The distribution of congestion rent is agreed upon between the CCP responsible for each cable and the corresponding capacity owners.

The table below provides an overview on the involved parties:

<b>Borders / Interconnectors</b>	<b>TSOs (SOs)</b>	<b>Capacity Holders</b>	<b>PXs (NEMOs)</b>	<b>CCP</b>	<b>“Shipping CCP”</b>
NO-NL (NorNed)	Statnett, TTB	Statnett, TTB	NPS, APX	NPS, APX	APX
DE-DK (DK1-DE)	ENDK, TTG	ENDK, TTG	NPS, EPEX	NPS, ECC	ECC
DE-DK (DK2-DE, Kontek)	ENDK, 50HzT	ENDK, 50HzT, VattenfallAB	NPS, EPEX	NPS, ECC	NPS
DE-SE (Baltic Cable)	SvK, TTG	Statkraft	NPS, EPEX	NPS, ECC	NPS

### **Financial settlement**

The CCPs interoperating in respect of a given cable/interconnector will agree between themselves the precise payment modalities that will be applied, and CCPs will retain standard payment procedures and processes where practical.

In order to reduce the cash flows that will be exchanged between CCPs, only daily net payments will be exchanged, and as a general rule each liable CCP will procure to meet the recipient CCP’s payment deadline. In the event of discrepancies in the payment cycles applied by CCPs – for instance, due to national bank holidays – standard overdraft facilities will be used to secure timely payment.

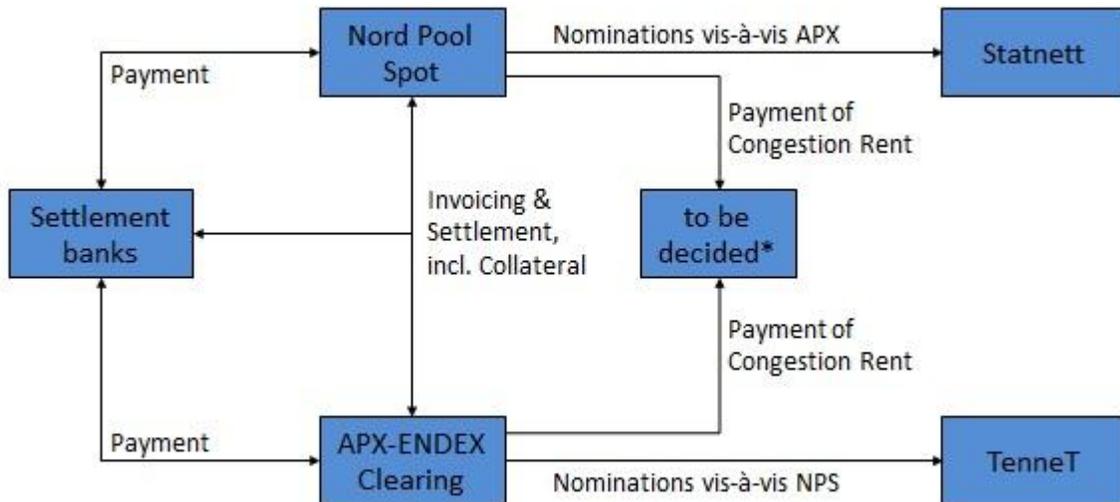


## Physical delivery

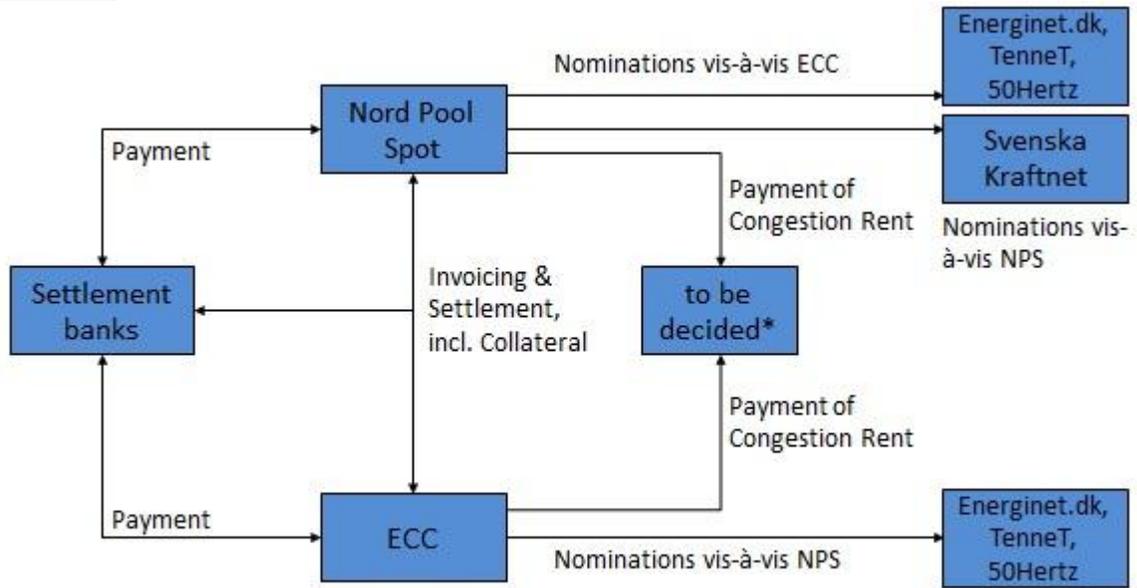
CCPs assume physical deliveries to be effected through local hub and cross nominations as per the prevailing balance responsibility arrangements in relation with the relevant TSOs, but CCPs do not assume the physical delivery risk in connection with cross border nominations made in accordance with the allocated capacities, and consider these nominations to be firm.

The following diagrams provide a schematic overview of the solution.

Note: contracts arise upon receipt of market coupling PCR results (flows, prices)



\*No party has been designated by the TSOs so far



\*No party has been designated by the TSOs so far

Figure 4 Overview on CCP shipping solution



## 5. Losses on DC cables in NWE Price Coupling

A first meeting and discussion on losses on DC cables in the NWE Price Coupling between the NWE parties and the NRAs has taken place. The NWE Price Coupling project takes notice that the NRAs' working assumption is that losses should be taken into account by the algorithm for all HVDC connections with a common method unless there are other technical constraints for certain interconnections which would pose a social cost and reduce social welfare.

In this regard, the NRAs have indicated that they need more information to better understand the impacts and the technical consequences of taking into account such HVDC losses. The NWE TSOs have received on October 1<sup>st</sup> from the NRAs a list of questions. The answers to these questions will be addressed as soon as possible by the NWE TSOs in cooperation with the NWE PXs.

The approach and criteria used for evaluating the activation of losses on specific DC interconnectors linked to Day Ahead Price Coupling within NWE shall be harmonized as much as possible in line with EU Regulation. The evaluation shall be based on the general principle of social welfare.



## 6. Normal, backup and fallback procedures

### 6.1. Introduction and terminology

In this first section of this chapter we will give a brief overview of the terminology used as well as an indication of the interrelationship between normal, backup and fallback procedures.

The Market Coupling solution is a three-phase (pre-coupling, coupling and post-coupling) process for which a number of common procedures have been created and shall be applied (included in the “NWE APCA Operations”). Execution of each phase requires the application of procedures constituting the set of NWE common procedures in order to ensure coordinated performing of the necessary actions for all of the parties involved within NWE Price Coupling. The NWE common procedures are split into several categories described in this document:

- Normal procedures (NWE\_NOR\_XX)
- Backup procedures (NWE\_BUP\_XX)
- Fallback procedures (NWE\_FAL\_XX)

The local procedures of the different regions (CWE, Nordic, GB) or PCR Project will not be detailed within the NWE common procedures. However, a Single Point of Contact (SPoC) for each region is designated to be in charge of (monitoring) the update/follow-up of the local procedures in accordance with the common procedures.

The common procedures, including PCR procedures, will be included within the NWE APCA Operations.

Next to the Normal, Backup and Fallback procedures, there will additionally be some special procedures describing for example the procedure for the short- and long clock change (DST procedures).

#### 6.1.1. Definitions

The following scheme provides an overview of the relation and time slot when these different procedures shall be applied during the operational processes.

Three concepts must be kept in mind when reading the procedures:

- **The Target Time** is the latest timing applied in production for completing a normal procedure on a day to day basis. Completion of a normal procedure is generally performed before that time.
- **The Latest Fallback Time** is the latest timing for triggering the fallback procedure (i.e. prepare the decoupling).
- **The Decoupling Deadline** is the timing defined as critical for NWE Price Coupling meaning that, after this timing, NWE Price Coupling cannot be performed and relevant bidding zones and/or interconnectors are decoupled (i.e. capacity is not allocated via Price Coupling).



Note that Normal procedures may still apply after target time provided that it is still feasible to use the Normal procedure. If before the target time it becomes clear that Normal procedures will not be usable in time, it may be decided to start the back-up procedures before the Target Time. The same reasoning applies to the Latest Fallback Time. By contrast, the Decoupling takes place after the Decoupling Deadline.

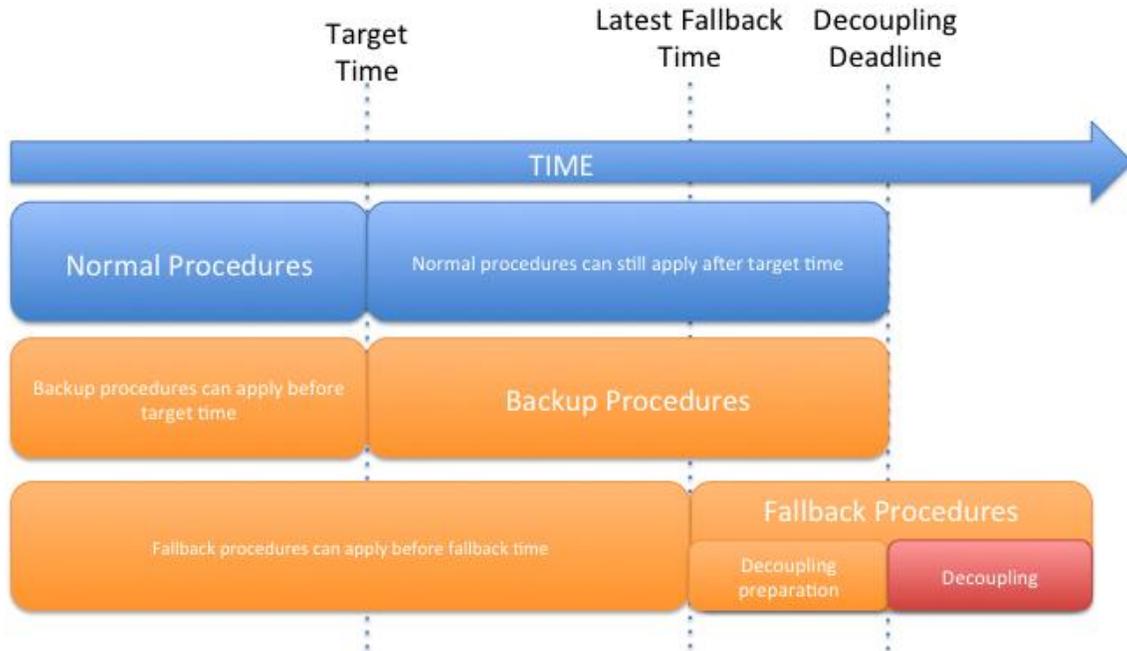


Figure 5 Sequence of NWE common procedures

## 6.2. Normal procedures

During each phase, a number of common procedures will be operated under normal conditions. These procedures are called the Normal procedures (NWE\_NOR\_XX) and describe, for each phase, the normal actions to be performed by NWE parties in a clear weather scenario. Normal procedures are performed before the Target Time on a daily basis. The following Normal procedures are currently being drafted in addition to the PCR procedures and all local procedures.

- NOR01: CZCs and Allocation Constraints submission and publication
- NOR02: Final validation and publication of the results
- NOR03: Scheduled Exchanges calculation and transfer
- NOR04: Trading confirmation and scheduled exchanges notification



### 6.3. Backup procedures

Backup procedures (NWE\_BUP\_XX) describe the backup actions that are available in order to overcome issues. A backup procedure should be triggered once the target time associated with a specific process step cannot be met or it is foreseen that it will not be met with Normal Procedures.

Backup procedures are available so that the NWE Market Coupling can still be operated for all its steps (i.e. fallback is not triggered).

### 6.4. Fallback procedures

This chapter describes the ongoing discussion regarding the fallback options. The solutions described have not yet been approved.

Fallback procedures are triggered when the normal or backup (detailed in section 6.5) procedures have failed. In any case fallback procedures are triggered after the latest fallback time.

In this example for the CWE region, fallback procedures can be split into two parts:

- Preparation of the decoupling: incident committee is triggered and actions (for instance CWE shadow auctions) are taken in preparation for decoupling in case the issue is not solved before the latest fallback time.
- Decoupling of the relevant interconnectors from the NWE Price Coupling process:
  - Capacities are allocated via explicit auction for the decoupled interconnectors and set to 0 within the coupling process.
  - Order books are reopened for market participants and a new price calculation is launched.

Within NWE, several fallback procedures exist, applying either to all borders of a single bidding zone or to specific borders, in order to manage unforeseen situations. In case the issue is solved before the decoupling deadline, performing of the fallback procedure can be stopped (i.e. no decoupling is performed).

#### 6.4.1. What is fallback

A fallback situation occurs when the price coupling results for one or more borders cannot be published before the critical deadline, for any reason. If this is the case the fallback procedure is triggered.

The PCR system can handle any partial decoupling. This means that, in the case of an issue, not all borders will by definition be decoupled. The PCR system allows that only the concerned borders are decoupled, meaning that several partial decouplings can be processed at the same time.

The following scheme indicates the possible reasons for a fallback situation and also indicates which borders need to decouple in such cases. Please note that this scheme is still under discussion.



#### 6.4.2. Fallback solutions in NWE

For the fallback solution the NWE parties will continue with the current arrangements in place for the CWE region, the Nordic-Baltic region and the CWE-Nordic interconnectors (except the Baltic cable).

For the internal borders in the CWE region and for the CWE-Nordic interconnectors (except the Baltic cable) this means using the shadow auction system of CASC as described in more detail in section 6.7.

Internally in the Nordic-Baltic region, in case the NWE Price Coupling fails, NPS will perform a price coupling 'locally' for its own region. There will not be explicit auctions on a border per border basis in the Nordic-Baltic region.

For GB, should a fallback situation be declared in advance for the next sessions of NWE Price Coupling in case of any foreseen unavailability, the fallback mode will be daily explicit auctions, which will be performed on the relevant auction platform (CMS IFA or BritNed Kingdom depending on the situation of decoupling). If required, the auction rules for these cables will need to reflect the fallback procedures. When a situation of fallback occurs on the day, IFA will perform a daily explicit auction (operational timings for bidding would be shortened compared to the previous situation) whilst BritNed will allocate the daily capacity in the following intraday auctions.

A detailed solution is currently being discussed for IFA and for BritNed.

The following specific cases are still under discussion:

- In case there is a problem concerning both the IFA and the BritNed cable at the same time, will the two bidding zones in GB (GB1=NPS/N2EX / GB2=APX UK) remain coupled or not via the infinite virtual link?

#### 6.4.3. Description of the CWE shadow auction performed by CASC

The CWE shadow explicit auction currently consists of:

- maintaining a permanent data base where all pre-registered market parties (fallback participants) may file, amend or withdraw bids for capacity. During normal operation, these bids are not used;
- should no market coupling results be calculated and validated by 13:40 on a particular day, CASC performs a fallback auction to allocate the available transmission capacities according to the merit order determined by the filed bids. From 13:40, the participants are



- not allowed to update their bids for the upcoming shadow auction as CASC takes a snapshot of the fallback database at 13:40. The results of the explicit allocation are not published immediately after calculation but instead at 14:00 in case decoupling is decided (i.e. no market coupling results are available at 14:00).
- should a fallback situation be declared in advance for the next sessions of CWE MC in case of any foreseen unavailability, the participants are allowed to update their bids according to the time schedule communicated. CASC performs a fallback auction to allocate the available transmission capacities according to the merit order.

The timings above are influenced by the timings of the current volume coupling on the CWE-Nordic interconnectors. With the introduction of price coupling in the NWE region, these timings might change.



## 7. Governance arrangements

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## 8. Planning

The NWE project managers and task force leaders have during the summer period started employing bottom up planning while identifying all remaining work in the respective task forces. The NWE project is dependent on several implementation projects and it has become clear over the summer that the design for some of these implementation projects is not finalised.

### 8.1. Development

The following five implementation projects are to be performed by a subset of NWE parties on which the NWE Price Coupling project has dependencies:

1. PCR (the PMB system with the PCR algorithm embedded).
2. The GB virtual hub implementation in GB.
3. The implementation of the physical and financial settlement for the CWE-Nordic interconnections.
4. The implementation of the physical and financial settlement for the GB – CWE interconnections and within GB (between the two GB bidding zones).
5. Regional systems – possible adaptations needed for pre- and post-coupling.

The current planning for these implementation projects is to finalize the development and local testing of these solutions by mid Q1 2013.

### 8.2. Testing

The testing of the NWE Price Coupling solution will be performed jointly by the NWE parties after the implementation and testing of each region on local/regional level.

The overall testing aims at validating the following:

- Systems implemented at local level are consistent with each other and allow the correct processing of the price coupling.
- Procedures designed by NWE are consistent with local procedures and realistic when applied in real conditions.

The testing includes the normal operations (normal procedures, see section 6.2) as well as backups and fallback (backup and fallback procedures, see sections 6.3 and 6.4).

Following test phases are foreseen:

1. Connectivity test
  - Technical tests to ensure that data can be exchanged and integrated correctly through the NWE chain
2. Integration test



- Tests on the local systems to validate that they meet the requirements in terms of functionality in an integrated environment
- 3. Simulation test
  - Tests by operations to validate that the whole chain of systems meets the requirements in real time and is consistent with the designed procedures.
- 4. Member test
  - Tests with market participants to introduce them and to familiarize them to the future NWE operational process

The elapsed time for the first 3 test phases (connectivity, integration and simulation tests) is estimated to be 10 – 12 weeks. The elapsed time for the member test will be approximately 2 weeks. Only after successful member testing the final decision for a Go-Live date can be taken. Market participants will be informed in time through updates sent by their power exchanges and through a second stakeholder event that is planned beginning of Q2 2013.

### Overall target planning

The overall target planning thus looks as follows:

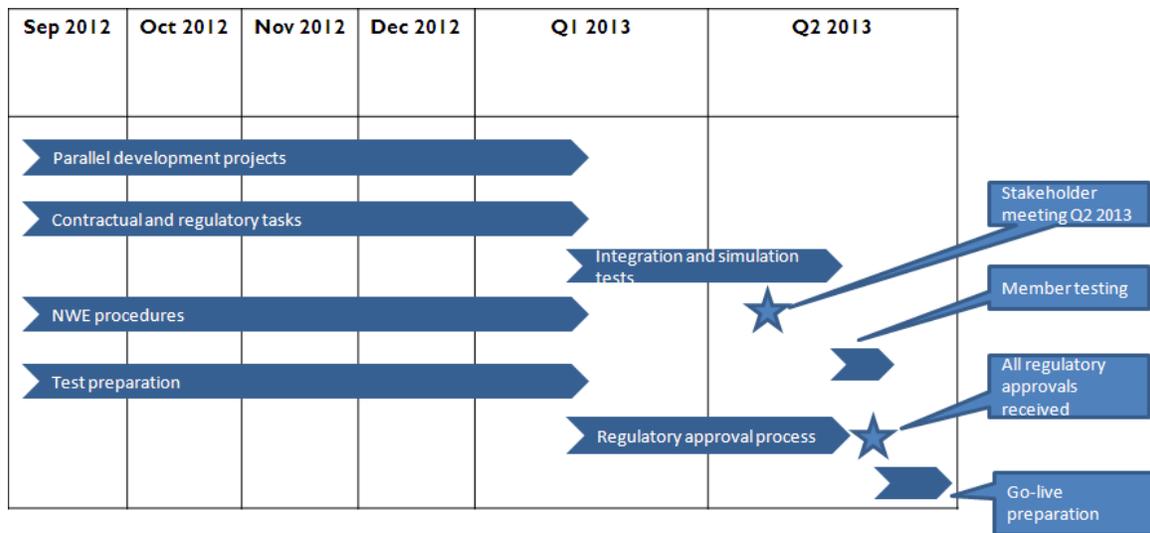


Figure 6 Overall target planning

The successful and timely implementation of the NWE Price Coupling solution is subject to the:

- Timely finalization of the design of the solution (where not finished yet)
- Timely delivery of **all** the separate development projects NWE Price Coupling is depending on
- Successful finalization of integration and simulation testing
- Successful finalization of the member test
- Timely reception of all necessary regulatory approvals

If any of the above steps takes more time than estimated or cannot be successfully finalized, this will have an impact on the planning.







## 9. Annex 1: Glossary

**APCA: All Parties Cooperation Agreement** is a contract between the NWE parties which defines the roles and responsibilities for the NWE Price Coupling solution.

**Aggregated Order Information:** set of all relevant data representing all Orders received by a Power Exchange for a given day.

**Allocation Constraints** the constraints as specified by the TSO that the Price Coupling of Regions algorithm shall respect in the Day Ahead market. Allocation Constraints may include, (but shall not be limited to): operational security constraints, ramping constraints, transmission losses.

**Agent:** a non-automated entity interacting with one or more systems and is represented in the diagram as abstract human figures.

**Bidding Zone** :the largest geographical area within which Market Participants are able to exchange energy without Capacity Allocation.

**BRP:** Balance Responsible Party

**BSC:** Balancing and Settlement Code

**Capacity Allocation:** the attribution of Cross Zonal Capacity.

**CCP:** Central Counter Party.

**CGDA:** ENTSO-E Coordination Group for the implementation of the European Day-Ahead Market Coupling.

**CID:** Congestion Income Distribution

**Congestion Income:** the revenues received by System Operators as a result of Capacity Allocation in the Day Ahead markets;

**Cross ZonalCapacity** :the capability of the interconnected electricity transmission network to accommodate energy transfer between Bidding Zones. It can be expressed either as NTC value or flow based parameters, and takes into account operational security constraints;

**CSA:** Cross Zonal Schedule Agent

**CZC:** Cross Zonal Capacity

**Day Ahead Market:** the market timeframe where commercial transactions are executed the day prior to the day of delivery of traded products.

**DST:** Daylight Saving Time

**EPC:** European Price Coupling.



**ECVN:** Energy Contract Volume Notification

**ECVNA:** Energy Contract Volume Notification Agent

**Elaxon:** service provider for NGIC that receives the hourly physical notifications

**FX:** Foreign Exchange

**GB Virtual Hub project:** the project awarded to NPS by NGIC to implement the GB virtual hub.

**HLA: High Level Architecture**

**Individual Results:** For each Market Time Period, price of each Bidding Zone and allocated quantities of a Market Participant.

**Interim Tight Volume Coupling (ITVC):** Solution to allocate capacity on cables between CWE and Nordic countries via volume coupling before the introduction of NWE Price Coupling. Although obsolete with the introduction of NWE PC, the term is used in this document to refer to the following interconnectors: DK1-DE, DK2-DE, Baltic Cable and NorNed.

**Market Participant:** an entity authorized by a Power Exchange to submit Orders.

**Market Time Period :** is the time span(s) for delivery of energy used in the Day Ahead and Intraday Market;

**NGIC:** National Grid Interconnectors Limited

**NP:** Net Position

**NPS:** Nord Pool Spot.

**Orders :** an intention to purchase or sell energy expressed by a Market Participant through a market platform subject to a certain number of execution conditions as determined by the rules governing that market platform. The Order may refer to several Market Time Periods but shall refer only to a single Bidding Zone.

**PMB:** PCR Matcher and Broker.

**Power Exchange or 'PX':** the entity which collects and delivers Orders.

**PCR :** Price Coupling of Regions is a solution which consists of a coordinated matching function commonly agreed between European power exchanges and based on a decentralized coordinated calculation with a common matching algorithmic software (enhanced version of Cosmos) taking into account in particular the Cross Zonal Capacities and Allocation Constraints.

**Price Coupling Results:** the Net Positions, the Scheduled Exchanges and the price of each Bidding Zone calculated by the PCR.

**Net Position :** the netted sum of electricity exports and imports for each Market Time Period for a given Bidding Zone.



**SA:** Shipping Agent

**Scheduled Exchange:** The transfer scheduled between Bidding Zones, for each Market Time Period and for a given direction.

**SLA:** Service Level Agreement

**SE:** Scheduled Exchange

**SEC:** Schedule Exchange Calculator

**SO:** System Operator

**TCO:** Trade Confirmation



## 10. Annex 2: Sequence in which information is produced and changed.

The numbering of the information flows doesn't always respect the indicative sequence of the actions.

More specifications as the responsibilities, the format and the interfaces are defined in the implementation details (separate documents).

Some of the following steps are under the responsibility of the PCR and are described below in grey for information purposes.

### Generic information flow

Flow Nb	Info	Produced by	From	To	Predecessor
Pre Coupling					
1a	Produce data for capacity calculation	TSO Back-End Systems	-	-	
1b	Data for capacity calculation and optionally Allocation Constraints		TSO Back-End Systems	TSOs Pre Coupling systems	
2a	Capacity calculation process and Allocation Constraints process	TSOs Pre Coupling Systems  and/or  TSO Back End Systems	-	-	
2b	Cross Zonal Capacities and optionally Allocation Constraints		TSOs Pre Coupling Systems	TSO Back-End Systems	2a
2c	Cross Zonal Capacities and Allocation constraints		TSOs Pre Coupling Systems  and/or	Local PX IT systems	2a



			TSO Back End Systems		
2d	Cross Zonal Capacities and Allocation constraints		Local PX IT systems	PMB	2c
3a	Orders		Market Participant	Trading System	
3b	Aggregate Orders	Trading System			3a
3c	Aggregated Orders		Trading System	PMB	3b
Coupling					
4a	Coordinator's Price Coupling Results calculation	PMB	-	-	3c,2d
4b	Price Coupling Results		PMB	Local PX IT Systems	4a
5	Check of Price Coupling Results	Trading System	-	-	4b
6a	Preliminary PX confirmation		Local PX IT Systems	PMB	5
6b	Coordinator's Preliminary PX confirmations process	PMB			6a
6c	Global preliminary PX confirmations		PMB	Local PX IT systems	6b
7	Price Coupling Results (optional per region)		Verification Coupling Module	TSOs Verification Module	6c
8a	Final Confirmation process (optional per region)	TSOs Verification Module			7



8b	Final Confirmation (optional per region)		TSOs Verification Module	Verification Coupling Module	8a
8c	Final Confirmation		Local PX IT systems	PMB	8b
8d	Coordinator's Final Confirmations process	PMB			8c
8e	Global Final Confirmation		PMB	Local PX IT systems	8d
Post Coupling					
8f	Global Final Confirmation (optional per region)		Verification Coupling Module	TSOs Verification Module	8e
9a	Price Coupling Results		Verification Systems	Post Coupling Systems	
9b	Price Coupling Results and Global Final Confirmation (optional per region)		Post Coupling Module	TSOs Post Coupling Module	
9c	Scheduled Exchanges calculation (optional per region)	TSOs Post Coupling Module			8f
9d	Scheduled Exchanges		Post Coupling Systems	Cross PX clearing and Settlement system	9a, 8f
9f	Scheduled Exchanges		Post Coupling Systems	CID Systems	9a, 8f
10	Trading confirmation		Cross PX clearing and settlement	Shipping systems	9b



			systems		
11	Scheduled Exchanges Notification		Shipping systems	TSO Back-End Systems	10
12a	Congestion Income		Shipping systems	CID Systems	11
12b	Congestion Income verification process		CID Systems		12a
12c	Congestion Income		CID Systems	TSO Back-End Systems	12b
12d	Congestion Income verification process		TSO Back-End Systems		12c

**Information flow in the CWE region**

Stays the Same
Modifications needed
New

Flow Nb	Info	Produced by	From	To	Pred e-cess or	Format	Communi cation
<b>Pre-Coupling</b>							
1a	Produce data for capacity calculation	TSO Back-End Systems					



1b	Data for capacity calculation		TSO Back-End Systems	CWE TSO Common System (pre coupling module)	1a	Capacity Document (xml)	ECP
1c	Cross Zonal Capacities (NL-NO, DE-DK1)		TSO Back-End Systems	CWE TSO Common System (pre coupling module)		Capacity Document (xml)	ECP
2a	Capacity calculation process	CWE TSO Common system (pre coupling module)			1b	N/A	N/A
2b	Cross Zonal Capacities (CWE)		CWE TSO Common System (pre coupling module)	TSO Back-End Systems	2a	Capacity Document (xml)	ECP
2c	Cross Zonal Capacities (CWE + NL-NO, DE-DK1)		CWE TSO Common System (pre coupling module)	CWE PX ECP Endpoint	2a	Capacity Document (xml) (Format still to be confirmed)	ECP
2d	Cross Zonal Capacities (CWE + NL-NO, DE-DK1)		EPEX or APX Pre-Coupling Module	PMB	2c	PMB Capacity Document (xml)	Webservices
3a	Orders		Market Participant	APX and EPEX Trading Systems			



3b	Aggregate Orders	APX and EPEX Trading Systems			3a		
3c	Aggregate Orders		APX and EPEX Trading Systems	PMB	3b	Order Document (XML)	Webservices
<b>Coupling</b>							
4a	Coordinator's Price Coupling Results calculation	PMB					
4b	Price Coupling Results		PMB-system of PMB-Coordinator	APX and EPEX PMBs who then forward to Trading Systems	4a	Results Document (XML)	Local Web Interface/webservices
5	Check Price Coupling Results	APX and EPEX Verification Coupling Module			4b		
6a	Preliminary PX confirmation		APX and EPEX Verification Coupling Module	PMB	5	Confirmation Document (XML)	Local Web Interface
6b	Coordinator's Preliminary PX Confirmations Process	PMB-system of PMB-Coordinator			6a		
6c	Global preliminary PX		PMB-system of	APX and EPEX PMBs	6b	Confirmation Document	Local Web Interface



	confirmati on		PMB- Coordina tor	who then forward to Verificati on Coupling Module		t (XML)	
7a	Price Coupling Results (NWE) <sup>i</sup>		CWE PX ECP Endpoint	CWE TSO Common System (TSO Verificati on Module)	6c	Energy Account Report (xml)	ECP
7b	Transfor m net Positions received from PMB into CWE only Net Positions	CWE TSO Common System (TSO Verificatio n Module)			7a		
8a	CWE Final confirmati on process (CWE Net position validation + validation on received NL-NO and DE- DK1 Schedule d Exchange s by concerne d TSOs)	CWE TSO Common System (TSO Verificatio n Module)			7b		



8b	CWE Final confirmation (CWE Net position validation + validation on received - NL-NO and DE-DK1 Scheduled Exchanges by concerned TSOs)		CWE TSO Common System (TSO Verification Module)	CWE PX ECP Endpoint	8a	Confirmation Document (XML)  (Format and number of files still to be defined)	ECP
8c	Final confirmation		APX and EPEX Verification Module	PMB (including coordinator)	8b	Confirmation Document (XML)	Local Web Interface
8d	Coordinator's final confirmations process	PMB-system of PMB-Coordinator			8c		
8e	Global final confirmation		PMB-system of PMB-Coordinator	APX and EPEX PMBs who then forward to Verification Coupling Module	8d	Confirmation Document (XML)	Local Web Interface
8f	Global final confirmation		CWE PX ECP Endpoint	CWE TSO Common System (TSO	8e	Confirmation Document (XML)	ECP



				Verificati on Module)			
8g	Global final confirmati on (optional)		CWE TSO Common System (TSO Verificati on Module)	TSO Back-End Systems	8f	Confirmat ion Documen t (XML)	ECP
8h	CWE Net Positions for informatio n		CWE TSO Common System (verificati on module)	TSO Back-End Systems	8f	Xml	ECP
8i	CWE Net Positions		CWE TSO Common System (verificati on module)	CID System (CRDS)	8f	Xml	ECP
<b>Post- Coupling</b>							
9a	CWE Schedule d Exchange s Calculatio n	CWE TSO Common System (post coupling module)			8f		
9b	Non-CWE (FR→GB, DE-DK1, NL-NO)  Schedule d Exchange file creation (Transfor	CWE TSO Common System (post coupling module)			7a, 8f		



	m Market Coupling Results to Programming Authorizations)						
9c	CWE, NL-NO, DE-DK1CWE-GB Scheduled Exchanges		CWE TSO Common System (post coupling module)	Cross PX Clearing and settlement system	9a	Rights Document (xml)	ECP
9d	CWE and CWE-GB Scheduled Exchanges		CWE TSO Common System (post coupling module)	CID System (CRDS)	9a	Rights Document (xml)	ECP
9e	CWE, NL-NO, DE-DK1,CWE-GB Scheduled Exchanges		CWE TSO Common System (post coupling module)	TSO Back-end Systems	9a	Rights Document (xml) Number of files still to be defined.	ECP
10a	NWE net position and prices (including CWE prices)		Local PX Verification Coupling Module	CID System (CRDS)	8e	Energy Account Report (xml)	ECP
10b	CWE and CWE-GB prices		EPEX and/or APX Verification Coupling Module	Cross PX Clearing and settlement system	8e	Energy Account Report (xml)	Local web interface or services



10c	CWE net position and prices for information (optional)		CID System (CRDS)	TSO Back-End Systems	10a	Energy Account Report (xml)	ECP
10d	NWE net position and prices for information (optional)		CIR (CRDS)	TSO Back-End Systems	10a	Energy Account Report (xml)	ECP
11a	Check that the CWE and CWE-GB Scheduled Exchanges are compatible with the received NWE, or internally calculated CWE, Net Positions	Cross-PX Clearing and settlement System	-	-	9c		
11b	Calculate transmission obligation transactions (based on CWE and CWE-GB Scheduled Exchanges and Clearing Prices)	Cross-PX Clearing and settlement System	-	-	11a		



11c	Trade confirmations for local hub transmission obligations (only implemented where needed)		Cross PX Clearing and settlement System	CCP Systems	11b		
11d	Trade confirmations for Scheduled Exchanges (only implemented where needed)		Trading Systems	CCP Systems	11b		
12	CCP - CCP Clearing link process, in which the imbalance between the CCPs is settled	Between CCPs' systems			11c, 11d		
13a	Daily trade report for transmission obligations.	CCP systems			11c		
13b	Daily trade report		CCP system	CID System (CRDS)	13a		



14a	Generate CWE Schedule d Exchange and local hub notifications	CCP systems			9b, 11c		
14b	CWE Schedule d Exchange notifications.		CCP systems	TSO Back-End Systems	14a		
14c	local hub notifications		CCP systems	TSO Back-End Systems			
15	Congestion Income verification process. check with Clearing prices / CWE and CWE-GB Schedule d Exchanges against the daily trade reports	CID System (CRDS)			9c, 10a, 13b		
16a	Congestion Income TSO shares calculation	CID System (CRDS)			16		



16b	Congestion Income TSO shares information and total amount		CID System (CRDS)	TSO Back-End Systems	17a		
17a	Produce self-bill from the CCPs to CID System (CRDS) for Congestion Income payment (monthly, on paper)	CCPs' systems			13a		
17b	Send self-bill (on paper)		CCP system	CID System (CRDS)	18a		

**Information flow in the Nordic- Baltic region**

Flow Nb	Info	Produced by	From	To	Predecessor
Pre Coupling					
1a	Produce data for capacity calculation	TSO Back-End Systems	-	-	
1b	Data for capacity calculation and optionally Allocation Constraints		TSO Back-End Systems	NOIS	



2a	Capacity calculation process and Allocation Constraints process	NOIS	-	-	
2b	Cross Zonal Capacities and optionally Allocation Constraints		NOIS	TSO Back-End Systems	2a
2c	Cross Zonal Capacities and Allocation constraints for Nordic-Baltic, Swe-Pol, and CWE-Nordic		NOIS & in few cases via EDI	NPS PX IT systems	2a
2d	Cross Zonal Capacities and Allocation constraints		NPS PX IT systems	PMB	2c
3a	Orders from NPS Nordic-Baltic Elspot Market per Bidding Zone		Market Participants via SESAM Web or EDI	NPS TS SESAM	
3a	Aggregated and anonymized orders from PoIPX Polish Spot Market		PoIPX Trading/IT System	NPS TS SESAM	
3b	Aggregate Orders	NPS TS SESAM			3a
3c	Aggregated Orders		NPS TS SESAM	PMB	3b
Coupling					
4a	Coordinator's Price Coupling Results calculation	PMB	-	-	3c,2d
4b	Price Coupling Results including Zonal Prices, and Area-to-Area flows (Scheduled Exchanges) on Nordic-Baltic, SwePol and all CWE-Nordic		PMB	NPS PX IT Systems	4a



	interconnectors.				
4c	Calculation of Nordic System Price	PMB System Price plugin	NPS		3c,2d,and 4b (CWE-Nordic flows)
5	Check of Price Coupling Results, including portfolio allocation via Verification Module	NPS Trading System and Verification Module	-	-	4b
6a	Preliminary confirmation (PX) of Price Coupling results towards PMB	NPS Trading System		PMB	4b,4c,5
6b	Coordinator's Preliminary PX Confirmation Process	PMB			6a
6c	Global preliminary PX confirmations		PMB	NPS PX IT systems	6b
6d	Trade Report	NPS TS SESAM	NPS TS SESAM	Market Participants SESAM Web or EDI	6c
8c	Final Confirmation		Local PX IT systems	PMB	8b
8d	Coordinator's Final Confirmations process	PMB			8c
8e	Global Final Confirmation		PMB	NPS PX IT systems	8d
Post Coupling					



9a	Price Coupling Results		PMB	Post Coupling Systems	
9d	Scheduled Exchanges		NPS Post Coupling	NPS Cross Clearing and settlement system (SETS)	9a
9e	Scheduled Exchanges		NPS Post Coupling	NPS Congestion Income Distribution System (SETS)	9a
10	Trading Confirmations (between CCPs/Shippers)		NPS Cross Clearing and settlement system (SETS)	NPS CCP Shipping System (SETS)	9d
11	Scheduled Exchanges notification (Note: SE's are also, or possibly even instead sent via Post Coupling Module to TSO Back End System or NOIS)		NPS CCP Shipping System (SETS)	TSO Back End Systems	10
12a	Congestion Income		NPS CCP Shipping System (SETS)	NPS Congestion Income Distribution System (SETS) system	9a
12b	Congestion Income Verification Process	NPS Congestion Income Distribution System (SETS)			12a
12c	Congestion Income		NPS Congestion Income Distribution	TSO Back End Systems	12b



			System (SETS)		
12d	Congestion Income Verification Process	TSO Back End Systems			12c

The following draft table illustrates in more detail (differentiated per interconnector) the capacity submission and flow validation process for the interconnectors between Nordic and CWE). Note that already in the Price Calculation Results via PMB (process 4b above) all current four (4) CWE-Nordic interconnector flows are established and used in relevant subsequent processes described above. Also note that CWE TSO CS is described in the CWE HLA:

	Provision of CZCs (1a, 1b)	CZCs reception (2a, 2c)	Submission to PMB (2d)	Validation of exchanges (8a and 8b)	Information on flows
DK1-DE	TTG to CWE TSO CS	CWE TSO CS (NPS receives information for publication purposes)	CWE TSO CS via APX/EPEX	CWE TSO CS	CWE TSO CS => TTG NPS => NOIS
DK2-DE (Kontek)	ENDK to NOIS	NPS	NPS	NPS	NPS
NO-NL (NorNed)	TTB to CWE TSO CS	CWE TSO CS (NPS receives information for publication purposes)	CWE TSO CS via APX/EPEX (NPS as backup)	CWE TSO CS	CWE TSO CS => TTB NPS => NOIS
SE-DE (Baltic Cable)	To be clarified	To be clarified	To be clarified	To be clarified	To be clarified



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<sup>i</sup> Prices from this file are not guaranteed to be correct, as global final confirmation is not received