INTRA-DAY MARKET
DETAILED MARKET DESIGN

JRC/PTT/2017/C.3/0017/OC

NL-Petten: Detailed Level Market Design of the Hellenic Forward, Day-Ahead and Intraday Markets and respective Market Codes and high-level IT

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Prepared by ECCO International
San Francisco, California

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ECCO International
268 Bush Street, Suite 3633
San Francisco, CA 94104
Phone: 415-731-9113
Fax: 415-731-9114

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Revision History

Version	Date	Description: Day-Ahead Electricity Market
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1.0	25 July 2017	ECCO first external release
1.5	04 September 2017	ECCO second internal release draft
2.0	17 September 2017	ECCO second external release
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3.0	17 November 2017	ECCO third external release

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Executive Summary

ECCO International ("ECCO") has been commissioned by the Joint Research Centre (JRC) of the European Commission to develop a Detailed Level Design, the Market Codes and the IT Functional Specifications for the Target Model-based energy market in Greece. This includes the Forward, Day-Ahead, and Intra-Day Markets for the Market Operator (LAGIE) and the Balancing Market for the Transmission System Operator (ADMIE). The proposed market design contained in the report draws upon the High Level Market Design executed by ECCO in 2014.

This report is the **deliverable of Task 3.1 of this project**. The report analyzes the detailed design of the **Greek Intra-Day Electricity Market**, taking into consideration the procedures established in the north-western European countries (XBID Solution for Continuous Intra-Day Trading), the Intra-Day Market processes of combined auctions and continuous trading proposed for the Italian borders, and the special characteristics of the Greek electricity market.

According to the European Regulation 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (hereafter referred to as "CACM Regulation") it is obligatory to introduce an Intra-Day Market (IDM) design with specific rules in order to implement price coupling (implicit intra-day allocation of daily Physical Transmission Rights on the interconnections) in line with the provisions of the so-called Target Model.

The creation of an Intra-Day Market is contained in the CACM Regulation document[1], which establishes the guidelines on the Capacity Allocation and Congestion Management (CACM) rules and sets the requirements for the formation of a single internal Intra-Day Market in Europe. This market is designed to have harmonized rules, procedures and timing, tradable products and maximum/minimum prices (Articles 51-55 of the European Regulation 2015/1222).

The continuous trading scheme is the preferred Intra-Day Market clearing process according to the CACM Regulation, Articles 51-53, where it is stated that:

*"Article 51. Objectives of the **continuous trading matching algorithm***

*1. From the Intra-Day Cross Zonal Gate Opening Time until the Intra-Day Cross Zonal Gate Closure Time, the **continuous trading matching algorithm** shall determine which orders to select for matching such that matching:*

(a) aims at maximising economic surplus for single intraday coupling per trade for

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[1] European Commission, Official Journal of the European Union, Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management. Accessed 01.07.17: http://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:32015R1222.

the intraday market time-frame by allocating capacity to orders for which it is feasible to match in accordance with the price and time of submission;

(b) respects the allocation constraints provided in accordance with Article 58(1);

(c) respects the cross-zonal capacity provided in accordance with Article 58(1);

(d) respects the requirements for the delivery of results set out in Article 60;

(e) is repeatable and scalable.

*2. The **continuous trading matching algorithm** shall produce the results provided for in Article 52 and correspond to the product capabilities and functionalities set out in Article 53.*

*Article 52. Results of the **continuous trading matching algorithm***

1. All NEMOs, as part of their MCO Function, shall ensure that the continuous trading matching algorithm produces at least the following results:

(a) the execution status of orders and prices per trade;

(b) a single Net Position for each Bidding Zone and market time unit within the intraday market.

2. All NEMOs shall ensure the accuracy and efficiency of results produced by the continuous trading matching algorithm.

3. All TSOs shall verify that the results of the continuous trading matching algorithm are consistent with cross-zonal capacity and allocation constraints in accordance with Article 58(2)."

Under the continuous trading scheme, Orders are stored in an Order Book according to their execution specifications and they are visible to all Participants until they are matched or cancelled. The matching algorithm follows a time-price priority principle, which means that Orders are matched depending on the arrival time and the price of the Orders. The Orders are stored in an Order Book until they are matched, or in some cases they are withdrawn if not immediately matched depending on their execution specifications. The Order Book is available for (visible by) all Participants. This means that Participants can see previous Orders submitted to the market before actually bidding. Because of this, the matching process is different from a marginal pricing scheme. Automatic matching process meaning Buy and Sell Orders with crossed prices. The matcher will match the Orders at the price of the passive Order i.e. the one already in the Order Book, otherwise (if the prices are crossed as happens in the batching procedure) they are matched at the average price between both Orders.

The most significant drawback of the continuous trading option is the liquidity (or lack thereof) attained in the Intra-Day Market. Indeed, the liquidity of Intra-Day Markets in countries following the continuous trading option (i.e. Germany, France, Belgium

and UK) is lower compared to the markets in countries following the trading sessions / auctions scheme (i.e. Spain and Italy).

The continuous trading prevents the bundling (accumulation) of demand and supply and thus reduces liquidity[2]. Nevertheless, it has been proven that the liquidity can be significantly increased when cross-border trades are possible (e.g. in the Franco-German intra-day continuous trading process).

Moreover, another drawback of the continuous trading regime is that the utilized pay-as-bid mechanism does not generate a reference price that is as transparent as the obtained prices under a marginal pricing system. Moreover, in continuous trading the congestion rent (in case of cross-zonal intra-day trades) is not visible, since the cleared trades entail the same sell/buy price. To this end, ENTSO-E has proposed a methodology for pricing intra-day Cross-Zonal Capacity in accordance with Article 55 of European Regulation 2015/1222[3].

As a Member State, Greece is obligated to fully comply with the European regulations and proceed with the creation of an Intra-Day Market and with the coupling of this Intra-Day Market with the other European Intra-Day Markets, since such reform will lead to the maximization of the overall European social welfare through the efficient utilization of the scarce interconnection capacity and the effective allocation of the pan-European resources.

The Intra-Day Market is an essential market element in creating a well-functioning electricity market, since it allows Participants to update their trading position taking into account evolving market and system conditions when approaching real-time. According to the Day-ahead Market Code, the Day-Ahead Market Gate Closure Time in Greece shall be at 12:00 CET (13:00 EET) on day D-1, leaving a time window ranging from 11 to 35 hours where market and system conditions may change. During this time, unexpected outages may occur, weather changes may affect consumption and there will almost certainly be a foreseeable deviation from the day-ahead forecasted output of the intermittent generation. Upon the implementation of an Intra-Day Market in Greece, Participants will be able to continue to fine tune their Net Positions after the Day-Ahead Market Closure Time, taking into account new available information about their production assets (Generating Units

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[2] A hybrid approach is followed in Germany in order to increase the liquidity: (a) an intra-day call auction with auction with auction with 15-minute products / contracts takes place at 3 pm D-1, allowing the simultaneous trading of 96 quarters for delivery at the next day; (b) then, at 4 pm D-1 the continuous intraday trading starts with quarterly products for the next day. The market benefits from a concentration of liquidity at the beginning of the intraday process. The intraday call auction allows a transparent reference price for the 15-minute contracts to emerge (at the continuous trading).

[3] All TSOs' proposal for the single methodology for pricing intraday cross-zonal capacity in accordance with Article55 of Commission Regulation (EU) 2015/1222of 24 July 2015 establishing a guideline on capacity allocation and congestion managements. Accessed 13.07.17:

https://consultations.entsoe.eu/markets/czidcp/

and/or RES Units) and their represented demand.

In the current market design (2017) there is no intra-day allocation of cross-border capacities in the interconnections. In compliance with the CACM Regulation this is expected to change. A two-phase approach shall be implemented for attaining a robust solution of the Intra-Day Market in Greece, as follows:

1st phase: At the 1st phase, three Local Intra-Day Auctions (LIDAs) shall be implemented within Greece, consistent with the number and timing of the corresponding Local and Complementary Regional Intra-Day Auctions of the 2nd phase (referred below), in order to achieve the least-effort transition from the first to the second phase.

2nd phase: At the 2nd phase, the design of the Greek Intra-Day Market shall adjust to implement pan-European Continuous Intra-Day Trading through the already agreed ID Solution, in combination with one Local Intra-Day Auction (LIDA) and two Complementary Regional Intra-Day Auctions (CRIDAS). Furthermore, in case of introducing Pan-European Intra-Day Auctions (PEIDAs), the timing of CRIDAs will align with the PEIDAs. The design of this phase directly adheres to the prerequisites of the Target Model and the corresponding CACM Regulation.

The internal procedures and the standard corporate governance of the European markets will also be applied in Greece. All pre-coupling and post-coupling operations outlined in the CACM Regulation shall be implemented by the Greek Market Operator (MO) and the Transmission System Operator (TSO).

The participation of Producers in the Intra-Day Market is on a unit-basis, per Regulator's instructions; therefore, no nomination process is needed after the matching process.

RES Producers, RES Aggregators and the Last Resort RES Aggregator participate for each Dispatchable and Non-Dispatchable RES Portfolio and Load Representatives participate for each Dispatchable and Non-Dispatchable Load Portfolio. Nevertheless, it should be noted that the Participants shall be able to submit both Sell and Buy Orders for all Entities they own/represent, for DAM Delivery Position Correction or DAM Offtake Position Correction.

Concerning the format of the Orders submitted by the Participants the following are valid:

a) in the Local Intra-Day Auctions (LIDAs) at the 1st phase the types of products shall be simple step-wise and linear piecewise Orders,,

b) in the Complementary Regional Intra-Day Auctions (CRIDAs) starting at the 2nd phase (and solved by EUPHEMIA or by another solver) the types of products shall be simple step-wise Orders, linear piecewise Orders and Block Orders, and

c) in the continuous trading XBID platform at the 2nd phase according to "All NEMOs' proposal for products that can be taken into account by NEMOs in intra-day coupling

process"[4] the types of Orders are Limit Orders, Linked Orders and Iceberg Orders, with certain execution specifications None (NON),Immediate-or-Cancel (IOC), Fill-or-Kill (FOK), All-or-Nothing (AON)and certain validity restrictions Good-for-Session (GFS), Good-till-Date (GTD)).

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[4] Available online at:

https://www.e-control.at/documents/20903/388512/20170214_Products+Proposal_ID.pdf/59c71434-86dd-a7fe-8821-5959090fa03e
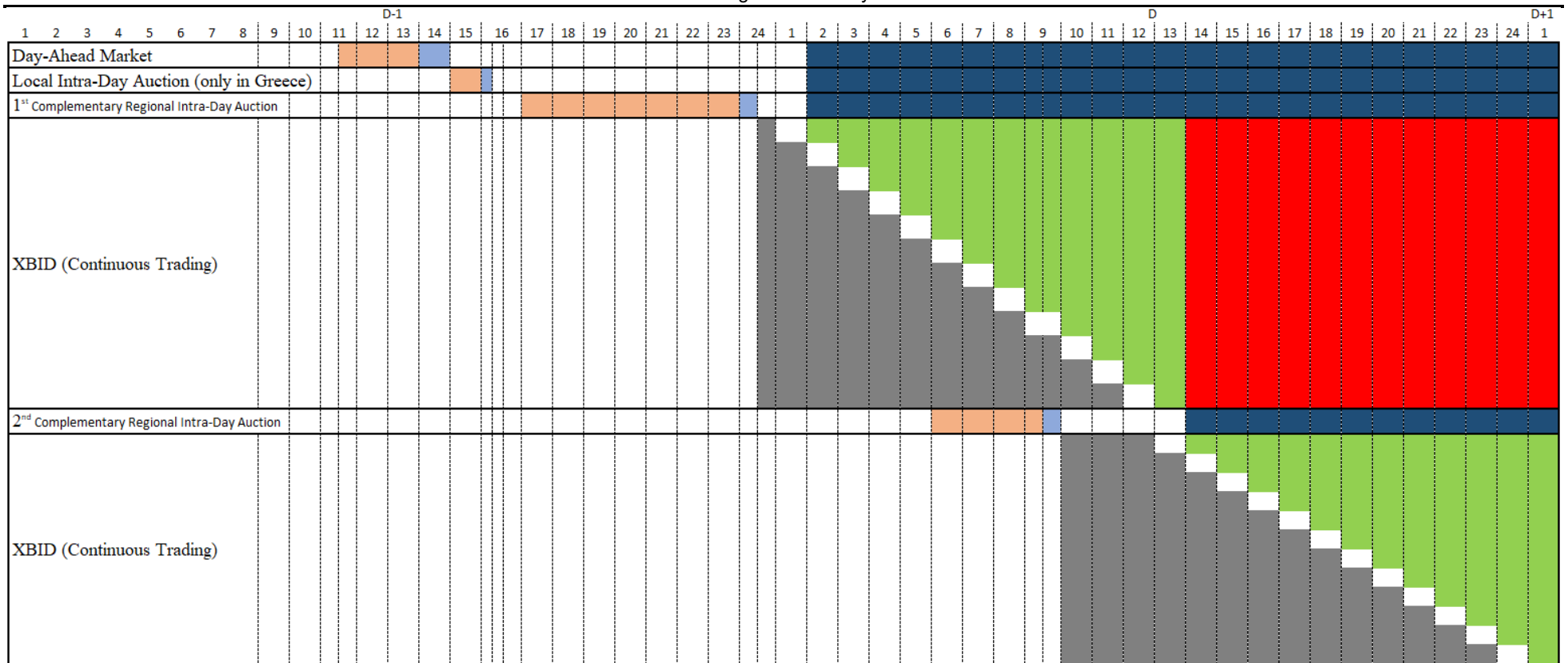
Figure0--1: Number and timing of LIDA, CRIDAs and the intra-day continuous trading process (hours in EET)

In the CRIDAs (at the 2nd phase) Producers shall be able to submit all types of Orders. RES Producers and RES Aggregators (collectively called RES Operators) shall be able to submit all types of Orders, but:

a) for Non-Dispatchable RES units or RES portfolios (e.g. wind plants, PV stations), the specific features of the assets they own/represent (inherent variability and uncertainty) may deem appropriate the use of only Simple Hourly Orders, although all types of orders will be available to these Participants as well, as mentioned above.

b) for Dispatchable RES units or RES portfolios (e.g. biomass and co-generation plants), Block Orders may cover the special needs of the respective RES Operators since these Entities are like conventional units in terms of commitment / scheduling features. Therefore they could use Block Orders to secure their commitment and operation during several hours or even the whole day.

Concerning the Load Representatives representing demand entities, Simple Hourly Orders and Block Orders seem to be the most appropriate choices for the Greek IDM.

Concerning the Order feasibility in the Intra-Day Market, the following feasibility checks shall be performed by the Market Operator on the Sell/Buy Orders at the Orders' submission phase prior to the market clearing:

a) **Generating Unit and RES Unit margin:** Even though the energy Sell Orders are economically binding, the Trading Platform of the Market Operator may perform a validation check to ensure that the offered quantities can be actually produced by the specific Generating Units and RES Units. Therefore, at the submission process, the Trading Platform of the Market Operator shall validate per Generating Unit and RES Unit that the sum of energy Sell Orders submitted to the Intra-Day Market, along with the cleared quantities at the Day-Ahead Market, do not exceed the Available Capacity, taking also into account the awarded reserve capacities from the latest ISP execution. Otherwise, curtailment rules on the Sell/Buy Orders shall apply, or in case of Sell Block Orders they shall be fully rejected.

b) **Import / export margins**: The Market Operator shall calculate the margins, namely the maximum energy quantities to be offered for imports and exports in the non-coupled interconnections. More details about the calculation of the margins for imports and exports can be found in Section 7.2.8 of this report.

The Market Operator and the Regulator shall establish powerful market monitoring processes. More, specifically, they shall monitor closely the strategic behavior of the Participants (one at a time or in groups performing concerted practices) for exercising market power and/or setting extraordinary high or low prices. In such cases, the Regulator has the power to impose strict sanctions on the concerned Participants, giving appropriate signals to all Participants to withdraw from any unlawful or anti-competitive practices.

1 Introduction

1.1 Scope and Benefits of the Intra-Day Market

Intra-Day Markets are an essential market element in creating a well-functioning electricity market. Specifically, Intra-Day Markets allow Participants to update their trading position based on their risk profile taking into account evolving market and system conditions as we approach real time. The ability of Participants to adjust their position is also essential in integrating variable Renewable Energy Sources (RES) such as wind and solar energy into the electricity market. This allows RES to use more accurate short-term forecasts for their generation output and reduce their deviation exposure in the real-time market.

Within the scope and driven processes of the Target Model and the CACM Regulation, it is imperative that well-designed and functioning Intra-Day Markets are set up on a regional or even pan-European basis. The ultimate target is the formation of a pan-European Intra-Day Market, following the Day-Ahead Market Coupling (integration).

Upon the implementation of such an Intra-Day Market in Greece, Participants will be able to continue to fine tune their positions after the Day-Ahead Market Gate Closure Time, taking into account new available information about their own production and consumption position and also the overall market and system conditions.

According to the provisions of the Day-Ahead Market Code, the Day-Ahead Market Gate Closure Time in Greece shall take place at 13:00 EET on the day before the Delivery Day, leaving a time window ranging from 11 to 35 hours where market and system conditions may change. During this time, unexpected outages can occur, weather changes may affect consumption, and there will almost certainly be a foreseeable deviation from the day-ahead forecasted output of intermittent generation. Adjustment of possible infeasible schedules resulting from the Day-Ahead Market may also be needed.

The effect of many of these events is known well in advance, thus allowing for a market-based solution instead of resorting to the use of system reserves is very feasible and essential. It is therefore important to allow Participants to rebalance their positions as close to real time as possible, which is the key objective of Intra-Day Markets.

In that sense:

a) the Intra-Day Market may be viewed as the market operating between the Day-Ahead Market and the **physical gate closure time**, i.e. the time after which the Market Schedules submitted to the TSO may no longer be changed, and

b) the intra-day trading may be viewed as an extension of the day-ahead fine tuning.

Participants shall undertake this fine tuning to ensure that:

➢ **They have exploited all profitable opportunities that can materialize from the generation and load trading:** if, in the run-up to the time of delivery, it becomes clear that the underlying demand and supply fundamentals of the market are not as they were expected to be, then there may be profitable opportunities for Participants with flexible physical resources (e.g. flexible sources of generation or load management) to profit from any physical shortfall/surplus; and

➢ **Their contracted energy position is close to their expected physical energy position (thus reducing their imbalances and their financial exposure in the Real-Time Balancing Market):** If they are short in their energy position (i.e. if they have sold more than their expected production or bought less than their expected consumption) they may face a relatively high and unattractive price for the imbalance quantities in the Imbalance Settlement procedure. If they are long in their energy position (i.e. if they have sold less than their expected production or bought more than their expected consumption) they may receive a relatively low and unattractive energy price (for the produced energy which they have not previously contracted or for the previously bought energy which they did not finally consume) in the Imbalance Settlement procedure.

Clearly, factors related to the fundamental demand and supply balance of the power system will, therefore, influence intra-day trading volumes. For example:

➢ **Power plant outages**: if a Generating Unit, which was expected to be producing a certain amount of energy, fails to do so near the time of delivery (e.g. due to an outage), the Producer owning/representing this unit will be prompt to fine tune his market position to the new expected production level (or to zero in case of an outage), via intra-day trading with other Participants.

➢ **Changes in wind forecast**: as wind power becomes an important source of energy, changes in wind forecasts can have a significant impact on the position of players with wind generation in their portfolio. The error of wind generation forecasts reduces gradually over time, with significant improvements in accuracy around the three-hour-ahead stage. Hence, as wind forecasts change as delivery comes closer, RES Producers and RES Aggregators representing wind generation in their assets / portfolio will typically seek to fine tune their contracted position via intra-day trading.

➢ **Changes in demand**: if the level of demand changes from the one which was forecasted at the day-ahead stage (e.g. due to different weather conditions than the ones predicted), then similarly Load Representatives will look to fine tune their contracted positions via intra-day trading.

➢ **Changes in the cross-border capacities**: The commercial capacities published by the TSOs prior to the Day-Ahead Market's stage, could possibly be increased after the Day-Ahead Market's results are available. TSOs can then rerun their processes related to the availability of cross-border capacity and the security of the

interconnected power system with more precise data. The new available capacity in the interconnectors can be incorporated to the Intra-Day Markets, thus allowing further gains for the Participants to be materialized from trading.

It should also be noted, that a well-functioning Intra-Day Market will also increase the efficiency of the Balancing Market. Intra-Day Market re-schedules will allow "better" (lower) deployment of balancing resources in real-time, which will be used only when needed.

The Trade Wind project[5] found that allowing for generation re-scheduling in the intra-day timeframe leads to savings in operational costs of power generation. By accepting wind power forecasts up to three hours before delivery, a reduction in the demand of reserves of €260 million per year could be achieved in a European level. Such benefits are even larger when considering intra-day re-scheduling of cross-border exchanges. Savings range between €1 billion and €2 billion per year, compared to a situation where cross-border exchange must be scheduled day-ahead.

In a nutshell, Intra-Day Markets offer substantial benefits to Participants and the market as whole and offer a platform for further trading. The Greek Intra-Day Market is specifically designed to take into consideration:

a) the prerequisites of the Target Model, the CACM Regulation, Law 4425/2016 and the regulatory decision 67/2017;

b) the intra-day cross-border operations in the Italian Borders (Central South European region); specifically, the design solution and special features of the Italian Intra-Day Market are of critical interest for Greece, in view of the two markets' coupling procedures;

c) the special market and financial conditions in Greece; and

d) the status of the local electricity markets in the Greek northern borders (Bulgaria, FYROM, Albania and Turkey).

1.2 Scope of this report

The CACM Regulation briefly describes the roles of the stakeholders in the Intra-Day Market, including:

➤ pre-coupling operations,

➤ coupling operations, and

➤ post-coupling operations.

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[5] TradeWind project: http://www.trade-wind.eu/index.php?id=9

The details concerning these three distinct phases along with the detailed design of the Greek Intra-Day Market are described in this report.

It should be noted that the target of this document is mainly not to describe the stakeholders' internal processes, but to:

➢ analyze the operation of the Greek Intra-Day Market (including pre-coupling, coupling and post-coupling procedures, gate closure times),

➢ record all the stakeholders participating in the Intra-Day Market in Greece along with the categorization of the Entities they represent, and the respective registries kept by the Market Operator and the Transmission System Operator,

➢ describe the tradable products in the Intra-Day Market, along with their respective clearing rules, and

➢ describe the interfaces of the Intra-Day Market with the Day-Ahead and the Balancing Markets, **as well as with the Clearing House**.

1.3   Structure of the report

The structure of this report is the following:

*Chapter 2*presents the Participants of the Intra-Day Market, the Entities represented, the registries kept by the Market Operator, the TSO and the RES and CHP Units Registry Operation, the participation requirements and rules and the respective participation fees.

Chapter 3 lays down the phased approach for the implementation of the Intra-Day Market in Greece. The two implementation phases are briefly described, concluding in a hybrid approach with both internal and regional intra-day auctions and continuous trading sessions.

*Chapters4, 5 and 6*present the basic features, tradable products, matching process and the attained results of Local Intra-Day Auctions (LIDAs),Complementary Regional Intra-Day Auctions (CRIDAs) and the Continuous Intra-Day Trading sessions, respectively.

Chapter 7 elaborates on the interfaces of the proposed Intra-Day Market with the respective Day-Ahead and Balancing Markets, as well as on the interface with the Clearing House.

Chapter 8 discusses market manipulation and monitoring issues, and describes the body of the Market Operator, called Market Surveillance, that shall be responsible for the protection of the Power Exchange and its markets from manipulative behavior on market prices by the Participants.

Finally, *Annex A* presents the basic features and timeline of the XBID project, which aims to create a joint integrated intra-day cross-zonal market in European level. The most important

milestones are recorded, along with the respective timelines of Local Implementation Projects concerning Greece.

2   Participation in the Greek Intra-Day Market

In this Chapter, we record all the stakeholders participating in the Intra-Day Market in Greece along with the categorization of the Entities they represent and the respective registries kept by the Market Operator and the Transmission System Operator.

2.1   Entities

The elementary programming unit bearing a Market Schedule in the context of the Intra-Day Market analyzed in this document is referred to as the Entity. The set of Entities includes all physical assets connected to the Transmission System or the Distribution System, as follows:

a) **Generating Unit:** Conventional dispatchable Generating Unit with an installed capacity above 5 MW, which can follow Dispatch Instructions by the TSO. This category includes also the Dispatchable CHP Units above 35 MW, as referred in the Hellenic Transmission System Operation Code, and the Auto-Producer Conventional Units, namely the conventional dispatchable Generating Units of Auto-Producers (or Self-Suppliers).

   Representative Participant: Producer

b) **Non-Dispatchable Load Portfolio**: Portfolio (aggregation) of individual loads which cannot follow Dispatch Instructions by the TSO.

   Representative Participant: Load Representative

c) **Dispatchable Load Portfolio:** Portfolio (aggregation) of individuals loads which **can** follow Dispatch Instructions by the TSO.

   Representative Participants: Load Representative for the energy supply and for adjusting its demand based on economic signals (demand-response)

d) **RES Unit:** An individual RES Unit which directly participates in the wholesale electricity market. A RES Unit comes under one of the categories 1(b), 2, 3(b), 4, 5 or 6 presented in Annex C of the Day-Ahead Market Detailed Market Design document.

   Representative Participant: RES Producer

e) **Dispatchable RES Portfolio:** Portfolio (aggregation) of RES Units of a specific RES category (e.g. biomass units, etc.) located in a specific Bidding Zone, which participates in the wholesale electricity market and which (based on its technical capability) **can** follow Dispatch Instructions (on a portfolio basis) by the TSO. The RES units included in a Dispatchable RES Portfolio come under one of the categories 1(b) 2, 3(b), 4, 5 and 6 presented in Annex C.

Representative Participant: RES Aggregator, Last Resort RES Aggregator, RES Producer[6]

f) **Non-Dispatchable RES Portfolio:** Portfolio (aggregation) of RES Units of the same RES category (e.g. wind plants, PV stations, etc.) located in a specific Bidding Zone, which participates in the wholesale electricity market, but which **cannot** follow Dispatch Instructions by the TSO. The RES Units included in a RES Portfolio come under one of the categories 1(b), 2, 3(b), 4, 5 and 6 presented in Annex C.

Representative Participant: RES Aggregator, Last Resort RES Aggregator, RES Producer

g) **RES FiT Portfolio:** Portfolio (aggregation) of RES Units which shall not participate in the wholesale electricity market. The RES Units included in the RES FiT Portfolio come under one of the categories 1(a) or 3(a) (remuneration under a Feed-in-Tariff regime) presented in Annex C of the Day-Ahead Market Detailed Market Design document.

Representative Participant: RES and CHP Unit Registry Operator

h) **Generating Unit in Commissioning or Testing Operation:** Generating Unit that has declared to the TSO a specific energy production schedule for the Delivery Day, due to commissioning operation or testing operation.

Representative Participant: Transmission System Operator

i) **RES Unit in Commissioning or Testing Operation:** RES Unit that has declared to the TSO a specific energy production schedule for the Delivery Day, due to commissioning operation or testing operation.

Representative Participant: Transmission System Operator

We should note the following, regarding the Entities presented above:

1) The RES Aggregator referred in the above list can alternatively be the Last Resort RES Aggregator referred in the recent Greek Law 4414/2016 (concerning the new remuneration scheme of RES Units in Greece). **For simplification purposes, in the remaining of this report we will use only the term RES Aggregator when referring to the representative of a RES Portfolio, without excluding the possibility for the representative to be the Last Resort RES Aggregator**.

2) An individual RES Unit can be also represented by a RES Aggregator (or the Last Resort RES Aggregator), but as a single Entity (being itself a RES Portfolio).

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[6] A RES Producer can represent the RES Units registered in its Participant Account only, either on a unit-basis, or on portfolio-basis.

2.2 Participants

The Participants representing one or more Entities are the following:

a) Producers representing (on a unit basis) Generating Units (including Auto-Producer Conventional Units),

b) Load Representatives representing Non-Dispatchable Load Portfolios and/or Dispatchable Load Portfolios,

c) RES Producers representing Dispatchable and Non-Dispatchable RES Portfolios (i.e., a Portfolio of RES units of the same RES category located in a specific Bidding Zone),

d) RES Aggregators representing Dispatchable and Non-Dispatchable RES Portfolios,

e) the Last Resort RES Aggregator representing Dispatchable and Non-Dispatchable RES Portfolios,

f) TSO representing RES Units in Commissioning or Testing Operation and a Generating Units in Commissioning or Testing Operation and for the Mandatory Hydro Injections for each Hydro Unit, and

g) RES and CHP Units Registry Operator representing the RES FiT Portfolio and High-Efficiency Cogeneration Dispatchable Unit.

h) Traders which have acquired explicit Intra-Day Physical Transmission Rights in non-coupled interconnections for imports.

2.3 Registries

For the scope of the Forward Market, Day-Ahead Market and Intra-Day Market operation, the Market Operator shall keep a separate Registry for all Participants.

In addition, the Transmission System Operator shall keep separate registries for the Generating Units, the Dispatchable Load Portfolios, the DR portfolios, the Dispatchable RES Units and the Dispatchable RES Portfolios; the TSO shall pass to the Market Operator the necessary information of these registries, for the purposes of the herein described Intra-Day Market operation. The registries maintained by the TSO are analytically described in the detailed design of the Balancing Market.

Finally, the RES and CHP Units Registry Operator shall keep separate registries for the Dispatchable RES Units, the Non-Dispatchable RES Units, the Dispatchable RES Portfolio, the Non-Dispatchable RES Portfolio, the RES Units in Commissioning or Testing Operation and the Dispatchable CHP Units. The RES and CHP Units Registry Operator shall pass to the Market Operator the necessary information of these registries, for the purposes of the herein described Intra-Day Market operation.

2.4   Participation Requirements

Participation of a Participant in the Intra-Day Market prerequisites:

a) a valid Participation Agreement with the Market Operator;

b) a valid and duly signed Financial Agreement either directly or indirectly (through a Clearing Member) with the Market Operator or the Clearing House; and

c) a valid and duly signed Balancing Contract with the Transmission System Operator.

2.5   Participation Rules

First of all, it should be noted that participation in the Intra-Day Market is optional for all Participants. Independently of the approach adopted in each phase, as described in Chapter 3, of the overall process (intra-day auctions and Continuous Intra-Day Trading) participation in the Intra-Day Market means in particular:

a) the submission of Sell Orders by Producers for each Generating Unit registered in their Participant Account for energy injection up to the Generating Unit's Available Capacity, which is not allocated via accepted Sell Orders or Priority Price-Taking Sell Orders in the Day-Ahead Market;

b) the submission of Buy Orders by Producers for each Generating Unit registered in their Participant Account for DAM Delivery Position Correction and/or energy withdrawal for the Auxiliary Loads of the Generating Units registered in their Participant Account;

c) the submission of Sell Orders by RES Producers for each Dispatchable and Non-Dispatchable RES Portfolio registered in their Participant Account for energy injection up to the sum of the Available Capacities of the RES Units included in the RES Portfolio, which is not allocated via accepted Sell Orders or Priority Price-Taking Sell Orders in the Day-Ahead Market;

d) the submission of Buy Orders by RES Producers for each Dispatchable and Non-Dispatchable RES Portfolio registered in their Participant Account for DAM Delivery Position Correction and/or energy withdrawal for the Auxiliary Loads of the RES Units included in the RES Portfolio;

e) the submission of Sell Orders by RES Aggregators for each Dispatchable and Non-Dispatchable RES Portfolio registered in their Participant Account for energy injection up to the sum of the Registered Capacities of the RES Units included in the RES Portfolio, which is not allocated via accepted Sell Orders or Priority Price-Taking Sell Orders in the Day-Ahead Market;

f) the submission of Buy Orders by RES Aggregators for each Dispatchable and Non-Dispatchable RES Portfolio registered in their Participant Account for DAM Delivery Position Correction and/or energy withdrawal for the Auxiliary Loads of the RES Units included in the RES Portfolio;

g) the submission of Buy Orders by Suppliers and Self-Suppliers, acting as Load Representatives for local consumers for each Dispatchable and Non-Dispatchable Load Portfolio registered in their Participant Account, for energy withdrawal which is not allocated via accepted Buy Orders or Priority Price-Taking Buy Orders in the Day-Ahead Market;

h) the submission of Sell Orders by Suppliers and Self-Suppliers, acting as Load Representatives for local consumers for each Dispatchable and Non-Dispatchable Load Portfolio registered in their Participant Account, for DAM Offtake Position Correction;

i) the submission of Sell Orders by Traders, Suppliers and Self-Suppliers which have acquired explicit Intra-Day Physical Transmission Rights in non-coupled interconnections for imports;

j) the submission of Buy Orders by Traders, Producers, Suppliers, RES Producers and RES Aggregators which have acquired explicit Intra-Day Physical Transmission Rights in non-coupled interconnections for exports;

k) the submission of Priority Price-Taking Sell or Buy Orders by the Transmission System Operator for the deviations in the scheduled production of each Generating Unit in Commissioning or Testing Operation and each RES Portfolio for RES Units in Commissioning or Testing Operation and for the Mandatory Hydro Injections for each Hydro Unit;

l) the submission of Priority Price-Taking Sell or Buy Orders by the Transmission System Operator for the deviations in the forecasted Transmission System Losses;

m) the submission of Priority Price-Taking Sell or Buy Orders by the Last Resort RES Aggregator for the deviations in each forecasted production of the RES Portfolio;

n) the submission of Priority Price-Taking Sell or Buy Orders by the RES and CHP Units Registry Operator, for the deviations in the forecasted production of each RES FiT Portfolio and for the Priority Declarations of each High-Efficiency Cogeneration Dispatchable Unit.

This means that there is no need for allocation of intra-day traded positions in physical assets after the clearing of each Intra-Day Market process (nomination process).

Additional participation rules that shall be implemented in the framework of the Intra-Day

Market are the following:

a) Producers shall submit Techno-Economic Declarations for each Generating Unit registered in their Participant Account according to the provisions of the Balancing Market Code.

b) Producers and RES Producers shall submit Total or Partial Non-Availability Declarations for each Generating Unit and RES Unit registered in their Participant Account, respectively, according to the provisions of the Balancing Market Code.

c) RES Aggregators representing Dispatchable and/or Non-Dispatchable RES Portfolios are not required to submit Total or Partial Non-Availability Declarations.

d) The energy quantities included in the Sell Orders are deemed to be injected at the Meter Point.

e) The energy quantities included in the Buy Orders are deemed to be withdrawn at the Transmission-Distribution Boundary.

2.6   Participation fees

The Participants shall pay fees for the Trading Services provided by the Market Operator. The overall fees shall comprise the following components:

A) <u>Annual Fee</u>, separately for each market (Forward, Day-Ahead and Intra-Day Market); the Annual Fee represents the cost of Trading Services for the participation in the markets, and it shall be a fixed amount per year,

B) <u>Membership Fee</u>, separately for the Forward Market and for the spot market (Day-Ahead and Intra-Day Markets);

C) <u>Transactions Fee</u>, for each MWh traded (both bought and sold) by each Participant.

The Membership Fee constitutes a one-off payment to all newly-admitted Participants. The Membership Fee shall be due on the Participation Commencement Day.

The Annual Fee in the first year shall be due on the Participation Commencement Day. The annual fee for every subsequent year Y shall be due five (5) Working Days before the start of the calendar year Y. No refund shall be given by the Market Operator to the Participant in case of termination during a year.

The Transactions Fee shall be charged to the Participants for the execution of Orders. Thus, Transaction Fees depend on the executed volume in Megawatt hours (MWh). The Transactions Fee shall be due in the 5th Working Day of calendar month M+1 for the energy transactions concluded in calendar month M.

The fees shall be collected directly by the Market Operator, following the issuance of a respective invoice to each Participant.

The values of the above fees (Membership Fee, Annual Fee and Transactions Fee) shall be established for each calendar year by a decision by the Regulator following a proposal of the Market Operator..

3 Two-Phase Approach for the Greek Intra-Day Market

3.1 Phased approach

In January 2017, the Greek Regulatory Authority for Energy (RAE), within the scope of its responsibilities under Article 6Paragraph 2 of Law 4425/2016 and Article 32 of Law 4001/2011, regarding the guidelines and instructions to the competent Market Operators for the establishment of the Market Codes, issued Decision 67/2017 which was published in the Government Gazette no. 774/13.03.2017[7]. In this Decision, a two-phase approach has been established by the Regulator for the implementation of the Intra-Day Market (see also Figure 3-1), taking into consideration the special market and financial conditions in Greece, as follows:

1)   In the 1st phase, Local Intra-Day Auctions shall be implemented within Greece, consistent with the number and timing of the corresponding Local and Complementary Regional Intra-Day Auctions of the 2nd phase, in order to achieve the least-effort transition from the first to the second phase.

2)   In the 2nd phase, the design of the Greek Intra-Day Market shall adjust to implement pan-European Continuous Intra-Day Trading through the agreed ID (XBID) Solution, in combination with one Local and two Complementary Regional Intra-Day Auctions (CRIDAs). Furthermore, in case of introducing Pan-European Intra-Day Auctions (PEIDAs), the timing of CRIDAs will align with the PEIDAs. The design of this phase directly adheres to the pre-requisites of the Target Model and the corresponding CACM Regulation.

The transition from the 1st to the 2nd phase shall take place when the evolutions on Local Implementation Project 14(LIP14) allow such transition, and consequently the commencement of pan-European continuous trading on the Italian borders is possible.

In this Section the additional details on these two phases are provided.

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[7] The Decision is available online at the following link:

http://www.et.gr/idocs-nph/search/pdfViewerForm.html?args=5C7QrtC22wEsrjP0JAlxBXdtvSoClrL8e5lVH_38-2x5MXD0LzQTLf7MGgcO23N88knBzLCmTXKaO6fpVZ6Lx3UnKl3nP8NxdnJ5r9cmWyJWeIDvWS_18kAEhATUkJb0x1LIdQ163nV9K--td6SIuV-TGxbJRNFgdUu4bLT6KrrF4evsPAEQPTGk0MlXZZKt
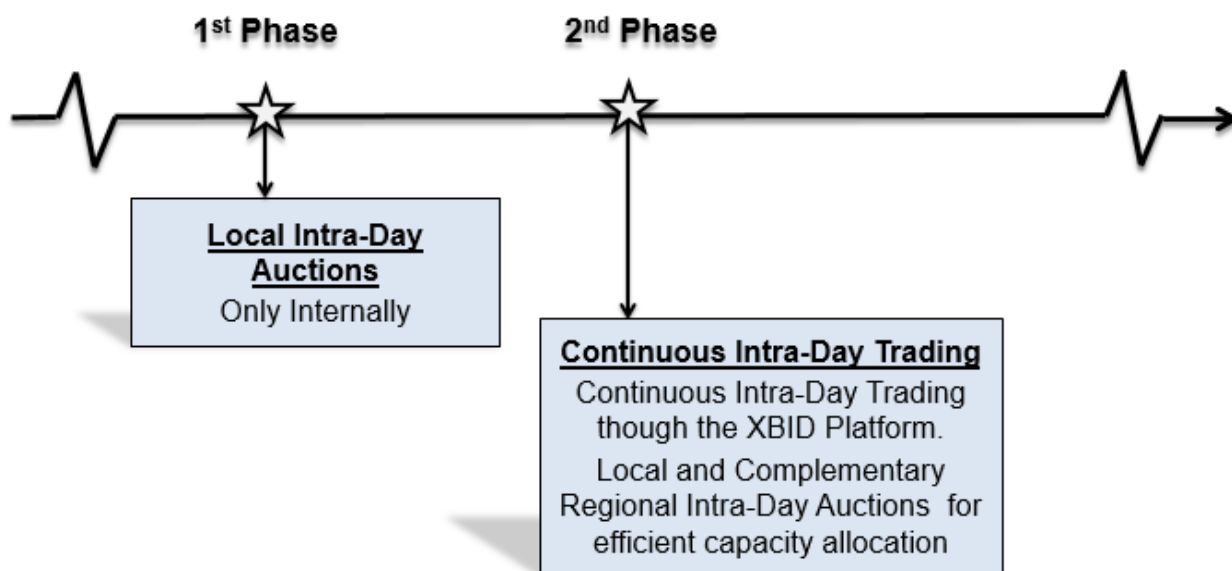
Figure 3-1: Two-Phase Approach for the Greek Intra-Day Market

❖ **Phase 1**

In the 1st Phase, only Local Intra-Day Auctions(LIDAs) shall be implemented in Greece, consistent with the number and timing of the corresponding Local and Complementary Regional Intra-Day Auctions of the 2ndphase.

The justification for the number and design of the cross-zonal and internal intra-day auctions, as well as further elaboration and analysis on the detailed market design and special features of the intra-day auctions in Greece are presented in *Chapter 4*of this report.

❖ **Phase 2**

In the 2nd Phase, the design of the Greek Intra-Day Market shall adjust to implement pan-European Continuous Intra-Day tradingthrough the XBID Solution, in combination with one Local and two Complementary Regional Intra-Day Auctions (CRIDAs),for the efficient cross-zonal capacity allocation.

In this Phase, the implicit pan-European continuous trading through the XBID Solution shall be incorporated in the Intra-Day Market design. The sole LIDA and the two CRIDAs shall be implemented for capacity pricing purposes (congestion rent calculation), in order to reveal the value of Cross-Zonal Capacity when it is scarce[8].

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[8] It should be noted that according to the single methodology for pricing intra-day Cross-Zonal Capacity in accordance with Article 55 of CACM Regulation,, which is based on two pan-European intra-day auctions

Figure 3-2 provides an illustration of the number of timings of the LIDA, CRIDAs and the Continuous Intra-Day Trading process. The justification for the number and design of the Complementary Regional Intra-Day Auctions and the Continuous Intra-Day Trading, as well as further elaboration and analysis on the detailed market design and special features of this phase are presented in *Chapters 5 and 6*, respectively.

(PEIDAs), with a similar number and timing with the CRIDAs described in this report. Nevertheless, in this proposal it is stated that "*the complementary regional auctions are always additional and allowing their implementation in special regional circumstances shall not contravene the Pan-European solution prescribed by the Proposal*". In case PEIDAs are decided by ACER for pricing intra-day Cross-Zonal Capacity, then the CRIDAs described in this report may be converted appropriately to PEIDAs. The methodology is online available via the following link:

(https://www.entsoe.eu/Documents/Network%20codes%20documents/Implementation/cacm/170810_CZI DCP_Methodology_Explanatory_Note_AllTSOs.pdf)
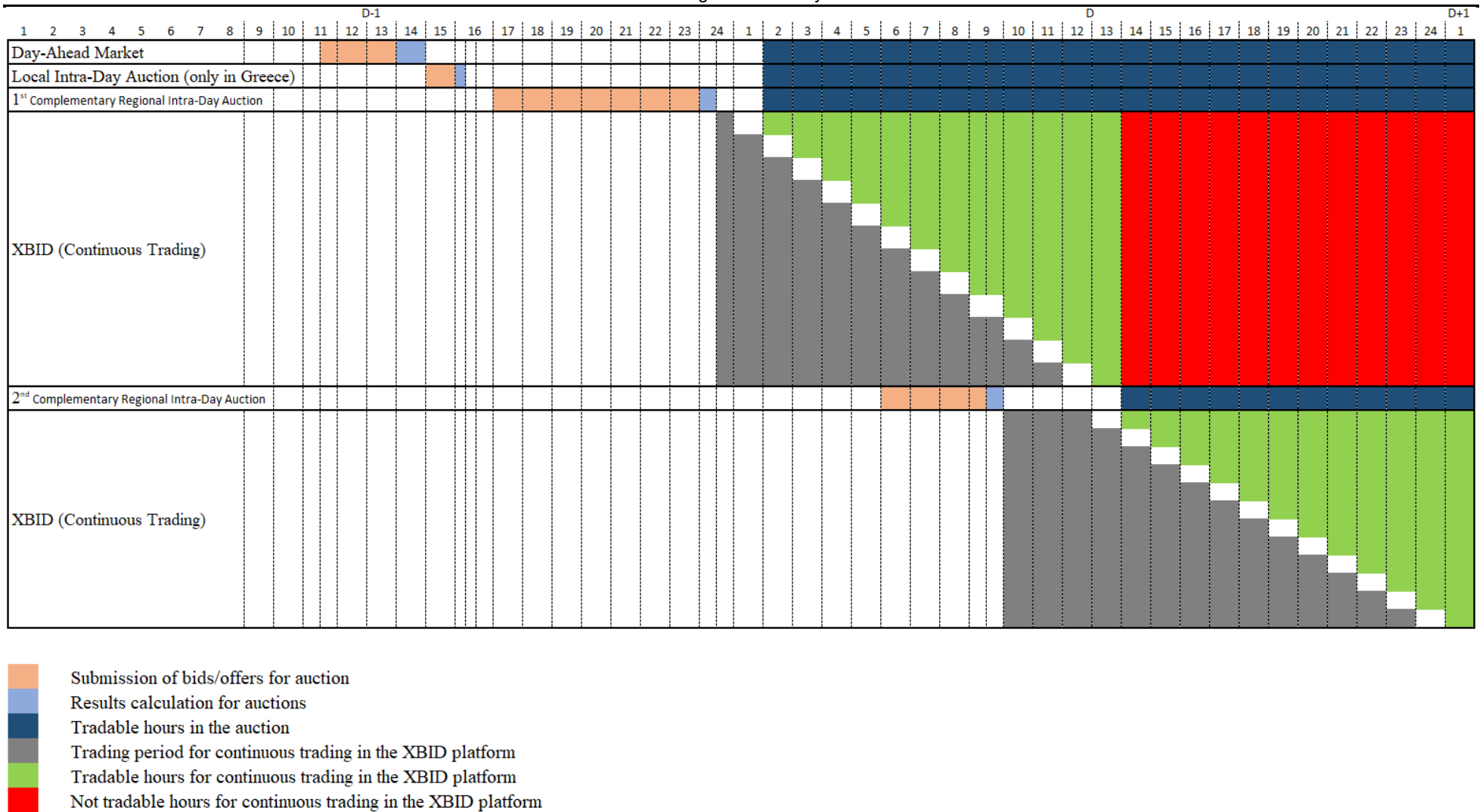
Figure 3-2: Number and timing of LIDA, CRIDAs and the intra-day continuous trading process

3.2   Pros and cons of intra-day auctions and continuous trading

At this point, it is critical to briefly evaluate the main pros and cons of intra-day auctions and the Continuous Intra-Day Trading.

❖ **Advantages of Continuous Intra-Day Trading**

First, Continuous Intra-Day Trading constitutes a better solution for RES and demand Entities than fixed auction sessions with gate closure times at pre-determined times near or during the Delivery Day, as the purpose of Intra-Day Markets is to allow for fast adjustments as close as possible to real-time. Information on changes in generation or demand conditions may come in at any time, at which point a quick reaction may be needed to close positions. In continuous trading, Buy Orders and Sell Orders can be submitted to the Market Operator at any time until a certain point (i.e. one hour) before delivery. **This is intended exactly to provide greater flexibility for Participants to perform short-term adjustments in light of changing market and system conditions.**

Second, Continuous Intra-Day Trading has the potential to accommodate forecast updates of RES power production that might occur even within one hour. These are already applied in some countries with products in less than one hour (as in Germany with 15 minute contracts available for trading).

❖ **Disadvantages of Continuous Intra-Day Trading**

There are two main disadvantages in the implementation of Continuous Intra-Day Trading, as follows:

1. When intra-day trading takes place across Bidding Zones, involving the allocation of Cross-Zonal Capacity, the issue of economical allocation arises. Specifically, continuous trading only works with a "first-come-first-served" type of allocation method**. This allocation methodology is not market-based and therefore it may not result in the most efficient allocation of Cross-ZonalCapacity**. However, the loss of social surplus resulting from Intra-Day Market trading may not be substantial due to the following three factors:

   a) First, it is probably unlikely that too much highly valued transmission capacity will be available in the Intra-Day Market in the same direction as already traded in the Day-Ahead Market. The last signal of the value of Cross-Zonal Capacity is the price difference between the Bidding Zones in the Day-Ahead Market Coupling. If the Day-Ahead Market price difference is non-zero, then all available capacity will have been allocated through the Market Coupling, leaving none for the intra-day timeframe (in the same direction). On the other hand, if there is ample free capacity remaining for intra-day trade (i.e., there was no Day-Ahead Market price difference between the coupled markets), the capacity price is zero, and it does not matter how it is allocated, as long as there is enough of it left. It should be noted that the

above theoretical analysis does not consider the case of loop flows, in which case there exist non-congested borders with different market prices on the respective connected Bidding Zones[9].Nevertheless, the above theoretical analysis remains useful.

b) Second, intra-day trading itself is likely to be rather limited in volume (unless market and system conditions are rapidly changing in a substantial way or high RES penetration/market participation increases intra-day liquidity), which also limits the loss of efficiency from a non-market-based capacity allocation procedure (as previously discussed continuous trading works with a "first-come-first-served" type which is not a market-based allocation methodology).

c) Third, the efficiency loss is also limited in time. If the intra-day transmission capacity is allocated through auctions, these will have to be organized quite frequently. Thus, a first-comer in a continuous allocation only gets preference over those who arrive later, but within the same Market Time Unit of the corresponding auction session. Those arriving in subsequent auction sessions are disadvantaged in an auction-based allocation system as well.

2. **The Continuous Intra-Day Trading does not provide indication (or a signal) of the resulting congestion rent, which is the most important stumbling block for the immediate implementation of the Continuous Intra-Day Trading**. To this end, ENTSO-E has proposed a methodology for pricing intraday cross-zonal capacity in accordance with Article 55 of CACM Regulation, which includes also pan-European intra-day auctions (PEIDAs), namely implicit intra-day auction trading sessions held at pan-European level to allocate the available intraday cross-zonal capacity at all Bidding Zone borders by applying a market coupling mechanism between the Bidding Zones, by which a price for the intra-day cross-zonal capacity shall be determined.

❖ **Advantages of intra-day auctions**

The aggregation of Buy Orders and Sell Orders at a single point in time (gate closure time) in the case of fixed auctions, gives a better indication of prices (market-based method) than transactions spread near and over the Delivery Day (in case of Continuous Intra-Day Trading). Marginal pricing of energy, in this case, may promote economically efficient bidding at (just above) generation unit marginal price. On the contrary, under the same conditions a pay-as-bid rule resulting from a continuous trading

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[9] In the flow-based model, in case of loop flows there is possibility that a single interconnection line is congested within a loop and all Bidding Zones included in the loop have different market prices (not only the two Bidding Zones on the two ends of the congested interconnection line), even though all other interconnection lines are non-congested. This is explained by the 2[nd]Kirchhoff law, concerning the calculation of flows in a meshed interconnected power system using the Power Transfer Distribution Factors (PTDFs). In such case, no more energy transfer can be performed within the loop in the congested direction in any interconnection line (even in the non-congested lines), since in that case the normal flow capacity of the congested interconnection line shall be violated (flow > capacity).

may encourage bidding just below estimated system marginal price (in order not to lose revenues, since they are paid as-bid). The latter may be an advantage for large market players, who have better information about market and system conditions (thus, they can predict more easily the marginal price, and bid just below that level in order to be accepted and at the same time do not lose revenues) and in particular of the units at the margin.

For the above reasons (disadvantages of Continuous Intra-Day Trading and advantages of intra-day auctions), some European Market Operators (e.g. the Italian and Spanish MOs) favor the intra-day auctions.

❖ **Disadvantages of intra-day auctions**

The only disadvantage of intra-day auctions is that they are executed not so close to real-time (as is the case with the gate closure time of continuous trading for each Market Time Unit). This has a significant impact mainly:

a) to variable and uncertain resources (e.g. RES Units), since they do not have the option to adjust their sold energy quantities as close as possible to real-time (when they have a very good forecast of their production), thus they may be exposed to higher deviations;

b) to Load Representatives, who can predict their represented load with increased accuracy as close as possible to real-time.

❖ **Hybrid intra-day approach to be applied in the 2ⁿᵈ phase**

According to Article 63of the European Regulation 2015/1222:

"1. By 18 months after the entry into force of this Regulation, the relevant NEMOs and TSOs on Bidding Zone borders may jointly submit a common proposal for the design and implementation of complementary regional intraday auctions. The proposal shall be subject to consultation in accordance with Article 12.

2. Complementary regional intraday auctions may be implemented within or between Bidding Zones in addition to the single intraday coupling solution referred to in Article 51. In order to hold regional intraday auctions, continuous trading within and between the relevant Bidding Zones may be stopped for a limited period of time before the Intra-Day Cross Zonal Gate Closure Time, which shall not exceed the minimum time required to hold the auction and in any case 10 minutes.

3. For complementary regional intraday auctions, the methodology for pricing intraday cross-zonal capacity may differ from the methodology established in accordance with Article 55(3) but it shall nevertheless meet the principles provided for in Article 55(1).

4. *The competent regulatory authorities may approve the proposal for complementary regional intraday auctions if the following conditions are met:*

   (a) *regional auctions shall not have an adverse impact on the liquidity of the single intraday coupling;*

   (b) *all cross-zonal capacity shall be allocated through the Capacity Management Module;*

   (c) *the regional auction shall not introduce any undue discrimination between market participants from adjacent regions;*

   (d) *the timetables for regional auctions shall be consistent with single intraday coupling to enable market participants to trade as close as possible to real-time;*

   (e) *regulatory authorities shall have consulted the market participants in the Member States concerned.*

5. *At least every two years after the decision on complementary regional auctions, the regulatory authorities of the Member States concerned shall review the compatibility of any regional solutions with single intraday coupling to ensure that the conditions above continue to be fulfilled."*

Based on the experience already accumulated from the continuous Intra-Day Markets in EU, the liquidity of the "first-come-first-served" capacity allocation seems to be higher in the Market Time Units closer to the gate closure time. According to the approach at the 2nd phase, the market can obtain the advantages of both methods; (a) a Market Coupling solution for Market Time Units not so close to real-time, and (b) a continuous Intra-Day Market, trading closer to real time (e.g. next 12 hours).

The only disadvantage of the hybrid approach lies in the fact that the interaction between intra-day auctions and Continuous Intra-Day Trading (a) may complicate the participation of the Participants in the Intra-Day Market, and (b) may also split the liquidity of the Intra-Day Market. Both of these problems are considered manageable.

4   Local Intra-Day Auctions

4.1   Introduction

As stated in *Chapter 3*, the 1st phase of the Greek Intra-Day Market implementation concerns Local Intra-Day Auctions (LIDAs) within the Greek Bidding Zone. The LIDAs shall be implemented in Greece consistent with the number and timing of the corresponding Local and Complementary Regional Intra-Day Auctions of the 2nd phase of the implementation plan, in order to achieve the best possible transition from the 1st to the 2nd phase.

This *Chapter* is dedicated to the detailed design description of these LIDAs.

4.2   Gate Opening Time and Gate Closure Time

Taking into consideration the plan for the establishment of the Complementary Regional Intra-Day Auctions (CRIDAs), as provisioned by Article 63 of the CACM Regulation, in the Italy BRNN – Greece Capacity Calculation Region (CCR) in the 1st phase of the Intra-Day Market implementation in Greece three (3) LIDAs shall be implemented with the timings shown in Table 4-1.

A/A	Intra-Day Market session	GOT [EET]	GCT [EET]	Publication of results [EET]	Valid from [EET]	Valid to [EET]
1	LIDA1	14:00 D-1	15:00 D-1	15:15 D-1	01:00 D	01:00 D+1
2	LIDA2	16:00 D-1	23:00 D-1	23:15 D-1	01:00 D	01:00 D+1
3	LIDA3	05:00 D	08:30 D	08:45 D	13:00 D	01:00 D+1

Table 4-1: Local Intra-Day Auctions timing

4.3   Order Types

The only type of available Orders in the LIDAs is the simple step-wise and linear piecewise Orders. More specifically, the step-wise Orders are price-quantity steps that are non-decreasing in price for higher energy quantities of Sell Orders, and non-increasing in price for higher energy quantities of Buy Orders, separately for each Market Time Unit of the Delivery Day. On the other hand, the linear piecewise Orders contain only interpolated Orders.

The aggregated Sell and Buy Curves formulated by the Orders submitted by the Participants can be of the following types:

i) Linear piecewise curves (i.e. two consecutive points of the monotonous curve cannot have the same price, except for the first two points defined at the maximum / minimum prices of the Bidding Zone, as shown in *Figure 4-1*).
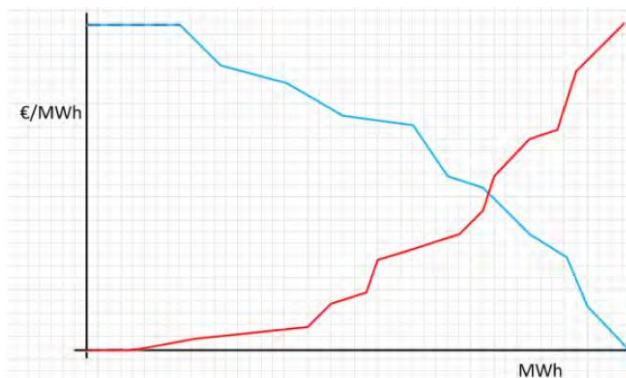
Figure 4-1: Linear piecewise selling and buying curves

ii) Stepwise curves (i.e. two consecutive points always have either the same price or the same quantity, as shown in *Figure 4-2*).
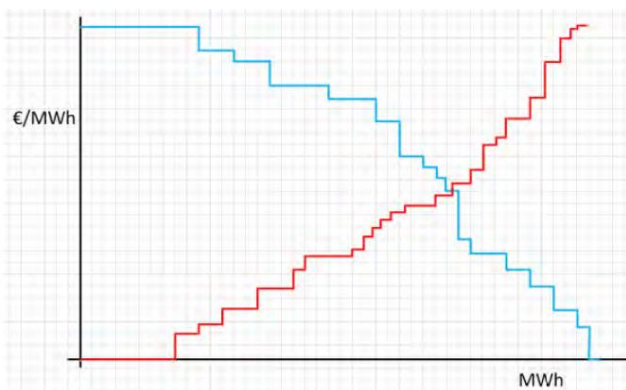
Figure 4-2: Stepwise selling and buying curves

Additionally, Priority Price-Taking Orders shall be submitted in the Intra-Day Market as prescribed in Section 2.5. More details on the submission of Priority Price-Taking Orders are provided in Section 7.2.4 of this report.

4.4   Acceptance Rules

This Section discusses the acceptance rules of the Orders submitted in the 1st implementation Phase.

1) The acceptance rules of a **step-wise Sell Order** submitted at a Bidding Zone are the following:

    a) A step of the Sell Order shall be totally accepted if its price is lower than the Local

Intra-Day Auction Clearing Price (LIDACP) of the Bidding Zone for the specific Market Time Unit of the Delivery Day.

    b) A step of the Sell Order shall be partially accepted if its price is equal to the LIDACP of the Bidding Zone for the specific Market Time Unit of the Delivery Day.

    c) A step of the Sell Order shall not be accepted if its price is higher than the LIDACP of the Bidding Zone for the specific Market Time Unit of the Delivery Day.

2) The clearing rules of a **step-wise Buy Order** submitted at a Bidding Zone are the following:

    a) A step of the Buy Order shall be totally accepted if its price is higher than the LIDACP of the Bidding Zone for the specific Market Time Unit of the Delivery Day.

    b) A step of the Buy Order shall be partially accepted if its price is equal to the LIDACP of the Bidding Zone for the specific Market Time Unit of the Delivery Day.

    c) A step of the Buy Order shall not be accepted if its price is lower than the LIDACP of the Bidding Zone for the specific Market Time Unit of the Delivery Day.

3) The clearing rules of a **linear piecewise Sell Order** submitted at a Bidding Zone are the following:

    a) A piece of the piecewise of the Sell Order shall be totally accepted if its price at the right end of the piece is lower than the LIDACP of the Bidding Zone for the specific Market Time Unit of the Delivery Day.

    b) A piece of the piecewise of the Sell Order shall be partially accepted if its price at the left end of the piece is lower than the LIDACP and its price at the right end of the piece is higher than the LIDACP of the Bidding Zone for the specific Market Time Unit of the Delivery Day.

    c) A piece of the piecewise Sell Order shall not be accepted if its price at the left end of the piece is higher than the LIDACP of the Bidding Zone for the specific Market Time Unit of the Delivery Day.

4) The acceptance rules of a **linear piecewise Buy Order** submitted at a Bidding Zone are the following:

    a) A piece of the piecewise of the Buy Order shall be totally accepted if its price at the right end of the piece is higher than the LIDACP of the Bidding Zone for the specific Market Time Unit of the Delivery Day.

    b) A piece of the piecewise Buy Order shall be partially accepted if its price at the left end of the piece is higher than the LIDACP and its price at the right end of the piece is lower than the LIDACP of the Bidding Zone for the specific Market Time Unit of the

Delivery Day.

c) A piece of the piecewise Buy Order shall not be accepted if its price at the left end of the piece is lower than the LIDACP of the Bidding Zone for the specific Market Time Unit of the Delivery Day.

4.5   Matching process

The matching process in LIDAs is as follows:

The objective function of the local intra-day auction clearing is the maximization of the total social welfare, namely the maximization of the sum of the surpluses of all Participants (submitting Sell and Buy Orders in the Bidding Zones within Greece) plus the congestion rent.

i)   The surplus of a Participant with an accepted Sell Order equals the difference of the LIDACP of the respective Bidding Zone minus the Sell Order Price, multiplied by the accepted energy quantity of the said Order.

ii)   The surplus of a Participant with an accepted Buy Order equals the difference of the Buy Order Price minus the LIDACP of the respective Bidding Zone, multiplied by the accepted energy quantity of the said Order.

iii)   The congestion rent equals the LIDACP difference between two neighboring Bidding Zones connected through an interconnection or an inter-zonal corridor, multiplied by the exchange transferred from the Bidding Zone with the lower LIDACP to the Bidding Zone with the higher LIDACP.

The problem constraints include for each Market Time Unit of the Delivery Day the energy balance equation in each Bidding Zone within Greece (the sum of accepted Sell Order quantities equals the sum of accepted Buy Order quantities), along with the acceptance conditions of the Orders and any network constraints (Cross Zonal Capacity) among the Bidding Zones within Greece (if any).

The LIDA problem constitutes a Quadratic Programming model, namely a model with continuous variables quadratic terms in the objective function and linear constraints.

4.6   LIDA results

The results of a LIDA comprise:

a)   the acceptance status of each Order,

b)   a single Net Position for each Bidding Zone and Market Time Unit; and

c) the LIDACP per Bidding Zone within Greece and per Market Time Unit.

All accepted Sell Orders and Buy Orders in a LIDA shall be settled at the LIDACP (marginal-pricing concept).

No later than fifteen (15) minutes after each LIDA Gate Closure Time, the Market Operator shall send to the Participants the LIDA results and shall publish such results to its website.

4.7   Fallback procedures

In case the execution of a LIDA delays, and in case the delay does not affect significantly the Balancing Market processes that are executed after the LIDA for the specific Market Time Units concerned in the said LIDA, the LIDA shall be executed normally with a small delay. In such case, the Market Operator shall inform timely the Participants for the delay, and shall justify the reasons of the delay.

In case the execution of a LIDA delays for a substantial period of time for any reason, so that it affects the execution of the Balancing Market processes that are executed after the LIDA for the specific Market Time Units concerned in the said LIDA, the LIDA shall be cancelled.

In case a LIDA cannot be executed for given Market Time Units, the corresponding intraday Cross-Zonal Capacity will be allocated in the following LIDA or CRIDA or Continuous Intra-Day Trading.

4.8   Objections and cancellation of trades

With regard to a Participant, all those transactions which are brought about by means of his input devices or his allotted technical access shall be binding.

5 Complementary Regional Intra-Day Auctions

5.1 Introduction

On 14th August 2015, the CACM Regulation came into effect defining, among others, the requirements for the single intra-day coupling which relies on:

- a continuous energy trading mechanism accommodating the implicit allocation of the intra-day Cross-Zonal Capacity[10];

- the development of a single methodology for pricing intra-day Cross-Zonal Capacity that shall reflect market congestion and be based on actual Orders ("the Pricing of Intra-day Capacity")[11].

Moreover, the CACM Regulation allows NEMOs and TSOs to complement the single intra-day coupling with a complementary regional auction mechanism as foreseen in article 63, paragraph 2, which states that "*[…] Complementary regional intraday auctions may be implemented within or between Bidding Zones in addition to the single intraday coupling solution referred to in Article 51 […]*".

In that sense, in February 2017, an explanatory note on Intra-day Coupling model for Italian Borders has been published [12] by RAE. This paper is a common proposal developed by NEMOs and the TSOs of the Italian Borders (IB). The Italian Borders in this context cover the electrical borders, for both power flow directions, between Italy and Slovenia, Italy and Switzerland, Italy and Austria, Italy and France, Italy and Greece. The geographical scope of this project includes the border between Austria and Slovenia. The borders between Italian internal Bidding Zones are also involved in this proposal.

The above-mentioned parties intend to implement an Intra-day Coupling Model in which the Target Model, based on a continuous trading mechanism, is complemented by Complementary Regional Intra-Day Auctions.

In brief, the execution of each CRIDA consists of the following steps:

1) The CCC in the relevant Capacity Calculation Region calculates the intra-day Cross-Zonal Capacity pursuant to relevant capacity calculation methodology;

2) The CCC makes available to NEMOs and publish the intra-day Cross-Zonal Capacity to be used in the CRIDA;

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[10]Article 51 of CACM Regulation

[11]Article 55 of CACM Regulation

[12]http://www.rae.gr/site/file/system/docs/consultations/04092015/080617/f20

3) The bidding period for the CRIDA opens (this step can commence before the two previous steps 1 and 2,but no later than the next step 4);

4) The CCC makes available and publishes the final value of intra-day Cross-Zonal Capacity to be used in the CRIDA along with possible Allocation Constraints, and this value is transferred to the NEMOs;

5) The bidding period for the CRIDA closes, and the auction clearing (calculation of auction results) starts;

6) After the calculation of the CRIDA results, such results are first validated by TSOs (against the intraday Cross-Zonal Capacity and Allocation Constraints they sent) and NEMOs (against the Orders there were submitted) before they can be published (including intra-day Cross-Zonal Capacity price), settled and shipped.

The remaining intra-day Cross-Zonal Capacity shall be made available for the subsequent continuous trading session for the respective Market Time Units involved in such session.

5.2   Intra-Day Cross Zonal Capacity Calculation Process

As mentioned in the introductory Section of this Chapter, the first step of the CRIDA is the calculation of the Cross Zonal Capacity. This Section presents the Cross Zonal Capacity made available to the CRIDAs and the way by which this capacity is priced.

5.2.1   Intra-Day Cross Zonal Capacity made available to the CRIDAs

a) Initial intra-day Cross-Zonal Capacity

Each CRIDA shall allocate Cross-Zonal Capacity based on the latest intra-day Cross-Zonal Capacity calculation.

In order to efficiently reflect the level of congestion, the available intra-day Cross Zonal Capacity for a given Market Time Unit at the moment when the calculated capacity level is defined (just before a CRIDA) shall be offered through this CRIDA. This means that the initial intra-day Cross-Zonal Capacity calculated for a given Market Time Unit shall first be allocated through a CRIDA, so that it is priced efficiently. The remaining intra-day Cross-Zonal Capacity that is left after the execution of the CRIDA shall then be allocated in the continuous matching session for this Market Time Unit.

The CRIDA will therefore price the intra-day Cross-Zonal Capacity before it is made available to the subsequent continuous matching session.

b) Update of intra-day Cross-Zonal Capacity

Moreover, with regards to the intra-day Cross-Zonal Capacity calculation, Articles 14 (1), (2) and (4) of the CACM Regulation require the TSOs to assess intra-day Cross-Zonal

Capacities not only in day-ahead timeframe (before the start of intra-day Cross Zonal Gate Opening Time), but also within the intra-day timeframe, where relevant. It is also explicitly required to take into account the latest available information for these calculations. Since the capacity calculation is dependent on the forecast of Net Positions taken into account in the base case, there is an opportunity for the CCCs to refine the capacity calculation for the remaining Market Time Units that are still not made available for continuous matching and lower the level of uncertainties, with therefore a higher probability of determining additional Cross-Zonal Capacities with a new recalculation.

Similarly with the allocation of the initial intra-day Cross-Zonal Capacity, any additional intra-day Cross-Zonal Capacity for a given Market Time Unit (obtained by a capacity reassessment, when relevant) shall first be allocated by a CRIDA so that it can be priced.

Concretely, for late Market Time Units, intra-day Cross-Zonal Capacity can be calculated several times, which may lead to a new capacity pricing through a subsequent CRIDA. Since the frequency of intra-day Cross-Zonal Capacity calculation is entirely dependent on the corresponding methodologies that are established at the different CCRs, the feasibility of this principle for which coherence of the timings of recalculation in the different CCRs is essential is still to be confirmed at an EU level.

5.2.2   Intra-Day Cross Zonal Capacity Pricing

a) Calculation

The CRIDA determines a single clearing price (called Complementary Regional Intra-Day Auction Clearing Price (CRIDACP) for each Bidding Zone and for each Market Time Unit.

In case the Coordinated Net Transmission Capacity approach is followed for congestion management in the region, the Cross-Zonal Capacity is priced as follows:

1) If all intra-day Cross-Zonal Capacity has been allocated by the CRIDA, the intra-day Cross-Zonal Capacity shall be priced at the value corresponding to the difference between the CRIDACPs of the respective interconnected Bidding Zones.

2) If not all intra-day Cross-Zonal Capacity has been allocated by the CRIDA, the intra-day Cross-Zonal Capacity shall be priced at zero.

In case a flow-based approach is followed for congestion management in the region, the above statements need to be slightly adapted, in the sense that the availability of the Cross-Zonal Capacity is conditioned by one or several Critical Network Elements at a CCR level (instead of a Cross-Zonal Capacity at a Bidding Zone border level):

1) If the power flow capacity of one Critical Network Element is fully used by the allocation performed in the CRIDA, then differences shall take place between the CRIDACPs of the interconnected Bidding Zones of the CCR;

2) If not, then the CRIDACPs of the Bidding Zones of the CCR shall be the same.

The price of intra-day Cross-Zonal Capacity shall be calculated shortly after the bidding period of the CRIDA closes, so that for a given Market Time Unit it is available to the Participants before the start of subsequent continuous matching session.

b) Robustness

The intra-day Cross-Zonal Capacity price determined by a given CRIDA shall reflect the market situation at the moment of this CRIDA is executed.

This means, in certain cases, that a price may be assessed for intraday Cross-Zonal Capacity (since it is congested at the moment of the CRIDA execution), while in a later moment this Cross-Zonal Capacity can be priced at a different value, for example it may be zero (if not congested anymore when more intra-day capacity is made available and not used).

5.3   Gate Opening Time and Gate Closure Time

In order to provide an efficient allocation procedure (also allowing pricing) for intra-day Cross-Zonal Capacity, NEMOs and TSOs of the Italian Borders aim to implement two Complementary Regional Intra-Day Auctions (CRIDAs) with the timing shown in Table 5-1 and in Figure 5-1.

A/A	Intra-Day Market session	GOT [EET]	GCT [EET]	Publication of results [EET]	Valid from [EET]	Valid to [EET]
1	CRIDA1	16:00 D-1	23:00 D-1	23:30 D-1	01:00 D	01:00 D+1
2	CRIDA2	05:00 D	08:30 D	09:00 D	13:00 D	01:00 D+1

Table 5-1: Complementary Regional Intra-Day Auctions timing

The timing of CRIDAs is as follows:

a) The first CRIDA shall be performed in day D-1, where Market Time Units[13] from 01:00 EET of Delivery Day D to 01:00 EET of Delivery Day D+1 are tradable and,

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[13] It should be noted that the Market Time Unit for the CRIDAs is equal to one (1) hour.

b) The second CRIDA shall be performed in the morning of the Delivery Day D, where only Market Time Units from 13:00EET of Delivery Day D to 01:00 EET of Delivery Day D+1 are tradable[14].

In order to perform the CRIDAs with the most updated value of the available Cross Zonal Capacity, the first CRIDA shall be performed at 23:00 EET, in order to allocate efficiently the Cross-Zonal Capacity as recalculated by Coordinated Capacity Calculator(CCC) after the day-ahead allocation process has been terminated. No later than 23:30 EET of the day D-1 the NEMOs shall publish the results of the first Complementary Regional Intra-Day Auction.

After the auction results have been published, the continuous trading through the XBID Solution shall commence. In the continuous trading only the Market Time Units, which are not auctioned in any following CRIDA, shall be tradable. By doing so, the level of uncertainties in the capacity calculation covering the remaining Market Time Units is lower, therefore there is a higher probability of determining additional Cross Zonal Capacities with a new recalculation.

During the second CRIDA the continuous trading does not stop, since there is no overlapping between Market Time Units traded in XBID and Market Time Units traded in this CRIDA. Only after the results of the second CRIDA are published (by 09:00 EET in day D), the continuous trading shall be progressively opened also for Market Time Units from 13:00 EET of Delivery Day D until 01:00 EET of Delivery Day D.

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[14] The second CRIDA aims to efficiently allocate additional capacity resulting from a new capacity calculation during Trading Day D.
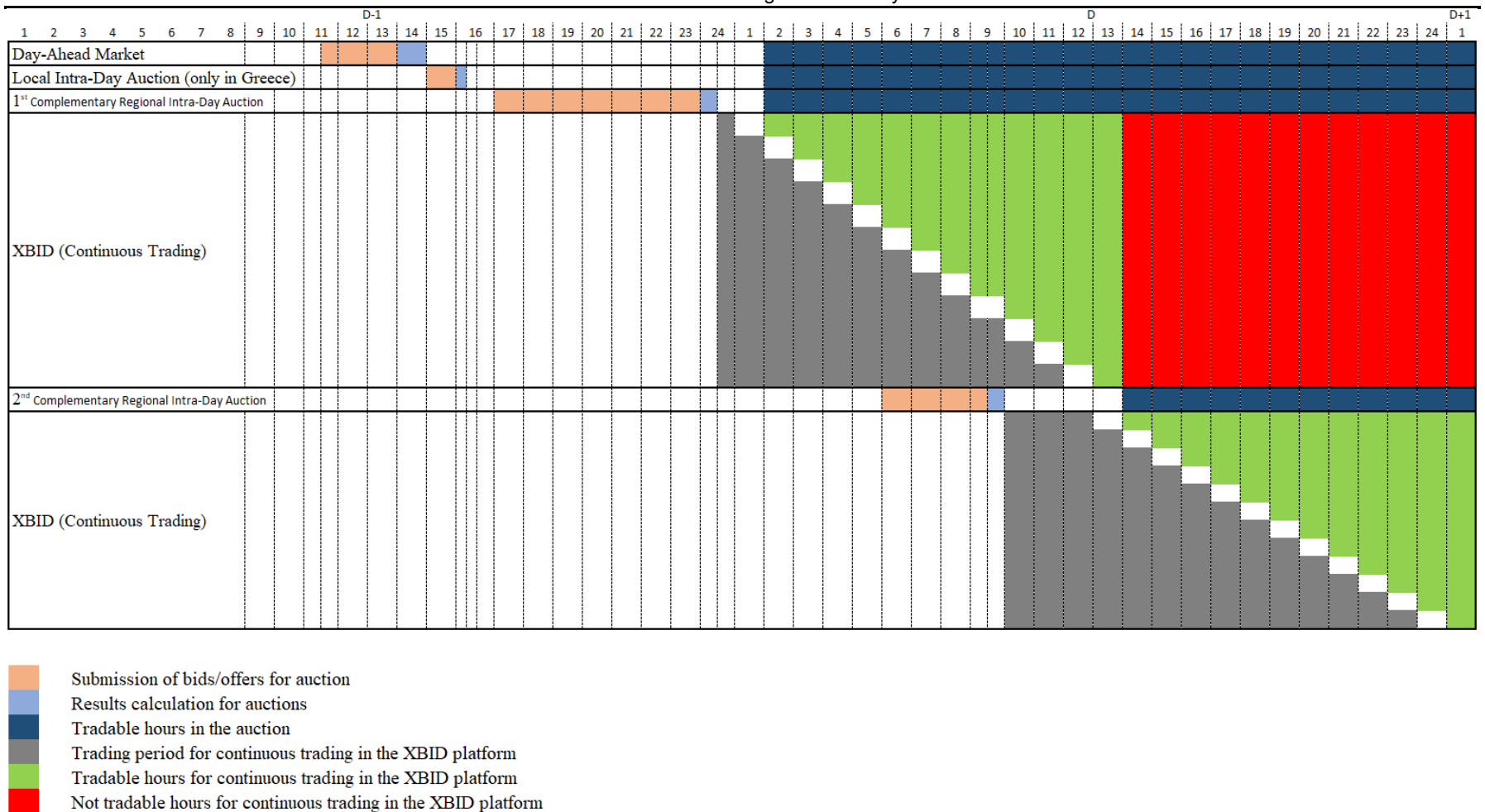
Figure 5-1: Number and timing of LIDA, CRIDAs and the Intra-Day Continuous Trading process

5.4   Order Types

The types of Orders that can be submitted by Participants in the CRIDAs are the following:

a) Step-wise Orders

b) Linear piecewise Orders

c) Block Orders: A Block Order consists of a fixed price limit (minimum price for Sell Block Orders and maximum price for Buy Block Orders), a Minimum Acceptance Ratio and an energy volume for a number of Market Time Units within the Delivery Day. The energy volume can be different for different Market Time Units.

   Block Orders cannot be accepted for a volume less than their Minimum Acceptance Ratio. The Minimum Acceptance Ratio is the same for all Market Time Units belonging to the Block Order.

It should be noted that there is no automatic transfer of Buy/Sell Orders from Participants from CRIDAS (pay-as-cleared mechanism) towards continuous matching (pay-as-bid mechanism). This means that the types of products to be traded in CRIDAs are not linked in any manner with the ones traded during continuous matching sessions.

Participants should be aware that it is their responsibility to place their Sell Orders separately and correctly in the CRIDA and the continuous matching sessions. Of course, it should be noted that there is no obligation for the Participants to submit Sell Orders in both mechanisms (CRIDAs and continuous trading) for a given Market Time Unit, since the participation in all Intra-Day Market processes is voluntary.

5.5   Acceptance Rules

The acceptance rules of a step-wise Sell Order submitted at a Bidding Zone in a CRIDA are the following:

a) A step of the Sell Order shall be totally accepted if its price is lower than the CRIDACP of the Bidding Zone for the specific Market Time Unit of the Delivery Day.

b) A step of the Sell Order shall be partially accepted if its price is equal to the CRIDACP of the Bidding Zone for the specific Market Time Unit of the Delivery Day.

c) A step of the Sell Order shall not be accepted if its price is higher than the CRIDACP of the Bidding Zone for the specific Market Time Unit of the Delivery Day.

The acceptance rules of a step-wise Buy Order submitted at a Bidding Zone are the following:

a) A step of the Buy Order shall be totally accepted if its price is higher than the CRIDACP of the Bidding Zone for the specific Market Time Unit of the Delivery Day.

b) A step of the Buy Order shall be partially accepted if its price is equal to the CRIDACP of the Bidding Zone for the specific Market Time Unit of the Delivery Day.

c) A step of the Buy Order shall not be accepted if its price is lower than the CRIDACP of the Bidding Zone for the specific Market Time Unit of the Delivery Day.

The acceptance rules of a linear piecewise Sell Order submitted at a Bidding Zone are the following:

a) A piece of the piecewise Sell Order shall be totally accepted if its price at the right end of the piece is lower than the CRIDACP of the Bidding Zone for the specific Market Time Unit of the Delivery Day.

b) A piece of the piecewise Sell Order shall be partially accepted if its price at the left end of the piece is lower than the CRIDACP and its price at the right end of the piece is higher than the CRIDACP of the Bidding Zone for the specific Market Time Unit of the Delivery Day.

c) A piece of the piecewise Sell Order shall not be accepted if its price at the left end of the piece is higher than the CRIDACP of the Bidding Zone for the specific Market Time Unit of the Delivery Day.

The acceptance rules of a linear piecewise Buy Order submitted at a Bidding Zone are the following:

a) A piece of the piecewise Buy Order shall be totally accepted if its price at the right end of the piece is higher than the CRIDACP of the Bidding Zone for the specific Market Time Unit of the Delivery Day.

b) A piece of the piecewise Buy Order shall be partially accepted if its price at the left end of the piece is higher than the CRIDACP and its price at the right end of the piece is lower than the CRIDACP of the Bidding Zone for the specific Market Time Unit of the Delivery Day.

c) A piece of the piecewise Buy Order shall not be accepted if its price at the left end of the piece is lower than the CRIDACP of the Bidding Zone for the specific Market Time Unit of the Delivery Day.

The acceptance rules of a Sell Block Order in a CRIDA are the following:

a) A Sell Block Order shall be accepted in its entirety (Acceptance Ratio equal to one) if the conditions below are simultaneously valid:

1) its offer price is lower than the weighted average CRIDACP for the Market Time Units of the Delivery Day involved in the Sell Block Order (i.e. between the respective Starting Period and Ending Period), weighted by the respective accepted energy quantities of the Sell Block Order; or

2) during the matching process this Sell Block Order has not been identified as a Paradoxically Accepted Block.

b) A Sell Block Order shall be accepted in part (Acceptance Ratio between its Minimum Acceptance Ratio and one), if its offer price is exactly equal to the weighted average CRIDACP for the Market Time Units of the Delivery Day involved in the Sell Block Order. The Acceptance Ratio takes such value so that the weighted average CRIDACP between the Starting Period and Ending Period is equal to the Sell Block Order price), weighted by the respective accepted energy quantities of the Sell Block Order. In case it is partially accepted, a uniform loading factor is applied for the sold energy in all Market Time Units of the Delivery Day involved in the Sell Block Order.

c) A Sell Block Order shall not be accepted (Acceptance Ratio equal to zero) if one of the following two cases applies:

1) if its offer price is higher than the weighted average CRIDACP for the Market Time Units of the Delivery Day involved in the Sell Block Order; or

2) if its offer price is lower than the weighted average CRIDACP for the Market Time Units of the Delivery Day involved in the Sell Block Order, but during the matching process this Sell Block Order has been identified as a Paradoxically Accepted Block.

In all cases, the accepted energy quantity of a Sell Block Order for each Market Time Unit of the Delivery Day involved in the Sell Block Order shall be equal to the Acceptance Ratio times the offered energy quantity of the Sell Block Order.

The acceptance rules of a Buy Block Order are similar to the respective acceptance rules of a Sell Block Order, with the difference that the Buy Block Order is cleared when its bid price is higher – rather than lower – than the weighted average CRIDACP for the Market Time Units of the Delivery Day involved in the Buy Block Order, weighted by the respective accepted energy quantities of the Buy Block Order.

5.6   Matching Process

The matching / coupling process of CRIDAs is as follows:

The objective function is the maximization of the total social welfare of all markets included in the region, namely the maximization of the sum of the surpluses of all Participants (submitting Sell and Buy Orders) in the region plus the congestion rent.

a) The surplus of a Participant with an accepted Sell Order equals the difference of the Complementary Regional Intra-Day Auction Clearing Price (CRIDACP) of the respective Bidding Zone minus the Sell Order Price, multiplied by the accepted energy quantity of the said Order.

b) The surplus of a Participant with an accepted Buy Order equals the difference of the Buy Order Price minus the CRIDACP of the respective Bidding Zone, multiplied by the accepted energy quantity of the said Order.

c) The congestion rent equals the CRIDACP difference between two neighboring Bidding Zones connected through an interconnection or an inter-zonal corridor, multiplied by the exchange transferred from the Bidding Zone with the lower CRIDACP to the Bidding Zone with the higher CRIDACP.

The problem constraints include for each Market Time Unit of the Delivery Day the energy balance equation in each Bidding Zone in the region (the sum of accepted Sell Order quantities equals the sum of accepted Buy Order quantities), along with the acceptance conditions of the Orders and any allocation constraints among the Bidding Zones in the region.

Since Block Orders are tradable in CRIDAS, binary variables are included in the problem formulation for the handling of the fill-or-kill feature of Block Orders. Additionally, since linear piecewise hourly Orders can be submitted by Participants in the CRIDAS, quadratic terms are included in the problem objective function. Therefore, the CRIDA problem constitutes a mixed-integer quadratic programming model, namely a model with continuous and binary variables, linear constraints and quadratic terms in the objective function.

The CRIDAS clearing engine handles the Paradoxically Accepted Block Orders through an iterative process, at each iteration of which the "intermediate solutions" resulting in Paradoxically Accepted Block Orders are effectively excluded from the binary tree defining the solution space. In the final solution, there are no Paradoxically Accepted Block Orders.

The regional intra-day auctions shall be solved either by the Day-Ahead Market clearing engine, Euphemia, or by another efficient solver. The calculation process in which orders are matched is analytically described in the public description of the PCR Market Coupling algorithm Euphemia[15], and it is also described in Annex B of the Day-Ahead Market Detailed Market Design document.

5.7   CRIDA Results

The results of a CRIDA comprise:

a) the acceptance status of each Order,

b) a single Net Position for each Bidding Zone and Market Time Unit, and

c) the Complementary Regional Intra-Day Auction Clearing Price (CRIDACP)per Bidding Zone and per Market Time Unit.

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[15] Price Coupling of Regions, EUPHEMIA Public Description, December 2016. Accessed 01.07.17:
   https://www.nordpoolspot.com/globalassets/download-center/pcr/euphemia-public-documentation.pdf

All accepted Sell Orders and Buy Orders in a CRIDA shall be settled at the CRIDACP (marginal-pricing concept).

No later than fifteen (15) minutes after each CRIDA Gate Closure Time, the CRIDA Operator shall deliver the Intra-Day Market Coupling Results, according to paragraph 4 of Article 37, to the Market Operator and to the Transmission System Operator. The time limit depends on the contractual agreement with the neighboring markets.

No later than thirty (30) minutes after each CRIDA Gate Closure Time, the Market Operator shall send to the Participants the CRIDA results and shall publish such results to its website.

5.8   Fallback Procedures

Contrary to the single day-ahead coupling, for which the CACM Regulation requires the establishment for fallback procedures according to Article 44, no requirements of this kind are given to the Intra-Day Market processes.

In case the execution of a CRIDA delays, and in case the delay does not affect significantly the Balancing Market processes that are executed after the CRIDA for the specific Market Time Units concerned in the said auction, the CRIDA shall be executed normally with a small delay. In such case, the Market Operator shall inform timely the Participants for the delay, and shall justify the reasons of the delay.

In case the execution of a CRIDA delays for a substantial period of time and for any reason, so that it affects the execution of the Balancing Market processes that are executed after the CRIDA for the specific Market Time Units concerned in the said auction, the CRIDA shall be cancelled

In case a CRIDA cannot be executed for given Market Time Units, the corresponding intraday Cross-Zonal Capacity will be allocated in the continuous matching session.

5.9   Objections and Cancellation of Trades

With regard to a Participant, all those transactions which are brought about by means of his input devices or his allotted technical access shall be binding.

6 Continuous Intra-Day Trading

6.1 Introduction

As stated in *Chapter 3* of this report, the 2nd implementation phase of the Greek Intra-Day Market adopts the solution of Continuous Intra-Day Trading in combination with Complementary Regional Intra-Day Auctions (as analytically described in *Chapter 5*).

The continuous trading scheme is the preferred Intra-Day Market clearing process according to the CACM Regulation, Articles 51-53, where it is stated that:

*"Article 51. Objectives of the **continuous trading matching algorithm***

*1. From the intraday cross-zonal gate opening time until the Intra-Day Cross Zonal Gate Closure Time, the **continuous trading matching algorithm** shall determine which orders to select for matching such that matching:*

(a) aims at maximising economic surplus for single intraday coupling per trade for the intraday market time-frame by allocating capacity to orders for which it is feasible to match in accordance with the price and time of submission;

(b) respects the allocation constraints provided in accordance with Article 58(1);

(c) respects the cross-zonal capacity provided in accordance with Article 58(1);

(d) respects the requirements for the delivery of results set out in Article 60;

(e) is repeatable and scalable.

*2. The **continuous trading matching algorithm** shall produce the results provided for in Article 52 and correspond to the product capabilities and functionalities set out in Article 53.*

*Article 52 Results of the **continuous trading matching algorithm***

1. All NEMOs, as part of their MCO Function, shall ensure that the continuous trading matching algorithm produces at least the following results:

(a) the execution status of orders and prices per trade;

(b) a single Net Position for each Bidding Zone and market time unit within the intraday market.

2. All NEMOs shall ensure the accuracy and efficiency of results produced by the continuous trading matching algorithm.

3. All TSOs shall verify that the results of the continuous trading matching algorithm are consistent with cross-zonal capacity and allocation constraints in accordance with Article 58(2)."

This *Chapter* provides a more in-depth analysis with regard to the continuous Intra-Day Market that shall operate in Greece at the 2nd phase of the implementation process.

Critical timings of the market, certain products along with their execution specifications and other features of the market are being proposed, taking into consideration the prerequisites of the CACM Regulation, the defined processes for the implementation of the regional Intra-Day Market with the neighboring countries, along with the current practice of the main existing continuous Intra-Day Markets in Europe.

The ultimate continuous solution of the Intra-Day Market in Greece shall bring about all the benefits presented in *Chapter 1* of this report. Particularly:

➢ The Intra-Day Market will constitute an important tool for Participants in Greece to keep positions balanced as injections/offtakes change between the Day-Ahead Market conditions and real time operations.

➢ The Intra-Day Market will also facilitate the more efficient integration of RES into the Greek wholesale electricity market.

➢ Intra-day trading across the Greek borders and within the pan-European Intra-Day Electricity Market will give Participants in Greece access to a wider selection of counterparts with different production mix and marginal costs, enhancing the overall market liquidity.

6.2   Gate Opening Time and Gate Closure Time

Two sessions of Continuous Intra-Day Trading are provisioned for the Greek Intra-Day Market during the 2nd phase of the implementation plan.

The Continuous Intra-Day Trading Gate Opening Time and Gate Closure Time of the first session are the following:

a) the Gate Opening Time shall be at 23:30 EET in day D-1 for the Market Time Units[16] starting from 01:00 EET and ending at 13:00 EET of calendar day D; and

b) the Gate Closure Time shall be sixty (60) minutes before each Market Time Unit.

The Continuous Intra-Day Trading Gate Opening Time and Gate Closure Time of the second session are the following:

a) the Gate Opening Time shall be at 09:00 EET in calendar day D for the Market Time Units starting from 13:00 EET of calendar day D and ending at 01:00 EET of calendar day D+1; and

b) the Gate Closure Time shall be sixty (60) minutes before each Market Time Unit.

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[16] The Market Time Unit for the Continuous Intra-Day Trading is equal to thirty (30) minutes.

The Trading Platform shall not validate any Orders before the respective Continuous Intra-Day Trading Gate Opening Time and after the respective Continuous Intra-Day Trading Gate Closure Time.

6.3   Order Types

Trading shall take place through the Market Operator's Trading Platform for storing of Orders, ranking of Orders and execution of transactions.

Participants shall submit Orders, under their unique identification codes, from their respective workstations to the Market Operator's Trading Platform, by means of electronic transmission. Starting at 23:30 EET in day D-1, the Participants shall be able to submit their Orders with respect to the first twenty-four (24) Market Time Units of the following Delivery Day D, and after the execution of the 2nd CRIDA (as shown in Figure 3-1) the Participants shall be able to submit their Orders with respect to the last twenty-four (24) Market Time Units of Delivery Day D. The submission of the Orders shall continue during the Delivery Day D, each time with regard to the Market Time Units which follow the submission of the respective Order.

Orders and transactions in the Market Operator's Trading Platform shall be performed in an anonymous manner.

The minimum contents of an Order submitted to the Trading Platform by a Participant shall be the following:

- Participant EIC Code,

- Entity for which the Order is submitted,

- The applicable contract code (determines the specific tradable contract within the Delivery Day: Simple Hourly Order, Half-hourly Order or Block Order),

- Whether the Order is a Buy Order or a Sell Order,

- The applicable Order Type (see "Type of Orders" in the *Table 6-1*),

- Energy volume and price

- Market Time Unit(s) for which it is submitted,

- Order's execution specifications (see "Orders' Execution Specifications" in the *Table 5-1*),

- Order's validity specifications, and

- If applicable: any additional information as mandated by the Energy Trading System Rules or the prevailing functionality of the Trading Platform.

Note that, the "indication" of other Biding Zones visibility shall not be provided by the Participant, but shall be traced by the functionalities of the SOBF and the CMM, within the pan-European Continuous Intra-Day Trading. Thus, it is not referred in the above list among the minimum contents of an Order submitted to the Trading Platform by a Participant.

The functionality of the Trading Platform shall automatically validate[17] the above-mentioned information for all Orders registered, and store Orders in electronic Order Books, in case these Orders, according to their execution specifications, were not executed or deleted from the Trading Platform straight away.

In the following *Table 6-1* the types of Orders that shall be possible to be submitted into the Intra-Day Market's Trading Platform by the Participants are presented, as well as the execution specifications that could be provided with each type of Order:

Types of Orders in the Trading Platform	
Limit Orders	Buy or Sell orders with a specified quantity and price, where Buy Orders can be executed at that price or lower and Sell Orders can be executed at that price or higher. Limit Orders may be executed partially (partial quantity) of fully (full quantity). Limit Orders for the predefined market can be entered with the execution restrictions NON, FOK or IOC. Limit Orders for the user-defined market always have the execution restriction AON. All Limit Orders can be entered with the validity restrictions GFS and GTD.
Linked Orders	In case linked Order submission either all Orders can be fully executed or no Order will be executed. A group of Orders can only be submitted with this submission restriction if it contains Orders only with the execution restriction FOK and if all Orders were entered for the same NEMO.
Iceberg Orders	Hidden volume Orders include an executable volume of the Product that is only partially visible to the market, leaving a hidden quantity divided into smaller parts "below the surface". More specifically, the total volume of the Order is divided into smaller parts, with only one part being displayed in the Order Book. Both the displayed (visible) and non-displayed (hidden) parts of the Order are available for potential execution against incoming Orders. The displayed part is automatically refreshed from a non-displayed part, once the

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[17] The analytical validation rules of the submitted Orders in all intra-day market processes are presented in Chapter 7 of this report.

displayed part is fully executed. Refreshing the displayed part is regarded as a new Order from a "time priority" point of view.

Hidden Volume Orders are used for the purpose of hiding the actual volume of an Order from the market. Especially when Participants need to buy or sell large amounts of a Product, they can divide their large Orders into smaller parts so that the public sees only a small portion of the Order at a time (just as the "tip of the iceberg" is the only visible portion of a huge mass of ice). By hiding its large size, a hidden volume Order reduces the price movements caused by substantial changes in the supply or demand of a certain Product.

The Order prices of the hidden part may differ from the respective price of the visible part. Iceberg orders can be entered with a peak price delta. Each new slice will then be entered with a new limit price which is reduced by the peak price delta for Buy Orders and increased by the peak price delta for Sell Orders.

Order's Execution Specifications

None (NON)	An Order submitted with the execution restriction NON is either executed immediately or, if the Order can't be matched right away, entered into the Order Book. Partial Order executions are allowed and NON Orders can be executed against multiple other Orders and create multiple trades.
Immediate-or-Cancel (IOC)	The Order is either traded (in any amount) at one point immediately after the Order is submitted or, if the Order can't be matched, deleted without entry in the Order Book. Partial executions are allowed and IOC Orders can be executed against multiple other Orders and create multiple trades. An Order with execution restriction IOC cannot have a validity restriction.
Fill-or-Kill (FOK)	The Order is either fully traded at one point immediately after the Order is submitted with its full quantity or deleted without entry in the Order Book. FOK Orders can be matched against multiple existing Orders in the Order Book. FOK orders cannot have a validity restriction.
All-or-Nothing (AON)	An Order submitted with the execution restriction AON is either executed against exactly one other Order with its full quantity or entered into the Order Book. Partial executions are not allowed. The execution restriction AON is only allowed for Orders in the user-defined market.

Order's Validity Specifications

Good-for-Session (GFD)	The time validity of a GFS Order is determined by the validity of the corresponding trading session of the Order. The GFS Order is pulled out of the trading automatically the defined time validity of the corresponding trading session passes.

Good-till-Date (GTD)	A GTD Order is deleted on the date and time specified by the Participant when submitting the Order, unless it is matched, deleted or deactivated beforehand.

Table 6-1: Execution of Orders in the Trading Platform of Market Operator's Intra-Day Market

It should be noted that in the case of a general suspension of trading, all Orders in the Trading Platform shall be automatically inactivated. With the return to normal operations, Participants shall have to re-activate all Orders from their inactive state.

Transactions concluded shall be automatically and mandatory subject to Clearing. The further registration process and completion of the transaction shall be subject to the provisions of the clearing rules of the Clearing House.

With regard to the Block Orders, Participants shall have the possibility to submit either user-defined blocks linking several consecutive Market Time Units of their choice, or pre-defined (by the Market Operator) Block Orders. In the latter case the following pre-defined blocks shall be applied:

➢ Baseload block, covering all tradable Market Time Units of any Delivery Day of a week.

➢ Peakload block covering all tradable Market Time Units from 08:00 (am) to 20:00 (pm) of a Delivery Day, on all Delivery Days from Monday to Friday. Of course, the choice of the Market Time Units of the peakload block may change, upon the willingness of the Market Operator and the TSO, depending on the system load profile.

The Simple Hourly Orders, namely the hourly (which comprise only one individual hour) and Half-hourly Orders (which comprise only one half-hourly period) shall be included in a central, open and anonymous Order Book, provided they fulfill all the minimum requirements specified.

According to Article 5 paragraph 11 of "All NEMOs' proposal for the price coupling algorithm and for the continuous trading matching algorithm, also incorporating TSO and NEMO proposals for a common set of requirements", there shall be no discrimination between the matching of single-time-unit orders, the matching of multiple-time-unit (i.e. block) Orders and granting explicit capacity requests. These requests shall all be treated on a first-come-first served basis.

6.4   Matching Process

This *Section* presents the concept of the intra-day matching elaborating on terms and processes that have been established in accordance with the already approved Intra-Day MCO Function of the MCO Plan.

❖ **Order matching in continuous trading**

Order matching is a deterministic process in the XBID System, which results in the conclusion of a trade.

For Orders to match, they must be of different sides (buy/sell) and on the same contract. There is no cross-matching between Orders on different contracts. In addition, the price limit of the Sell Order must be equal to or below that of the Buy Order (i.e. the intersection of the two order execution ranges may not be empty).

When an Order is matched in a trade, its quantity is reduced by the trade quantity. Orders with the execution restriction FOK or AON can only be matched with their full quantity. Orders with the execution restriction NON or IOC can also be matched partially.

Matching of Orders is based on their ranking, which follows the price-time-priority principle. Orders are always executed at the best possible price, meaning that the best (i.e. highest-price) Buy Order is always matched with the best (i.e. lowest-price) Sell Order first. Orders with the same price limit[18] are prioritized by their time stamp oldest first.

The ID algorithm supports two different matching processes: regular matching and batch matching. Regular matching is triggered by the entry of an Order with a new time stamp. Batch Matching is triggered by the increase of the cross-border capacity.

1) **Regular matching**

Regular matching is triggered by the entry of an Order with a new time stamp. An order with a new time stamp may be a newly entered Order, a modified Order, a (re)activated Order that was inactive before, or a new slice of an Iceberg Order.

❖ Price determination

When two Orders are matched in a regular match, one of these Orders must be an Order with a new timestamp and the other one must be an order already present in the Order Book.

The price at which two Orders are matched becomes the price of the trade that is concluded. Two Orders are matched at the limit price of the Order that was already in the Order Book.

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[18] A limit order is issued to buy or sell a certain quantity of a certain contract at a price with a certain limit (i.e. a minimum price for supply orders and a maximum price for demand orders) in a given delivery area.

If a Buy Order with a new timestamp is matched against an existing Sell Order, the limit price of the Sell Order becomes the trade execution price. If a Sell Order with a new timestamp is matched against an existing Buy Order, the limit price of the Buy Order becomes the trade execution price.

❖ Iceberg Orders in regular matching

In a matching process where a single Order with a new timestamp is matched against more than one slice of an Iceberg Order already in the Order Book, the price is always determined by the Iceberg Order already in the Order Book and never by the Order with the new timestamp, even if the timestamp of the Iceberg Order is renewed during the matching process.

❖ Matching against multiple Orders

If an Order with a new timestamp can be executed, it is not necessarily executed at a single price (except from Orders with the execution restriction AON), but may sequentially generate multiple transactions at different prices against multiple different Orders that already existed in the Order Book. As soon as the Order has been executed against all Orders at a certain price limit, the next best price level becomes best and the Order continues to be matched against Orders entered at this price level. This process continues as long as the incoming Order remains executable and has a positive Order quantity. Subsequently, the Order is deleted if the Order quantity has reached zero or if it has the IOC execution restriction. In all other cases, the Order is entered into the Order Book with its remaining quantity.

❖ Unmatchable orders

If an Order with a new timestamp cannot be executed against any existing Order, it is entered into the Order Book, unless it has the execution instruction IOC or FOK. If it has the execution restriction IOC or FOK, it is deleted.

2) **Batch matching**

Batch matching is triggered by an increase of the cross-border capacity. Batch matching rounds are also referred to as "intra-day auctions", because the matching displays certain auction-like characteristics.

An increase of cross-border capacity may lead to a crossed Order Book, in other words two sets of Orders that were not matchable before due to insufficient cross-border capacity becoming matchable. For user-defined Block Orders, which cannot be partially matched (because they have the AON execution restriction), this may happen by any capacity increase. For Orders that do allow for partial matching, this may only happen if an original zero value is increased, as any non-zero value would already have been used up by partial

matching.

In such cases, the regular matching process cannot be used, as there is no Order with a new timestamp. All Orders that have become matchable were already present in the Order Book and it is not obvious which one(s) of these should set the price of the trade(s). Therefore, a different matching process is followed, which is referred to as batch matching. The regular matching of Orders, as well as explicit capacity allocation, is suspended for the duration of the batch matching.

❖   Iceberg Orders in batch matching

In batch matching, Iceberg Orders with a peak price delta of zero participate with their total remaining quantity. Iceberg Orders with a non-zero peak price delta participate with each slice individually. After the first slice is executed completely the next slice with a new price limit and timestamp will participate until either all slices are fully executed or no further execution is possible anymore.

❖   Contract (or Order Book) sequence in batch matching

A capacity increase may enable the immediate matching of Orders for multiple contracts and for different Market Time Units. All orders in the affected Order Books will participate in the batch matching. The batch matching is performed per contract, as long as capacity is available.

❖   Price determination

All pairs that were matched in the same batch matching round get the same trade price. This trade price is the arithmetic mean of the price limits of the last pair matched in that round.

❖   **Examples of matching process**

a) The regular matching process usually starts with an Order entry. A newly entered order is executed immediately if another Order with the opposite side, for the same contract and crossed price within the price limit setup for the exchange already exists in the SOB. Otherwise it is, depending on the Order's execution restriction, either deleted or entered into the SOB. When an Order is matched in a trade, its quantity is reduced by the trade quantity.

Example 6-1: Considering an Order Book with Sell Orders and Buy Orders an example is provided for this case as shown in Figure 6-1. At time T=0 there is no Order matching since all Sell Orders are higher than the Buy Orders. At time T=1 a Sell Order with a lower price is inserted into the Order Book. This newly entered Sell

Order matches with a Buy Order that contains the exact volume and price (Orders in red bold letters in Figure 6-1). At time T=2, the matched Orders are not visible any more in the Order Book.

Greek LTS

	Buy	Sell
	P: 50MW-60€	P: 50MW-65€
T=0	P: 30MW-58€	P: 25MW-70€
	P: 25MW-55€	P: 20MW-80€

Greek LTS

	Buy	Sell
	P: 50MW-60€	**P: 50MW-60€**
T=1	P: 30MW-58€	P: 50MW-65€
	P: 25MW-55€	P: 25MW-70€
		P: 20MW-80€

Greek LTS

	Buy	Sell
	P: 30MW-58€	P: 50MW-65€
T=2	P: 25MW-55€	P: 25MW-70€
	P: 18MW-52€	P: 20MW-80€

Figure 6-1: Example of Order matching (case a)

b) If an Order can be executed, it may not necessarily be executed at a single price, but may sequentially generate multiple partial transactions at different prices against multiple different Orders that already exist in the SOB. When an Order was executed against the total available quantity (in other words: against all Orders that were entered with this price limit) at a given price level, the next best price level becomes best and the newly entered Order continues to be matched against Orders entered at this price level. This process continues as long as the incoming Order remains executable and has a positive order quantity. Subsequently the Order is either deleted (if the Order quantity has reached zero or depending on the execution restriction) or entered into the Order Book with its remaining quantity.

Example 6-2: Considering an Order Book with Sell Orders and Buy Orders an example is provided for this case as shown in Figure 6-2. At time T=0 there is no

Order matching since all Sell Orders are higher than the Buy Orders. At time T=1 a Sell Order with a lower price is inserted into the Order Book. This newly entered Sell Order matches with two Buy Orders since its volume covers the two highest Buy Orders and its price is lower than the Buy Order prices (Orders with red bold letters in Figure 6-2). At time T=2, the matched Orders are no longer visible in the Order Book.

Greek LTS

	Buy	Sell
T=0	P: 50MW-60€	P: 50MW-65€
	P: 30MW-58€	P: 25MW-70€
	P: 25MW-55€	P: 20MW-80€

Greek LTS

	Buy	Sell
T=1	**P: 50MW-60€**	**P: 80MW-57€**
	P: 30MW-58€	P: 50MW-65€
	P: 25MW-55€	P: 25MW-70€
		P: 20MW-80€

Greek LTS

	Buy	Sell
T=2	P: 25MW-55€	P: 50MW-65€
	P: 37MW-52€	P: 25MW-70€
	P: 15MW-49€	P: 20MW-80€

Figure 6-2: Example of Order matching (case b)

c) The matching process can also be triggered by events leading to a crossed Order Book which may occur when TSOs release additional Cross-Zonal Capacity or when cross-zonal trades release Cross-Zonal Capacity. This corresponds to the batch matching process referred above. According to the batch matching, all Orders that will be matched in the same batch matching roundget the same Trade price. This

price is the arithmetic mean of the price limits of the last matched pair of Orders in that round.

Example 6-3: Considering an Order Book with Sell Orders and Buy Orders an example is provided for this case as shown in Figure 6-3. At time T=0 there is no Order matching since the available Cross-Zonal Capacity is zero. At time T=1, 50 MW of Cross-Zonal Capacity become available from Italy to Greece and the cheapest Sell Order of the Italian Order Book matches with the most expensive Buy Order of the Greek Order Book (Orders with red bold letters in Figure 6-3). At time T=2, the matched Orders are no longer visible in the Order Book and the available Cross-Zonal Capacity is again zero until a new notification.

	Italian LTS		Greek LTS		
	Buy	**Sell**	**Buy**	**Sell**	
	P: 48MW-61€	P: 50MW-65€	P: 50MW-65€	P: 21MW-67€	
T=0	P: 22MW-52€	P: 25MW-69€	P: 30MW-58€	P: 27MW-70€	**CZC=0**
	P: 38MW-49€	P: 30MW-82€	P: 25MW-55€	P: 20MW-80€	

	Italian LTS		Greek LTS		
	Buy	**Sell**	**Buy**	**Sell**	
	P: 48MW-61€	**P: 50MW-65€**	**P: 50MW-65€**	**P: 50MW-65€**	
T=1	P: 22MW-52€	P: 25MW-69€	P: 30MW-58€	P: 21MW-67€	**CZC=50 MW**
	P: 38MW-49€	P: 30MW-82€	P: 25MW-55€	P: 27MW-70€	
				P: 20MW-80€	

	Italian LTS		Greek LTS		
	Buy	**Sell**	**Buy**	**Sell**	
	P: 48MW-61€	P: 25MW-69€	P: 30MW-58€	P: 21MW-67€	
T=2	P: 22MW-52€	P: 30MW-82€	P: 25MW-55€	P: 27MW-70€	**CZC=0**
	P: 38MW-49€	P: 42MW-86€	P: 72MW-51€	P: 20MW-80€	

Figure 6-3: Example of Order matching (case c)

6.5 Continuous Intra-Day Trading Results

According to Article 52 of the CACM Regulation, the continuous trading matching algorithm produces at least the following results:

a) the execution status of Orders and prices per trade; and

b) a single Net Position for each Bidding Zone and Market Time Unit within the Intra-Day Market.

No later than five (5) minutes after the Gate Closure Time of each session of Continuous Intra-Day Trading, the Market Operator shall send the matched Orders to the Clearing House for settlement purposes.

6.6 Fallback Procedures

If the Continuous Intra-Day Trading cannot be executed for given Market Time Units, the Continuous Intra-Day Trading shall be cancelled. No fallback procedure is defined for Continuous Intra-Day Trading.

6.7 Objections and cancellation of trades

With regard to a Participant, all those transactions which are brought about by means of his input devices or his allotted technical access shall be binding.

6.8 Summary of the Continuous Intra-Day Trading

The following *Table 6-2* provides a summary of the detailed design of the Greek continuous Intra-Day Market as presented in the previous Sections of this Chapter.

	Continuous Intra-Day Market in Greece
Trading Procedure	Continuous trading.
Underlying	Electricity traded for delivery on the same or on the following day, on single hours, 30-minute periods or on Blocks of Market Time Units.
Delivery Days & Hours	Trading shall be continuous 7 days a week and 24 hours a day.
Market Time Unit	The Market Time Unit for the Continuous Intra-Day Trading is equal to thirty (30) minutes.
Gate Opening Time	The Continuous Intra-Day Trading Gate Opening Time of the first session is at 23:30 EET in day D-1 for the Market Time Units starting from 01:00 EET and ending at 13:00 EET of calendar day D.

	The Continuous Intra-Day Trading Gate Opening Time of the second session is at 09:00 EET in calendar day D for the Market Time Units starting from 13:00 EET of calendar day D and ending at 01:00 EET of calendar day D+1.
Gate Closure Time	The Gate Closure Time, for both sessions, is sixty (60) minutes before each Market Time Unit
Quotation	€ per MWh.
Price Tick	The minimum price increment shall be EUR 0.01 per MWh.
Size	The minimum volume increment shall be 0.1 MW[19].*.
Min&MaxOrderPrices	Administratively Defined IDM Orders Lower Price and the Administratively Defined IDM Orders Upper Price
Tradable Contracts	The Article 53 of the CACM Regulation foresees that the continuous intra-day trading matching algorithm shall be able to accommodate Orders covering one Market Time Unit and multiple Market Time Units (blocks). In this context and following the already approved "All NEMOs' proposal for products that can be taken into account by NEMOs in intra-day coupling process"[20], the following general types of Orders shall be allowed in the Greek continuous Intra-Day Market: **1. Hourly Orders** The product supports trading in twenty-four (24) contracts, one for each hour of the Delivery Day. The Trading Platform automatically generates these contracts and makes them available for trading one day before the Delivery Day at a specified time. **2. Half-hourly Orders** The product supports trading in forty-eight (48) contracts, one for each half-hour of the Delivery Day. The Trading Platform automatically generates these contracts and makes them available for trading one day before the Delivery Day at a specified time. **3. Predefined Block Orders** They are single-type aggregations of hourly or half-hourly contracts. Predefined blocks combine several contiguous contracts of a single type with a minimum of two, which must be executed together. The Predefined Block Orders shall be decided by the Market Operator and shall be approved by the Regulator.

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[19] Most Exchanges in the NWE have currently 0.1 MW (switched from 1 MW) as a smallest volume tick. Small Participants shall benefit from increased granularity, enabling them to better tackle balancing issues.

[20] The proposal is available online at the following link:

https://www.e-control.at/documents/20903/388512/20170214_Products+Proposal_ID.pdf/59c71434-86dd-a7fe-8821-5959090fa03e

	4. <u>User Defined Block Orders</u> These are on-demand combinations of contracts defined by the Participant. The Market Time Unit of user-defined blocks (user-defined market contracts) must always be coverable by multiple regular market contracts of the product and with consecutive delivery times.
Type of Orders	The following types of Orders shall be used in the Greek Intra-Day Market: 1. Limit Orders 2. Linked Orders 3. Iceberg Orders
Orders' Execution Specifications	The following execution specifications shall be used for the execution of the Orders in the Greek Intra-Day Market: 1. None (NON) 2. Immediate-or-Cancel (IOC), 3. Fill-or-Kill (FOK), 4. All-or-Nothing (AON) Single-contract Orders (namely, hourly or half-hourly Orders) and pre-defined Block Orders shall be partially executable by default. It shall be possible to use the execution specification IOC or FOK (in which case, no partial acceptance shall be enforced). User-defined Block Orders shall not be partially executable and therefore shall have the execution specification AON by default.
Orders' Validity Specifications	The following validity specifications shall be used for the execution of the Orders in the Greek Intra-Day Market: 1. Good-for-Session (GFS) 2. Good-till-Date (GTD)
Special Circumstances	For the day of transition from summer time to winter time, hour 3 is automatically considered twice. For the day of transition from winter time to summer time, hour 3 is not considered in the transactions.

Table-6-2: Continuous Intra-Day Market in Greece

7 Interfaces and procedures of the Intra-Day Market

*Chapter7*presents the interfaces of the proposed Intra-Day Market with the respective Day-Ahead and Balancing Markets, as well as the interface with the Clearing House.

_The a_nalysis in this _Chapter_ refers to all intra-day processes, namely LIDAs, CRIDAs and Continuous Intra-Day Trading.

7.1 Interface of the Day-Ahead Market with the Intra-Day Market

The information that should be transferred from the Day-Ahead Market to the Intra-Day Market for each Market Time Unit comprises of the following:

D1: The already matched Scheduled Exchanges (imports/exports) on each interconnection. These Scheduled Exchanges should be submitted to the TSOs, in order to compute the Cross Zonal Capacity left unused after the Day-Ahead Market solution. This Cross Zonal Capacity will be eligible to be used in the Intra-Day Market trading processes.

D2: The Market Schedule (Net Position) of each Generating Unit or Generating Unit in Commissioning or Testing Operation, namely the energy schedule resulting from the Day-Ahead Market solution. This shall be used in conjunction with the intra-day traded energy quantities as the starting point (initial position) for each subsequent solution of the Integrated Scheduling Process problem. Note that, the energy schedule "coming" from the Day-Ahead Market for each Generating Unit, includes also the Exchange Based Forward and OTC quantities, which may have been traded in the Exchange Based Forward and bilateral OTC Markets by the corresponding Participant, allocated (declared) to the Generating Unit by the Participant at the Nomination Platform (by 10:00 D-1), and inserted as "Priority Price-Taking" Orders (Orders with priority in market clearing) in the Day-Ahead Market's clearing process by the Market Operator on behalf of the Generating Unit and by the TSO on behalf of the Generating Unit in Commissioning or Testing Operation during the pre-coupling operations. That is essentially the interface of the Forward and OTC Market processes with all intra-day processes following the Day-Ahead Market's solution.

D3: The Market Schedule (Net Position) of each RES Unit in Commissioning or Testing Operation, namely the energy schedule resulting from the Day-Ahead Market solution. This shall be used along with the energy bought/sold in the Intra-Day Market, in order to compute the RES Units' Net Position and which shall be used as input data in each

subsequent solution of the Integrated Scheduling Process problem. Note that, the energy schedule "coming" from the Day-Ahead Market for each RES Unit in Commissioning or Testing Operation, includes also the Exchange Based Forward and OTC quantities, which may have been traded in the Exchange Based Forward and bilateral OTC Markets by the corresponding Participant, allocated (declared) to the RES Unit in Commissioning or Testing Operation by the Participant at the Nomination Platform (by 10:00 D-1), and inserted as "Priority Price-Taking" Orders (Orders with priority in market clearing) in the Day-Ahead Market's clearing process by the Transmission System Operator during the pre-coupling operations.

D4: The Net Position of each Non-Dispatchable RES Portfolio in each Bidding Zone, which shall be used along with the energy bought/sold in the Intra-Day Market, in order to compute the RES imbalances that shall be inserted in each subsequent solution of the Integrated Scheduling Process problem. Note again that, the energy schedule "coming" from the Day-Ahead Market for this Entity, includes also the Exchange Based Forward and OTC quantities, which may have been traded in the Exchange Based Forward and Bilateral OTC Markets by the corresponding Participant, allocated (declared) per Bidding Zone by the Participant at the Nomination Platform (by 10:00 D-1) and inserted as "Priority Price-Taking" Orders (Orders with priority in market clearing) in the Day-Ahead Market by the Last Resort RES Aggregator on behalf of the Non-Dispatchable RES Portfolio during the pre-coupling operations.

D5: The Net Position of each Dispatchable RES Portfolio in each Bidding Zone, which shall be used along with the energy bought/sold in the Intra-Day Market as input data in each subsequent solution of the Integrated Scheduling Process problem. Note again that, the energy schedule "coming" from the Day-Ahead Market for this Entity, includes also the Exchange Based Forward and OTC quantities, which may have been traded in the Exchange Based Forward and Bilateral OTC Markets by the corresponding Participant, allocated (declared) per Bidding Zone by the Participant at the Nomination Platform (by 10:00 D-1) and inserted as "Priority Price-Taking" Orders (Orders with priority in market clearing) in the Day-Ahead Market by the Last Resort RES Aggregator on behalf of the Dispatchable Load Portfolio during the pre-coupling operations.

D6: The Net Position of each Non-Dispatchable Load Portfolio in each Bidding Zone, which shall be used along with the energy bought/sold in the Intra-Day Market, in order to compute the load imbalances that shall be inserted in each subsequent solution of the Integrated Scheduling Process problem. Note again that, the energy schedule "coming" from the Day-Ahead Market for each demand entity, includes also the Exchange Based Forward and OTC quantities, which may have been traded in the Exchange Based Forward and Bilateral OTC Markets by the corresponding Participant, allocated (declared) per Bidding Zone by the Participant at the Nomination Platform (by 10:00 D-1) and inserted as "Priority Price-Taking" Orders (Orders with priority in market clearing) in the Day-Ahead Market by the Market Operator on behalf of the Non-Dispatchable Load Portfolio during the pre-coupling operations.

D7: The Net Position of each Dispatchable Load Portfolio in each Bidding Zone, which shall be used along with the energy bought/sold in the Intra-Day Market as input data in each subsequent solution of the Integrated Scheduling Process problem. Note again that, the energy schedule "coming" from the Day-Ahead Market for each demand entity, includes also the Exchange Based Forward and OTC quantities, which may have been traded in the Exchange Based Forward and Bilateral OTC Markets by the corresponding Participant, allocated (declared) per Bidding Zone by the Participant at the Nomination Platform (by 10:00 D-1) and inserted as "Priority Price-Taking" Orders (Orders with priority in market clearing) in the Day-Ahead Market by the Market Operator on behalf of the Dispatchable Load Portfolio during the pre-coupling operations.

D8: The Net Position of the RES FiT Portfolio in each Bidding Zone, which shall be used along with the energy bought/sold in the Intra-Day Market, in order to compute the RES FiT Portfolio injection imbalances that shall be inserted in each subsequent solution of the Integrated Scheduling Process problem.

7.2   Intra-Day Market Processes

7.2.1   Introduction

The Intra-Day Market processes, in the framework of the Target Model provisions, (pre-coupling, coupling and post-coupling operations) are analytically discussed in *the Annex* of this report. It should be noted that Figures 9-6 to 9-10 illustrates the pre-coupling, coupling and post-coupling operations as "black boxes", since the detailed timeline and information exchange between the market entities during these processes are known to the Market Operator, TSO and the Regulator (through the respective ENTSO-E and IBWT working groups), and are out of the scope of this report.

In *Chapters 4, 5 and 6,*the format of the Orders that will be submitted in the Greek Intra-Day Market for each implementation phase is analyzed. Independently of the implementation phase, the Orders shall be submitted as specified in Section 2.5 of this report.

7.2.2   Information transfer from the Transmission System Operator to the Market Operator

The Transmission System Operator provides the following information to the Market Operator with respect to the operation of the Intra-Day Market for the Delivery Day D:

a) the information from the Balancing Market Registry for each Participant and for each Delivery Day D, until thirty (30) minutes before 1st LIDA Gate Opening Time at day D-1;

b) the information from the Generating Unit Registry for each Generating Unit for each Delivery Day D no later than thirty (30) minutes before the 1st LIDA Gate Opening Time at day D-1;

c) the results of the intra-day auction for the allocation of Physical Transmission Rights at the non-coupled interconnections, until fifteen (15) minutes after the publication of the Intra-Day Market Results to the Participants;

d) the Available Capacity of each Generating Unit and each RES Unit for each Market Time Unit of the Delivery Day Don a continuous basis upon receipt and acceptance of the Total or Partial Non-Availability Declaration of the Participant;

e) the Minimum Variable Cost of each Generating Unit for Delivery Day D until ten (10) minutes before the 1st LIDA Gate Opening Time at day D-1;

f) the Technical Minimum, as well as the Technical Minimum and Technical Maximum under Automatic Generation Control of the Balancing Service Providers; and

g) the awarded upward and downward Frequency Containment Reserve, automatic Frequency Restoration Reserve, manual Frequency Restoration Reserve and the ISP schedule of each Balancing Service Provider at each execution of the ISP, until the notification of the ISP results to the Participants.

7.2.3 Information transfer from the RES and CHP Units Registry Operator to the Market Operator

The RES and CHP Units Registry Operator provides to the Market Operator with respect to the operation of the Intra-Day Market for the Delivery Day D the information from the RES and CHP Units Registry for each RES Unit and CHP Unit no later than thirty (30) minutes before the 1st LIDA Gate Opening Time at day D-1.

7.2.4 Submission of Priority Price-Taking Orders

The Priority Price-Taking Sell Orders are simple one-step Step-wise Sell Orders that are submitted with a price equal to the lowest acceptable price at the Intra-Day Market, namely at the Administratively Defined IDM Orders Lower Price, minus a Priority Price Biasing Value. The Priority Price-Taking Buy Orders are simple one-step Step-wise Buy Orders that are submitted with a price equal to the highest acceptable price at the Intra-Day Market, namely at the Administratively Defined IDM Orders Upper Price, plus a Priority Price Biasing Value.

The Transmission System Operator submits, on behalf of Participants, Priority Price-Taking Orders at the Energy Trading System of the Market Operator at the LIDAs and/or CRIDAs for each Market Time Unit of the Delivery Day D for the following:

a) the deviation of the scheduled production of Generating Units in Commissioning or Testing Operation and RES Units in Commissioning or Testing Operation, if any;

b) the deviation of the Mandatory Hydro Injections, if any; and

c) the deviation of the forecasted energy quantities of the Transmission System Losses, if any,

until the respective LIDA and/or CRIDA Gate Opening Time.

The Transmission System Operator publishes for each Market Time Unit of Delivery Day with respect to the Intra-Day Market the updated energy quantities of the Priority Price-Taking Orders per Entity until the respective LIDA and/or CRIDA Gate Opening Time.

The Last Resort RES Aggregator submits Priority Price-Taking Orders at the Energy Trading System of the Market Operator with respect to the Intra-Day Market for each Market Time Unit of the Delivery Day D for the deviations of the forecasted production of each represented RES Portfolio, if any, until the respective LIDA and/or CRIDA Gate Opening Time.

The Last Resort RES Aggregator publishes for each Market Time Unit of Delivery Day with respect to the Intra-Day Market the updated energy quantities of the Priority Price-Taking Orders per Entity until the respective LIDA and/or CRIDA Gate Opening Time.

The RES and CHP Units Registry Operator submits Priority Price-Taking Orders at the Energy Trading System of the Market Operator with respect to the Intra-Day Market for each Market Time Unit of the Delivery Day D for the following:

a) the deviations of the forecasted production of each RES FiT Portfolio, if any; and

b) the deviations of the Priority Declarations of the High-Efficiency Cogeneration Dispatchable Units, if any,

until the respective LIDA and/or CRIDA Gate Opening Time.

The RES and CHP Units Registry Operator publishes for each Market Time Unit of Delivery Day with respect to the Intra-Day Market the updated energy quantities of the Priority Price-Taking Orders for RES FiT portfolio and each High-Efficiency Cogeneration Dispatchable Unit until the respective LIDA and/or CRIDA Gate Opening Time.

7.2.5 Information transfer from the Clearing House to the Market Operator

The Clearing House shall provide the following information to the Market Operator with respect to the operation of the Intra-Day Market:

a) on a continuous basis the Order Financial Limits of each non-suspended Participant; and

b) the list of suspended Participants, according to the relevant provisions of the Clearing House Rulebook, until each LIDA Gate Opening Time, CRIDA Gate Opening Time or Continuous Intra-Day Trading Gate Opening Time.

The latest updated data submitted by the Clearing House is considered by the Market Operator in case of a failure in receiving the above information.

7.2.6 Information transfer from the Coordinated Capacity Calculator to the Market Operator

The relevant Coordinated Capacity Calculator shall send to the Market Operator the Cross-Zonal Capacities and the Allocation Constraints no later than:

a) one (1) hour before each CRIDA Gate Closure Time, or

b) fifteen (15) minutes before each Continuous Intra-Day trading Gate Opening Time, according to Article 58 paragraph 1 of the CACM Regulation.

In case the relevant Coordinated Capacity Calculator is unable to provide for Cross-Zonal Capacity and Allocation Constraints before the time limits the Coordinated Capacity Calculator shall notify the Market Operator, according to paragraph 3 of Article 58 of the CACM Regulation. The Market Operator shall immediately publish a notice for the Participants.

7.2.7 Orders' quantities validation process

Orders are sent via an electronic interface to the Trading Platform for potential matching and execution.

Orders must be consistent with the injection or withdrawal capabilities of the physical points to which they refer and, above all, they must correspond to the real willingness to inject the related volumes of electricity. Even though the Orders are economically binding, the Market Operator shall perform a validation check to ensure that the sold quantities can be really produced / traded (e.g. by a Generating Unit, based on its maximum availability).

❖ **Generating Units and RES Units**

1st validation check: Against the Available Capacity of Generating Units and RES Units

The following provisions apply to Producers (for the Generating Units registered in their

Generation Account) and RES Producers (for the RES Units registered in their RES Account) being responsible for submitting Total or Partial Non-Availability Declarations in accordance with the provisions of the Balancing Market Code. It should be noted that. RES Aggregators and the Last Resort RES Aggregator are not obliged to submit Non-Availability Declarations for the RES Units they represent.

Consequently, upon submission of an Order in the Intra-Day Market related to a Generating Unit or a RES Unit, the following validation checks are performed by the Trading Platform:

a) Upon the submission of Intra-Day Market Sell Orders to the Trading Platform for each LIDA, and during the validation process of an Order corresponding to a Generating Unit or RES Unit: in case for a certain Market Time Unit the net energy quantities sold in the Day-Ahead Market plus the Intra-Day Market Sell Order quantity is lower than or equal to the Available Capacity of the said Generating Unit or RES Unit, then the Order shall be accepted and included in the local Order Book. Otherwise, the Order shall be curtailed up to the Available Capacity of the Generating Unit or RES Unit, respectively.

b) Upon the submission of Intra-Day Market Buy Orders to the Trading Platform for each LIDA, and during the validation process of an Order corresponding to a Generating Unit or RES Unit: in case for a certain Market Time Unit the net energy quantities sold in the Day-Ahead Market minus the Intra-Day Market Buy Order quantity is greater than or equal to zero, then the Order shall be accepted and included in the Local Order Book. Otherwise, the Order's quantity shall be curtailed up to the net energy quantities sold in the Day-Ahead Market of the Generating Unit or RES Unit, respectively.

c) Upon the submission of Intra-Day Market Orders to the Trading Platform of the Market Operator for each Complementary Regional Intra-Day Auction (CRIDA), and during the validation process of an Order corresponding to a Generating Unit or RES Unit: in case for a certain Market Time Unit:

   i) the net energy quantities sold in the Day-Ahead Market,

   ii) plus any net energy quantities (if any) already traded in a previous LIDA or CRIDA,

   iii) plus the said Intra-Day Market Sell Order quantity,

is lower than or equal to the Available Capacity of the said Generating Unit or RES Unit, then the Order shall be accepted. Otherwise, the Order shall be curtailed up to the Available Capacity of the Generating Unit or RES Unit, respectively. In both cases, the original or curtailed Order shall be included in the Local Order Book and shall be transferred to the CRIDA Order Book.

d) Upon the submission of Intra-Day Market Buy Orders to the Trading Platform for each CRIDA, and during the validation process of an Order corresponding to a Generating Unit or RES Unit: in case for a certain Market Time Unit:

i) the net energy quantities sold in the Day-Ahead Market,

ii) plus any net energy quantities (if any) already traded in a previous LIDA or CRIDA,

iii) minus the said Intra-Day Market Buy Order quantity,

is greater than or equal to zero, then the Order shall be accepted. Otherwise, the Order's quantity shall be curtailed up to the net energy quantities sold in the Day-Ahead and in previous LIDA or CRIDA of the Generating Unit or RES Unit, respectively. In both cases, the original or curtailed Order shall be included in the Local Order Book and shall be transferred to the CRIDA Order Book.

c) Upon the submission of an Order to the Trading Platform in the continuous trading process, the Market Operator shall validate the Orders corresponding to a Generating Unit or a RES Unit, according to the methodology explained above in the case (b) taking into account the already traded quantities in the same continuous trading session..

In case the above validation process fails:

a) as discussed above, the Orders submitted by a Producer or a RES Producer for a Generating Unit or a RES Unit accordingly shall be curtailed, but

b) the Producer or RES Producer shall not be subject to a non-compliance charge, since the participation in the Intra-Day Market is voluntary.

➢ **Example**:

Suppose a Participant A owns a Generating Unit with a net capacity of 300 MW. For the month May, this Participant enters into a baseload Forward Transaction (in the organized Forward Market) to sell 120 MWh/hour.

Also, for a certain Delivery Day D of May, the said Participant enters into a bilateral OTC transaction with another Participant B, to sell 12 MWh/hour for the whole day D. The Participant A declares by 10:00 EET in day D-1 the Generating Unit to cover both trades (forward & OTC).

Additionally, Participant A sells for the said Generating Unit (through a respective cleared Energy Sell Order) 35 MWh for Market Time Unit 13 of the Delivery Day D at the DAM, and another 15 MWh for the same Market Time Unit in the previous local / regional intra-day auctions and in the continuous trading process.

Finally, suppose that a partial unavailability declaration has been submitted by Participant A to the TSO for the said Generating Unit for Market Time Unit 13, equal to 250 MW.

For the Market Time Unit 13 of this Delivery Day D, the margin that should be set by the Market Operator for this Generating Unit for Intra-Day Day-Ahead Market Orders equals (250 – 120 – 12 – 35 - 15) MWh = 68MWh. In case a Sell Order above 68MWh is submitted by Participant A for this Generating Unit, the Order shall be curtailed at 68 MWh.

2ndvalidation check: Against the technical constraints and the already awarded reserve capacities of the Generating Units (in the latest ISP solution)

The provisions of this sub-section apply to all Intra-Day Market processes except from the 1stLocal Intra-Day Auction (LIDA) in both the 1st and the 2nd implementation phase of the Intra-Day Market.

Upon submission of Sell / Buy Orders for Generating Units or RES Units, the Trading Platform of the Market Operator shall automatically check such Sell / Buy Orders of the Producers or RES Producers (a) for feasibility against the technical constraints of their Generating Units or RES Units (e.g. technical minimum, AGC limits, ramp-rates, etc.), and (b) for consistency with the already awarded reserve capacities of in the former Integrated Scheduling Process solution, if any.

Specifically, the following validation tests are performed:

a) In case for a certain Dispatch Period

   i.   the ISP schedule of a Generating Unit or RES Unit

   ii. plus the already awarded upward Frequency Containment Reserve, automatic Frequency Restoration Reserve and manual Frequency Restoration Reserve

   iii. plus any previous accepted Market Sell Order during the same continuous trading session minus any previous accepted Market Buy Order during the same continuous trading session

   iv. plus the Intra-Day Market Sell Order quantity

   is higher than the Available Capacity of the said Generating Unit or RES Unit, then the Sell Order's quantity shall be curtailed so that the above sum is exactly equal to the Available Capacity or the Technical Maximum under Automatic Generation Control, whichever is lower, of the Generating Unit or RES Unit, respectively.

b) In case for a certain Dispatch Period

i. the ISP schedule of a Generating Unit or RES Unit

ii. minus the already awarded downward Frequency Containment Reserve, automatic Frequency Restoration Reserve and manual Frequency Restoration Reserve

iii. plus any previous accepted Market Sell Order during the same continuous trading session minus any previous accepted Market Buy Order during the same continuous trading session

iv. minus the Intra-Day Market Buy Order quantity

is lower than the Technical Minimum of the said Generating Unit or RES Unit, then the Buy Order's quantity shall be curtailed so that the above sum is exactly equal to the Technical Minimum or the Technical Minimum under Automatic Generation Control, whichever is higher, of the Generating Unit or RES Unit, respectively if any Reserve Capacity was awarded to the Generating Unit or RES Unit. If no Reserve Capacity was awarded then the Intra-Day Market Buy Order quantity cannot exceed the maximum between previous Market Schedule and ISP schedule.

In case the Sell / Buy Orders do not violate the above constraints, the Order is validated. Otherwise, in case the above validation process fails:

a) the Order submitted by a Producer or RES Producer for a Generating Unit or RES Unit, respectively, is adjusted appropriately (in terms of offered quantity) and included in the Local Order Book, but

b) the Producer or RES Producer shall not be subject to a non-compliance charge, since the participation in the Intra-Day Market is voluntary.

The above checks shall be performed automatically by the Trading Platform of the Market Operator. The latter shall only check the log files of the Trading Platform to verify that the validation process is properly executed.

> ***Important note**: Producers shall submit to the TSO a techno-economic declaration and a non-availability declaration for their Generating Units on daily basis. This data are needed by the Market Operator and the TSO, as follows:*
>
> a) *The only technical data needed by the Market Operator in order to perform the Sell Order quantity feasibility check (1st validation check referred above) in the Intra-Day Market is the Available Capacity of each Generating Unit.*
>
> b) *However, the techno-economic data of the Generating Units (e.g. technical minimum, technical maximum) are needed by the Market Operator and the TSO for two reasons:*
>
> 1. *Market Operator: In order to check the Sell / Buy Orders of the Producers at the Intra-Day Market for each Generating Unit they own (2nd validation check referred above).*
>
> 2. *TSO: In order to solve the Integrated Scheduling Process problem of the Balancing Market, as this will be analyzed in the Detailed Design document of the Balancing and Ancillary Services Market.*

7.2.8 Calculation of margins for imports and exports

In case of explicit intra-day auctions for the allocation of Physical Transmission Rights at the non-coupled interconnections, the respective auction results shall be sent by the TSO to the Market Operator not later than five (5) minutes before the LIDA Gate Closure Time, CRIDA Gate Closure Time or Continuous Intra-Day Trading Gate Closure Time. The Market Operator shall calculate the margins, namely the maximum energy to be offered for imports and exports in the non-coupled interconnections, as follows:

$$Margin_{p,i,h} \ = \ IntraDayPTRs_{p,i,h} \qquad \forall \ p,i,h$$

where:

p	index of Participants
i	index of the non-coupled interconnections
h	index of Market Time Unit
$IntraDayPTRs_{p,i,h}$	Intra-Day PTRs allocated through explicit auctions to Participant p, for interconnection i, for Market Time Unit h, in MW; the value of this parameter is equal to zero for all interconnections applying market coupling.

The margins calculated by the Market Operator shall be used for the validation of the offered energy quantities of the Participants for imports/exports on the non-coupled interconnections.

7.2.9   Orders Submission, validation and correction process

Participants that have been suspended by the Clearing House, due to non-payment of the due amounts or due to the enforcement of Stop Requests, according to the information provided by the Clearing House to the Market Operator shall not be able to access the Trading Platform in order to submit Orders at the Intra-Day Market.

Participants shall submit their Orders and cancel or modify these Orders from each Intra-Day Market Gate Opening Time until each respective Intra-Day Market Gate Closure Time. The finally validated Orders that have been submitted lawfully, subject to the provisions of this Chapter, shall be considered for matching.

The validated Orders in the Intra-Day Market are economically binding, meaning that in case of acceptance by the matching algorithm they shall be subject to a Financial Settlement.

The Trading Platform shall automatically reject a submitted Order by a Participant in the following cases:

a) when the price of the Order not corresponding to a Generating Unit is outside the range defined by the Administratively Defined IDM Orders Lower Price and the Administratively Defined IDM Orders Upper Price;

b) when the price of a Buy Order corresponding to a Generating Unit is outside the range defined by the Administratively Defined IDM Orders Lower Price and the Administratively Defined IDM Orders Upper Price; and

c) when the price of a Sell Order corresponding to a Generating Unit is outside the range defined by the Minimum Variable Cost of the Generating Unit for the Delivery Day and the Administratively Defined IDM Orders Upper Price.

In case of an automatic rejection of an Order, the Trading Platform shall automatically send to the respective Participant a rejection notice, including a justification for such rejection.

The Trading Platform shall automatically reject a submitted Order by a Participant when the valuation of the Order is higher than the respective Order Financial Limit. The valuation of the Order is calculated as follows:

a) in case of step-wise Order it is equal to the sum over all steps of the Order step price multiplied by the Order step quantity.

b) in case of linear piece-wise Order it is equal the sum over all segments of the average Order segment price multiplied by the Order segment quantity.

c) in case of a Block Order it is equal to the sum over all Delivery Periods the Block Order quantity multiplied by the Block Order price.

The Trading Platform shall automatically reduce the energy quantity of a submitted Order by a Participant in the following cases:

a) when the offered energy quantity of a Sell Order corresponding to imports on a non-coupled interconnection is higher than the respective margin, computed;

b) when the offered energy quantity of a Buy Order corresponding to exports on a non-coupled interconnection is higher than the respective margin, computed;

c) when the Sell Order quantity corresponding to energy injection for imports on an interconnection, submitted by a Self-Supplier, is higher than the respective DAM accepted Buy Orders' quantity of its own Dispatchable and Non-Dispatchable Load Portfolios;

d) when the Sell Order quantity corresponding to energy injection of a Dispatchable or Non-Dispatchable RES Portfolio violates the Registered Capacity of the Dispatchable or Non-Dispatchable RES Portfolio minus the respective DAM accepted Sell Orders' quantity.

e) when the Sell Order quantity corresponding to DAM Offtake Position Correction for a Dispatchable or Non-Dispatchable Load Portfolio, submitted by a Supplier or a Producer for the Auxiliary Load of a Generating Unit registered in the respective Participant Account, is higher than the respective DAM accepted Buy Orders' quantity;

f) when the Buy Order quantity corresponding to DAM Delivery Position Correction for a Generating Unit, RES Unit, Dispatchable or Non-Dispatchable RES Portfolio, submitted by the respective Participant, is higher than the respective DAM accepted Sell Orders' quantity;

Non-conforming Orders are automatically limited by the Trading Platform up to the energy quantity that is allowable according to the imposed imports /export margins (in case A and B above) or the imposed Order limits (in case C above).

In case of an automatic reduction of the offered energy quantity, the Trading Platform shall automatically send to the respective Participant a reduction notice, including a justification for such reduction.

7.2.10 Submission of information from the Market Operator to the Market Coupling Operator

After each CRIDA Gate Closure Time the Market Operator processes and anonymizes the validated Orders in the Local Order Book in order to submit them to the Shared Order Book of the CRIDA Operator.

Immediately after receiving the Cross Zonal Capacities and Allocation Constraints from the relevant Coordinated Capacity Calculator, the Market Operator submits the received data to the CRIDA Operator.

In Continuous Intra-Day Trading the Market Operator processes and anonymizes on a continuous basis the validated Orders in the Local Order Book, in order to submit them to the Shared Order Book of the Market Coupling Operator.

Immediately after receiving the Cross Zonal Capacities and Allocation Constraints from the relevant Coordinated Capacity Calculator, the Market Operator submits the received data to the Market Coupling Operator.

7.2.11   Matching – coupling process

The matching process of the LIDAs has been presented in Section 4.5. The respective matching process for CRIDAs has been presented in Section 5.6. Finally, the matching process in continuous trading sessions has been analytically presented in Section 6.4.

7.2.12   Intra-Day Market results

According to Article 52 of the CACM Regulation, the continuous trading matching algorithm produces at least the following results: (a) the execution status of Orders and prices per trade; (b) a single Net Position for each Bidding Zone and Market Time Unit (hour) within the Intra-Day Market.

Additionally, the Intra-Day Auction Clearing Price (IDACP) of each intra-day auction shall be derived. All accepted Sell Orders and Buy Orders in an intra-day auction shall be settled at the IDACP (marginal-pricing concept).

The Intra-Day Market results (IDACP for auctions, sum of executed Sell and Buy Orders, Net Position per Bidding Zone and per market time unit) are published in the website of the Market Operator at the latest 15 minutes after the gate closure time of LIDAs and 30 minutes after the gate closure time of CRIDAs.

7.3   Interface of the Market Operator with the Clearing House

The Clearing House has two responsibilities with respect to the Intra-Day Market:

1) the determination of the Order Financial Limits of each Participant in order to validate the Orders at the Intra-Day Market, and

2) the Clearing, Settlement, invoicing and cash transfer of the Intra-Day Market trades.

In the following sub-sections the interface of the Clearing House with the Trading Platform of the Market Operator with respect to the Intra-Day Market processes is described in detail.

7.3.1   Order Financial Limits

An Order Financial Limit is the possibility of limiting or rejecting Orders that are submitted by a Participant in the Trading Platform, during the Order validation process.

Clearing Members that provide financial settlement and coverage to Participants, acting as Non-Clearing Members of the Clearing House, shall conclude special agreements with their Non-Clearing Members, and the Clearing House shall conclude special agreements with its Clearing Members, with regard to the validation of the Orders submitted in the markets. They are, in particular, entitled to agree technically supported Order Financial Limits, as well as the consequences in case of a non-compliance with these limits. This includes, in particular, the obligation to tolerate procedures regarding the temporary exclusion from trading or the rejection of submitted Orders in the Trading Platform.

The Non-Clearing Members are obliged to establish agreements regarding Order Financial Limits, upon a request by their Clearing Members. In this case and depending on the respective limit, the Clearing Members can store the Order Financial Limits agreed on with their Non-Clearing Members in the electronic system of the Clearing House, which are subsequently transferred to the Trading Platform of the Market Operator.

Order Financial Limits can be also set to the electronic system of the Clearing House by the Participants themselves, in order to proactively manage their risk exposure. In case such Order Financial Limits entered by a Participant are more restricting than the respective limits enforced by its Clearing Member, then these more restricting limits shall apply.

The Clearing Member enforces such Order Financial Limits to the Participant applying a computational methodology, which must be notified to the Clearing House. The Order Financial Limits shall be financial limits (cash limits), limiting the amount that will be paid by the Participant in case the submitted Orders are accepted, depicting the maximum financial exposure up to which a Participant can buy energy.

The Order Financial Limits for the Delivery Day D shall be transferred by the Clearing House to the Market Operator on a continuous basis (and communicated to the Participants through the Trading Platform on a continuous basis). The Trading Platform of the Intra-Day Market shall then check each Buy Order with a positive price and each Sell Order with a negative price against the Order Financial Limit of the respective Participant. In case the Order Financial Limit fully covers the maximum value to be paid after the acceptance of the Order, then such Order shall be accepted and inserted in the Local Order Book. Otherwise, the Order shall be automatically rejected, and the Trading Platform shall inform the Participant through an electronic message with appropriate justification about such rejection.

In the occurrence of a technical problem in the Trading Platform or in the communication of the Clearing House with the Trading Platform, preventing the Market Operator from acquiring the Order Financial Limits from the Clearing House, the Market Operator shall consider the last valid Order Financial Limits.

7.3.2 Clearing data for settlement and invoicing purposes

❖ Introduction

No later than one (1) hour after each LIDA Gate Closure Time or CRIDA Gate Closure Time and no later than five (5) minutes after the Gate Closure Time of each session of Continuous Intra-Day Trading, the Market Operator shall send the auction results and the matched Orders accordingly to the Clearing House for settlement purposes.

Participants are required to pay to the Clearing House the sum calculated through the Intra-Day Market Settlement and which corresponds to the accepted Buy Orders that are included in the Intra-Day Market results. The Participants with accepted Sell Orders are entitled to collect from the Clearing House the sum calculated through the Intra-Day Market Settlement and which corresponds to the accepted Sell Orders that are included in the Intra-Day Market results.

❖ Calculation of Credits to Participants

The sums corresponding to payments shall be calculated daily for each Participant based on the accepted Sell Orders and the Intra-Day Market results referring to the Delivery Day for such Orders. The Intra-Day Market payments and collections are algebraic, i.e. payments are Credits if positive, or Debits if negative (e.g. due to negative IDACPs).

Any Participant submitting a Sell Order which is partially or wholly accepted at the Intra-Day Market or any Participant for which a Priority Price-Taking Sell Order is submitted and such Order is accepted at the Intra-Day Market shall be credited for such Order and for each Market Time Unit the sum resulting from the pricing:.

a) at the LIDACP or CRIDACP of the accepted energy quantity of the Order for LIDAs and CRIDAs accordingly; or

b) at the Order clearing price for continuous trading.

The Credit to Participant *p* for the accepted Sell Order*s o* is calculated for a Market Time Unit *t*, as follows:

$$IDER_{p,so,t} = IDACP_{z,t} \cdot IDIO_{p,so,t}$$

where:

$IDER_{p,so,t}$ the Credit to which a Participant *p* is entitled for the accepted Sell Order *so* (which was submitted in Bidding Zone *z*) for Market Time Unit *t*, in €;

$IDACP_{z,t}$ the Market Clearing Price in Bidding Zone *z* for Market Time Unit *t* for LIDAs and CRIDAs or the Order price for continuous trading, in €/MWh;

$IDIO_{p,so,t}$ the accepted energy quantity of Sell Order*s* which corresponds to Participant *p* for Market Time Unit *t*, in MWh.

The daily Credit to a Participant *p* for all accepted Sell Orders for the Delivery Day *d* is calculated as follows:

$$IDER_p = \sum_{teT} \sum_{so} IDER_{p,so,t}$$

❖ Calculation of Debits to Participants

The Debits shall be calculated daily for each Participant based on the accepted Buy Orders and the Intra-Day Market Results referring to the Delivery Day for such Orders. The Intra-Day Market collections are algebraic, i.e. collections are Debits if positive, or Credits if negative (e.g. due to negative IDACPs).

Any Participant submitting a Buy Order which is partially or wholly accepted at the Intra-Day Market Results shall be debited for each Market Time Unit the sum resulting from the pricing:

    a) at the LIDACP or CRIDACP of the accepted energy quantity of the Order for LIDAs and CRIDAs accordingly; or

    b) at the Order clearing price for continuous trading.

The Debit to Participant *p* for the cleared Buy Order *bo* is calculated for a Market Time Unit *t*, as follows:

$$IDEP_{z,p,bo,t} = IDACP_{z,t} \cdot IDOD_{p,bo,t}$$

where:

$IDEP_{z,p,bo,t}$ the Debit to a Participant *p* for an accepted Buy Order *bo* (which was submitted in Bidding Zone *z*) for the Market Time Unit *t*, in €;

$IDACP_{z,t}$ the Market Clearing Price in Bidding Zone *z* for Market Time Unit *t* for LIDAs and CRIDAs or the Order price for continuous trading in €/MWh; and

$IDOD_{p,bo,t}$ the accepted energy quantity of Buy Order *bo* which corresponds to Participant *p* for Market Time Unit *t*, in MWh.

The daily Debit to a Participant *p* for all accepted Buy Orders *bo* for the Delivery Day *d* is calculated as follows:

$$IDEP_p = \sum_{t \in T} \sum_{bo} IDEP_{p,bo,t}$$

❖ **Intra-Day Market Settlement procedure**

The Intra-Day Market Settlement shall be performed on a daily basis and shall include the following stages:

a) once the Credits and Debits to each Participant have been calculated, the Clearing House shall record such sums separately for each Participant in the Initial IDM Settlement Statement. This statement that is associated with each Participant will be communicated to Participants until 10:00 EET in day D+1 for Delivery Day D;

b) not later than 12:00 EET in D+1, the Participants are entitled to lodge documented objections to the Clearing House;

c) no later than 13:00 EET in day D+1, the Clearing House shall decide on any objections, finalize the Debits and Credits to each Participant and enter such sums separately for each Participant in the Final IDM Settlement Statement. The Final IDM Settlement Statement will be communicated to Participants (with respect to the part concerning each one of them).

Both the Initial IDM Settlement Statement and the Final IDM Settlement Statement shall refer to one Delivery Day and shall include at least the following information:

a) the Participant name and ID;

b) the energy quantities sold at the Intra-Day Market per Market Time Unit;

c) the energy quantities bought from the Intra-Day Market per Market Time Unit;

d) the LIDACPs and CRIDACPs per Bidding Zone and per Market Time Unit;

e) the total amount owed by the Clearing House to the Participant for the sold energy quantities at the Intra-Day Market, separately for each Sell Order for each Market Time Unit of the said Delivery Day in question, as well as the total sum of the payment for such Delivery Day;

f) the total amount owed by the Participant to the Clearing House for the bought energy quantities from the Intra-Day Market, separately for each Buy Order for each Market Time Unit of the said Delivery Day in question, as well as the total sum of the charges for such Delivery Day; and

g) any other information concerning the activities of each Participant that have been used to calculate the settlement sums.

The Final Intra-Day Market Settlement Statement shall be followed by a respective invoice for the payments of the Participants to the Clearing House, whereas the invoice of the Participants to the Clearing House are issued and sent electronically by the Participants at the afternoon of the following day (D+1) of the Delivery Day until 14:00 EET.

The cash transfer for the payments of the Participants to the Clearing House shall be performed until 16:00 EET of day D+1, whereas the payments of the Clearing House to the Participants shall be performed until 17:00 EET of day D+1.

7.4 Interface of the Intra-Day Market with the Balancing Market

The information that should be transferred from the Intra-Day Market to the Balancing Market comprises the following:

I1: The already Scheduled Exchanges (imports/exports) on each interconnection shall be submitted to the TSOs, in order to compute the Cross Zonal Capacity left unused after the Intra-Day Market solution. This Cross Zonal Capacity may be used in the Balancing Market for cross-border balancing purposes.

I2: The Market Schedule (Net Position) of each Generating Unit or Generating Unit in Commissioning or Testing Operation, namely the energy schedule resulting from the Intra-Day Market results. This, in conjunction with information D2, shall be used as the starting point (initial position) for each subsequent solution of the Integrated Scheduling Process problem of the Balancing Market, as detailed in the detailed design document of the Balancing Market.

I3: The Market Schedule (Net Position) of each RES Unit in Commissioning or Testing Operation, namely the energy schedule resulting from the Intra-Day Market clearing. This, in conjunction with information D3, shall be used in order to compute the RES Units' and Net Position, which shall be used as input data in each subsequent solution of the Integrated Scheduling Process problem, as detailed in the detailed design document of the Balancing Market.

I4: The Market Schedule (Net Position) of each Non-Dispatchable RES Portfolio in each Bidding Zone, namely the energy schedule resulting from the Intra-Day Market clearing.

This, in conjunction with information D4, shall be used in order to compute the Net Position of the Non-Dispatchable RES Portfolio which shall be used as input data in each subsequent solution of the Integrated Scheduling Process problem, as detailed in the detailed design document of the Balancing Market.

I5: The Market Schedule (Net Position) of each Dispatchable RES Portfolio in each Bidding Zone, namely the energy schedule resulting from the Intra-Day Market clearing. This, in conjunction with information D5, shall be used in order to compute the Net Position of the Dispatchable RES Portfolio which shall be used as input data in each subsequent solution of the Integrated Scheduling Process problem, as detailed in the detailed design document of the Balancing Market.

I6: The Market Schedule (Net Position) of each Non-Dispatchable Load Portfolio in each Bidding Zone coming from the Intra-Day Market clearing, which shall be used in conjunction with information D6 in order to compute the load imbalances that shall be inserted in each subsequent solution of the Integrated Scheduling Process problem of the Balancing Market, as detailed in the detailed design document of the Balancing Market.

I7: The Market Schedule (Net Position) of each Dispatchable Load Portfolio in each Bidding Zone coming from the Intra-Day Market clearing, which shall be used along in conjunction with information D7 as input data in each subsequent solution of the Integrated Scheduling Process problem, as detailed in the detailed design document of the Balancing Market.

I8: The Market Schedule (Net Position) of the RES FiT Portfolio in each Bidding Zone coming from the Intra-Day Market clearing, which shall be used along in conjunction with information D8, in order to compute the RES FiT Portfolio injection imbalances that shall be inserted in each subsequent solution of the Integrated Scheduling Process problem, as detailed in the detailed design document of the Balancing Market.

8 Market Manipulation and Monitoring

8.1 Market Surveillance

The precondition for proper functioning of a Power Exchange is the confidence which the Participants place in the Power Exchange and its pricing mechanism. In some situations, the Power Exchange may need to monitor the spot transactions undertaken by the Participants, especially by large and potentially dominant utilities, because of market power concerns during the transition to competitive electricity markets.

At the same time, however, regulators must be aware of the risks faced by Participants, and allow them to take steps to manage these risks responsibly. Instead, policies should be motivated by the effect the use of spot products will have on the objectives of utility regulation. Some parties may have incentives to manipulate the spot market prices. For this reason, the highest priority of an Exchange is to safeguard that the processes of trading and pricing are carried out fairly and free from "market manipulations".

The term "market manipulation" refers to:

1) transactions or Orders to trade: (a) which give, or are likely to give, false or misleading signals as to the supply of, demand for or price of a product, or (b) which secure, by a person, or persons acting in collaboration, the price of one or several products at an abnormal or artificial level, unless the person who entered into the transactions or issued the Orders to trade establishes that his reasons for so doing are legitimate and that these transactions or Orders to trade conform to accepted market practices; or transactions or Orders to trade which employ fictitious devices or any other form of deception or contrivance; or

2) dissemination of information through the media, including the Internet, or by any other means, which gives, or is likely to give, false or misleading signals as to exchange listed products, including the dissemination of rumors and false or misleading news, where the person who made the dissemination knew, or ought to have known, that the information was false or misleading.

The term "Attempt to manipulate the market" means:

1) entering into any Transaction, issuing any Order to trade or taking any other action relating to a Physical Energy Contract with the intention of:

a) giving false or misleading signals as to the supply of, demand for, or price of Physical Energy Contracts;

b) securing the price of one or several Physical Energy Contracts at an artificial level, unless the person who entered into the Transaction or issued the Order to trade

establishes that his/her reasons for doing so are legitimate and that such Transaction or Order to trade conforms to accepted market practices on the Greek wholesale electricity market; or

c) employing a fictitious device or any other form of deception or contrivance which gives, or is likely to give, false or misleading signals regarding the supply of, demand for, or price of Physical Energy Contracts;

or

2) disseminating information through the media, including the internet, or by any other means with the intention of giving false or misleading signals as to the supply of, demand for, or price of Physical Energy Contracts.

Observing the conduct by the Participants and safeguarding that the processes of trading and pricing are carried out fairly and free from "market manipulations" is the central task of a Power Exchange and of its executive bodies. This duty, in particular, is discharged by an autonomous and independent body of the Power Exchange, the "Market Surveillance", which records all the data regarding exchange trading and settlement of transactions on a daily basis, evaluates these and carries out any investigation activities which might be required.

The Market Surveillance is an independent body established by the Power Exchange (Market Operator). The Market Surveillance monitors the orderly trading and the proper execution of transactions on the electricity market. The Power Exchange also ensures the compliance of the Participants with the Market Operator rules and regulations and with the market codes.

The Market Surveillance systematically records and evaluates full data on exchange trading and the execution of transactions. It conducts any necessary investigations and promptly notifies the Market Operator if any facts established by the Market Surveillance lead to suspicions of:

a) a breach of the rules and regulations,

b) any act or omission of one or several member(s) that is likely to impair the orderly exchange trading or the execution of transactions.

This is particularly relevant regarding possible disruptions in the proper price setting. The Market Surveillance cooperates with regulatory authorities and reports to the Board of Directors of the Market Operator in order to protect the Power Exchange and its markets. The Market Surveillance is not authorized to decide on sanctions towards the Participants. The Market Surveillance just informs the Market Operator and the relevant regulatory authorities who are responsible for sanctioning. However, the Market Surveillance exercises its powers and duties only in the public interest (i.e. compliance with laws and regulations)

and in the interests of the Power Exchange.

The Market Surveillance has all necessary powers to perform its duties. For the performance of its tasks the Market Surveillance may, in particular:

a) conduct special investigations;

b) carry out inspections; and

c) request the disclosure of information and documents from Participants.

8.2 Rules of Conduct for Exchange Trading

In order to safeguard free, transparent and fair trading on the Greek wholesale electricity market, any form of manipulation of exchange trading and the exchange prices, as well as the unfair use of the Power Exchange and its facilities are banned. The following, in particular, are banned:

1) **Entering of Orders without trading interests ("fictitious Orders")**: Entering of Orders which are not intended to lead to the conclusion of a transaction ("fictitious Orders") and suitable to influence exchange prices is banned.

2) **The conclusion of transactions suitable for a manipulation of the exchange prices ("misleading trading transactions")**: The conscious conclusion of transactions which are suitable for setting incorrect or misleading signals regarding the electricity supply or demand or establishing an artificial price level is banned.

3) **Collusions or the collusive co-operation of Participants among each other**:Any collusive co-operation of Participants among each other which is suitable for influencing trading on the Power Exchange is banned.

4) **Price fixing behaviors from the Exchange Members**: Any influencing of the price and, in particular, any attempts at securing high prices by setting agreements between Participants on the same side in the market to buy or sell electricity at a fixed price is banned.

The Participants commit to fairness towards the Power Exchange and the other Participants. They shall only conclude transactions on the Greek wholesale electricity market in compliance with the customary trade practices and the principles of professional market traders.

The Participants, beyond the pure electricity trading, shall also support the Market Operator in further developing the transparency of the activities on the Power Exchange and the information of the public. They shall not use any information in an illegal or improper manner either for themselves or for others.

Participants, in particular, are banned from:

1) Publishing or disseminating market-relevant information in an intentionally incorrect manner or in such a manner that this information might have a confusing effect on the Participants of the Greek wholesale electricity market. Market-relevant information comprises of any information which is significant for the evaluation or pricing regarding any product traded on the Greek wholesale electricity market.

2) Holding back market-relevant information with the intention of misusing such information, if this violates statutory disclosure duties.

3) Carrying out other acts of deception suitable for having an improper effect on the market or the price of the products traded on the Greek wholesale electricity market.

4) Manipulating the technology of the Greek wholesale electricity market with a view to influencing the market prices or otherwise disturb the access of other Participants to the Greek wholesale electricity market.

5) Manipulating the Order-to-Trade (OTR)[21], used for the calculation of the Intraday Trading System fees imposed by the Market Operator, by placing Orders and executing Transactions so as to reduce their Trading System usage fees.

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[21]Order-to-Trade index refers to the ratio of the number of submitted orders with respect to concluded trades (transactions).

9   Annex A: The XBID Project

9.1   Introduction

The European Commission has established a Target Model for Intraday, based on continuous energy trading where cross-zonal transmission capacity is allocated through implicit continuous allocation. This model has been initially laid down into the Capacity Allocation and Congestion Management (CACM) Network Code and in 2015 into the CACM Regulation.

To this end, the European Power Exchanges EPEX SPOT, GME, Nord Pool Spot and OMIE (PXs) have established a transparent and efficient continuous intra-day trading environment to enable Participants to easily trade out their intra-day positions. The possibility of Participants to trade out their imbalances is thereby significantly improved as they do not only benefit from the local available intra-day liquidity, but also from the available liquidity in other Bidding Zones.

In order to help to realize this goal the PXs, together with the Transmission System Operators (TSOs) from 12 countries, have launched an initiative called the XBID Market Project to create a joint integrated intra-day cross-zonal market. The purpose of the XBID Market Project is to enable continuous cross-zonal trading and increase the overall efficiency of intra-day trading on the single cross-zonal Intra-Day Market across Europe. The wider XBID solution will create one integrated European Intraday market. It is worth referring that the XBID solution was officially selected and proposed by all NEMOs on 14th February 2017 as the preferable algorithm for the continuous trading matching in terms of the common setting of requirements in accordance with Article 37 of the CACM Regulation[22].

This single intra-day cross-zonal market solution will be based on a common IT system forming the backbone of the European solution, linking the Local Trading Systems operated by the Power Exchanges, as well as the available cross-zonal transmission capacity provided by the TSOs. Orders entered by Participants in one country can be matched by Orders similarly submitted by Participants in any other country within the IT systems' reach, provided there is Cross-Zonal Capacity available.

The Intra-Day Solution supports both explicit capacity allocation (where decided by National Regulatory Authorities) and implicit capacity allocation through continuous trading and is in line with the EU Target Model for an integrated cross-zonal Intra-Day Market.

There are three distinct work streams associated with the XBID Project, namely:

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[22] The proposal is available online at:

     http://energitilsynet.dk/fileadmin/Filer/Hoeringer/EL/2017/1.20170214_Algorithm_Proposal.pdf

1) the XBID Project itself, which is the basis of the pan-European XBID solution,

2) the Local Implementation Projects (LIPs) by current members, and

3) the XBID Accession Stream (AS) facilitating future members of the XBID Project.

The original members of the project are Austria, Belgium, Denmark, Finland, France, Germany, Great Britain, Italy, Luxembourg, Norway, Portugal, Spain, Sweden, Switzerland, and The Netherlands (shown in Figure 9-1)[23].
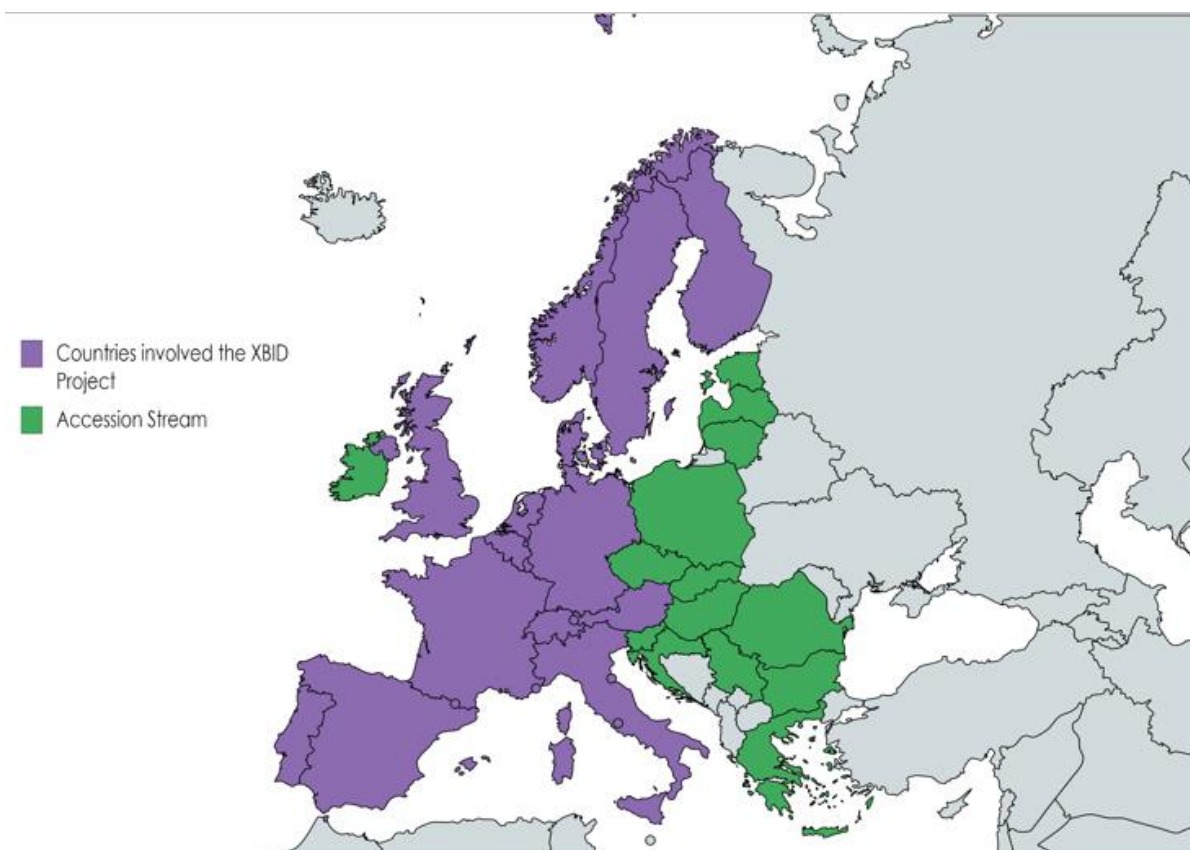

Figure 9-1: State-of-play in pan-European Intraday Coupling

The XBID Project initiated an Accession Stream with the objective to increase transparency on the pan-European intraday project in line with the CACM Regulation and to prepare accessions for a timely extension of the project to all TSOs and NEMOs subject to the CACM Regulation. The Accession Stream covers Bulgaria, Croatia, Czech Republic, Estonia,

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[23] Please note that the TSOs of Italy, Portugal and Spain are currently not members of the XBID project. GME (the Italian NEMO) and OMIE (the Spanish and Portuguese NEMOs) are full members of the XBID Project. REE (Spain) is a direct observer since 2014 and REN (Portugal) is in the XBID Accession Stream.

Greece, Hungary, Ireland, Latvia, Lithuania, Poland, Romania, Serbia, Slovakia and Slovenia (Figure 9-1).

There are currently four groups which are part of the Accession Stream as of August 2016 with TSO and/or NEMO participation. These four groups are illustrated in Figure 9-2 below. These groups are, building up on existing collaborations within the day-ahead projects, namely the Baltics, the 4M MC project, the Italian Borders Working Table (IBWT) and the Integrated - Single Electricity Market (I-SEM) project. During 2016, a number of meetings between these projects and the XBID Project were held in order to agree the next steps of accession. In general, it is the understanding of the Accession Stream that once the associated Local Implementation Projects (LIPs) have been formally established, their go-live period will follow the go-live of the existing LIPs.
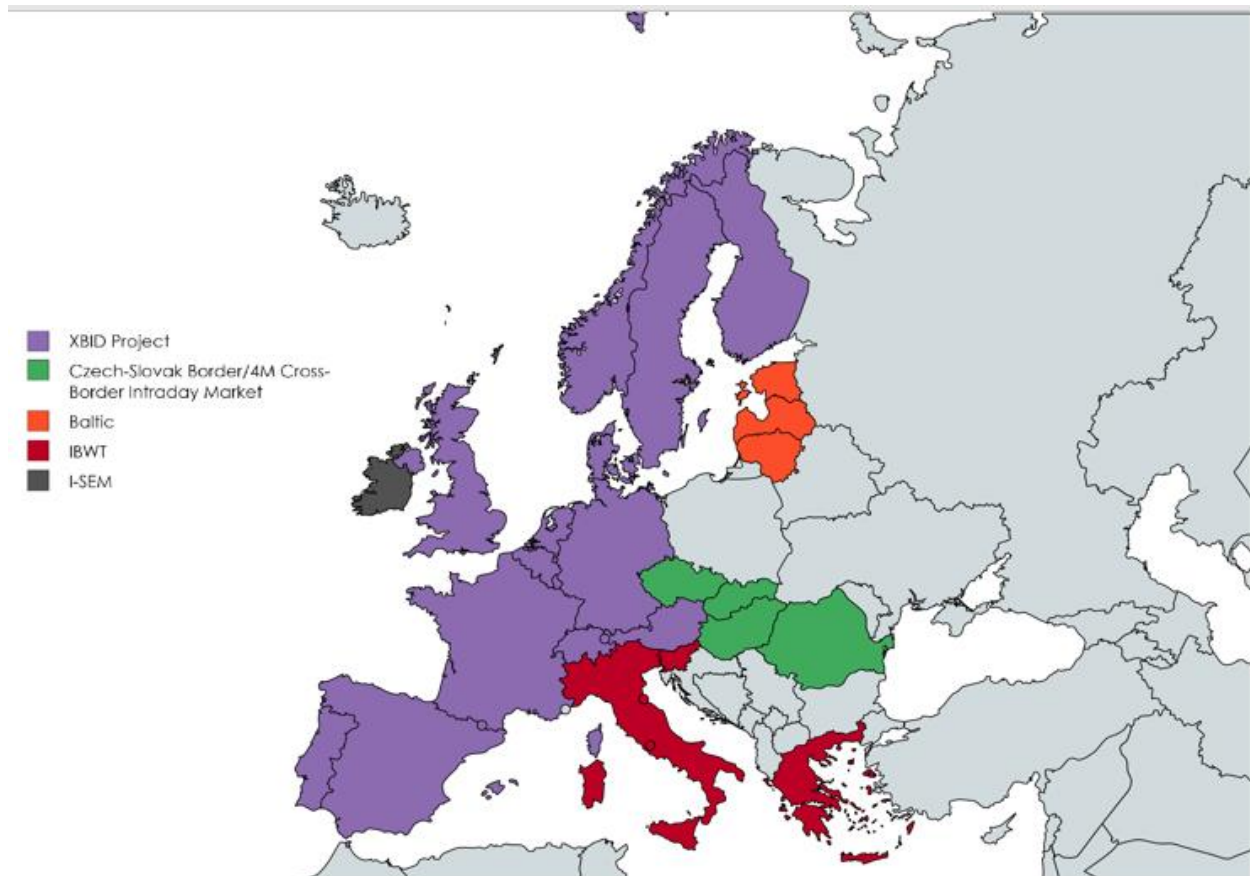

Figure 9-2: European Projects towards the Intraday Market Coupling

The current planning targets a go-live of the XBID Solution by the end of the 3rd quarter of 2017. The use of the system in production will be subject to TSOs and PXs Local Implementation Projects (LIPs) consisting on migrating respectively their borders and markets on the XBID Solution.

The direct benefit for the end consumer is expected to be positive, and the end consumers will benefit from this initiative increasing the overall wholesale market efficiency and facilitate the integration of the RES in the market. More concretely Participants having larger possibilities to be balanced before the hour of delivery will contribute to reduce the costs of reserves.

9.2   What the XBID Project does

The Orders submitted by the Participants of each PX will be centralized in one Shared Order Book (SOB). Similarly, all the intraday cross-border capacities are made available by the TSOs in the Capacity Management Module (CMM).

Order Books displayed to the Participants via the usual trading systems provided by their PXs will contain Orders coming from other Participants of the concerned PX and also Orders coming from other PXs for cross-border matching, provided there is enough Cross-Border Capacity available.

Orders submitted for different Bidding Zones can be matched provided there is enough Cross-Border Capacity available. In such a case, the order matching will be associated with implicit capacity allocation. Concretely, when two Orders are being matched the SOB and CMM will be updated immediately (on a continuous basis). Trade shall be done on a first-come first-served principle where the highest buy price and the lowest sell price get served first. The update of SOB will mean that the Orders that were matched are removed, and consequently that the available transmission capacity in the CMM will be updated. For how many borders the Cross-Border Capacities are updated will depend on where the matched Orders were located geographically.

The Shipping Module (SM) of the XBID Solution provides information from trades concluded within XBID to all relevant parties of the post-coupling process. The SM receives data from the SOB about all trades concluded:

➢   between two different Bidding Zones, and

➢   in the same Bidding Zone between two different Participants.

The data from the SOB and the CMM are enhanced with relevant TSO, Central Counter Party (CCP) and Shipping Agent data from the SM and transferred to the Participants.

9.3   Local Implementation Projects (LIPs)

To implement the XBID solution fourteen Local Implementation Projects (LIPs) have been established. A LIP consists of one or more borders, one or more TSOs and one or more PXs. LIP's main tasks are adaptation of local arrangements (i.e. procedures, shipping,

contracts), IT system adjustments, secure equal treatment between PXs and implicit/explicit access and ensuring readiness for the participation in the XBID LIP testing.

The LIPs are monitored via the Joint XBID Steering Committee and the Joint Coordination Team where individual LIP's progress is reported to. Further each LIP has set up a formal governance structure within the LIP (i.e. project manager, Steering Committee, etc.). Within the XBID governance structure the LIPs have to report on their readiness for LIP testing and go-live.

Fourteen LIPs have been initiated since 2015 and they are illustrated in Figure 10-3 below. The following paragraphs describe each LIP and its participants.

LIP 1 is called NORDIC LIP and covers all borders within the NORDIC region (i.e. Denmark, Finland, Sweden and Norway). The TSOs Energinet.dk, Svenskakraftnät, Statnett and Fingrid as well as the NEMOs EPEX and Nord Pool are participants to this LIP.

LIP 2 is referred to as DK2/DE (Kontek) and covers a Danish (DK2) and German border. Kontek is the HVDC cable between Germany and the Danish island Zealand. The TSOs Energinet.dk and 50Hertz are involved in the LIP as well as the NEMOs EPEX and Nord Pool.

LIP 3 is referred to as DK1/DE, DE/NL and covers a Danish (DK1) and German border as well as the border of Germany and the Netherlands. The TSOs Energinet.dk, TenneT Netherlands and Amprion, as well as the NEMOs EPEX, APX/Belpex and Nord Pool, are participants to this LIP.

LIP 4 is called NorNed and covers the border of Norway and the Netherlands. NorNed is the HVDC cable connecting both countries. Statnett and TenneT NL are the participating TSOs here and the NEMOs are APX/Belpex and Nord Pool.

LIP 5 covers the German – French, German – Swiss and German – Austrian borders. The participating TSOs are Amprion, TenneT Germany, TransnetBW, APG, RTE and Swissgrid. The NEMOs EPEX and Nord Pool are involved.

LIP 6 covers the Netherlands and Belgian border and the TSO members are Elia and TenneT Netherlands. APX/Belpex is the participating NEMO.

LIP 7 is called the BritNed LIP and incorporates the BritNed HVDC interconnector and the borders of GB and the Netherlands. The participating TSOs are BritNed Development Ltd, National Grid and TenneT Netherlands. APX/Belpex is the participating NEMO.

LIP 8 covers the French and Belgian border. Elia and RTE are participating TSOs and the NEMOs involved are APX/Belpex and EPEX.

LIP 9 and LIP 12 cover the borders of Spain and France as well as Spain and Portugal. REE, RTE and REN are the TSOs involved and the NEMOs OMIE and EPEX are participating. Nord Pool is also noted as an observer within LIP 9 and LIP 12.

LIP 10 is called the IFA LIP and covers the French and GB borders via the HVDC interconnector named Interconnexion France-Angleterre (hereafter referred to as "IFA"). RTE and National Grid are participating in the project as TSOs. EPEX and Nord Pool are participating NEMOs.

LIP 11 covers the border between Austria and Switzerland. The TSOs APG and Swissgrid are participants. EPEX is the participating NEMO.

LIP 13 covers the Baltic region. Elering, The TSOs Litgrid, AST, Fingrid (Estlink) SvenskaKraftnät (NordBalt) are participants. Nord Pool is the participating NEMO.

LIP 14 is called INB and covers France, Italy, Austria, Greece, Switzerland, Slovenia. BSP, EPEX, EXAA, GME, LAGIE and Nord Pool are the participating NEMOs.

It should be noted that LIPs 1,2,3,4,5,6,8,9,11,12 and 13 are expected to go-live by the end of Quarter 3 2017 while LIPs 7,10,14 are expected to go-live at a later stage (not defined yet).
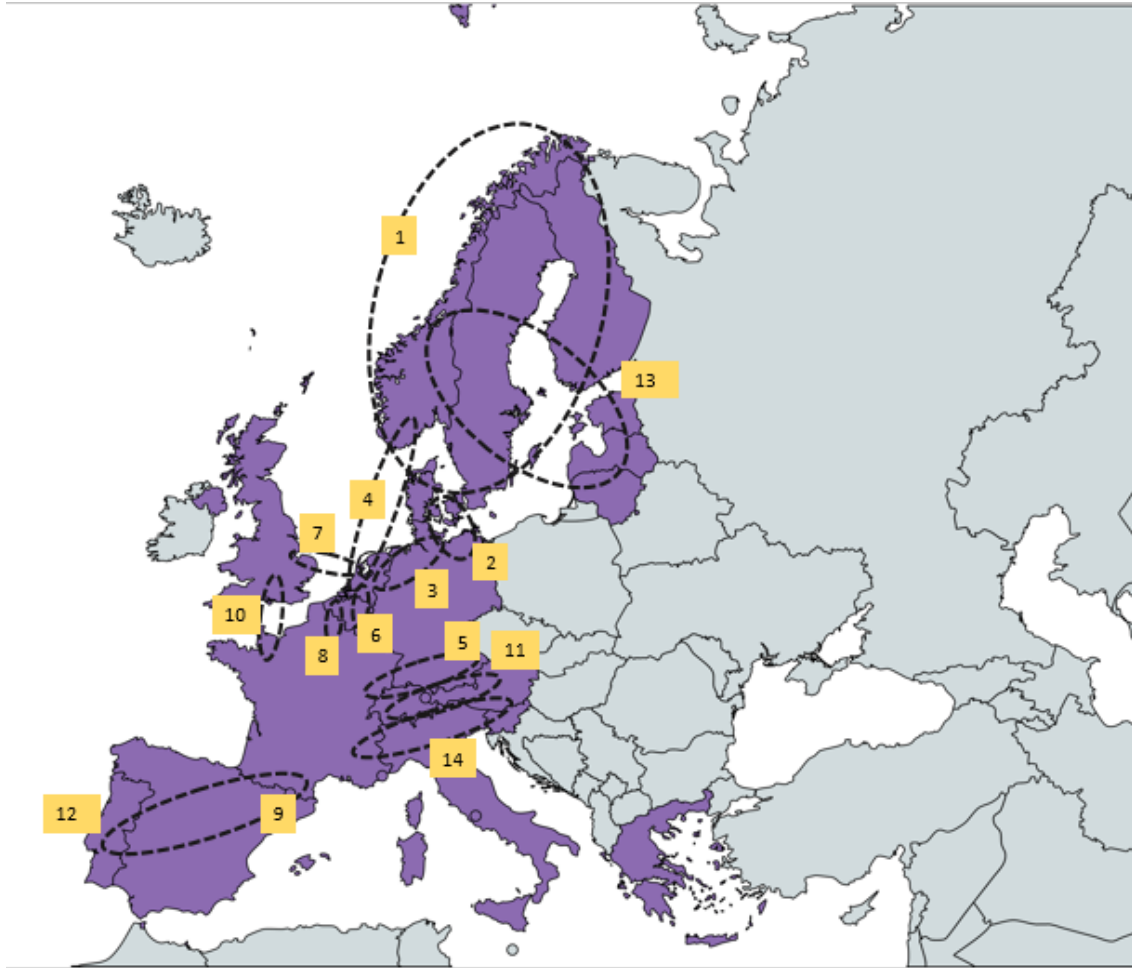
Figure 9-3: XBID Initial Local Implementation Projects

9.4 Cross Zonal Continuous Intra-Day Arrangements

The objective of this *Section* is to present the detailed architecture of the Continuous Intra-Day Trading arrangements, as these have been defined in the northern / central European markets considering always the provisions and the prerequisites of the CACM Regulation.

9.4.1 Key Features of the Cross Zonal Intra-Day Market Model

The cross zonal Intra-Day Market model that is promoted by the CACM Regulation and the corresponding XBID Project[24] is governed by the following key features:

- ➢ **The principle of continuous trading**: This principle allows Participants to contract immediately the necessary intra-day energy they need or to negotiate (anonymously) the price, without the need for (and risk associated to) contracting the cross-zonal transmission capacity separately.

- ➢ **Transparent and non-discriminatory access to the available Cross Zonal Capacity:** All Participants will have equal access to the available Cross Zonal Capacity. The access arrangements are provisioned in the EU Regulation 714/2009 elaborating on conditions for access to the network for cross-border exchanges in electricity[25].

- ➢ **Straight through processing**: Since intra-day trading is likely to take place in very tight time schedules, the operations associated with an intra-day deal will be made as simple and robust as possible. Ideally, intra-day liquidity would be accessible via "one mouse click", wherever it comes from. Furthermore, trades need to be firm and irrevocable.

- ➢ **Speed of transaction**: Attention is paid to the transaction speed and deal confirmation time. Any delay can create uncertainty on whether the transaction is completed or not, and increases the risk of cancelled transactions.

- ➢ **Additional liquidity**: Participants of existing Intra-Day Markets will benefit from additional liquidity, without the need for additional membership or clearing arrangements. Concentration of the liquidity of all participating markets, available on

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[24] Analytical details on the XBID project are provided in Annex A.

[25] The EU Regulation 714/2009 is available online at the following link:

http://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A32009R0714

one single screen; the intra-day liquidity is not split over different screens, assuring Participants of the best possible deal and maximizing the exchanged volume[26].

➢ **Extendibility**: The cross border intra-day mechanism is built in such a way, so that it may be easily extended to other Bidding Zones, not initially included in the cross border Intra-Day Market.

➢ **Independency from the capacity determination model**: The model is built in such a way that it is independent of the capacity determination model used to assess the available intra-day capacity (ATC-based or flow-based).

➢ **Compliance with EU regulation**: The model is compliant with EU regulation, and more specific regulation 1228/2003 on conditions for access to the network for cross border exchanges in electricity which prescribes that: *"Congestion management methods shall be market-based in order to facilitate efficient cross border trade. For this purpose, capacity shall be allocated only by means of explicit[27] (capacity) or implicit (capacity and energy) auctions. Both methods may coexist on the same interconnection. For intra-day trade, continuous trading may be used"*.

9.4.2   Detailed Design of the Cross Zonal Intra-Day Market Model

9.4.2.1   Introduction

Currently, a single intra-day coupling solution is not yet implemented in the European Union. Given the short timeframes available for intra-day trade, the Target Model and the CACM Regulation clearly foresee that the most efficient way to allocate available Cross Zonal Capacity is via an implicit method, i.e., linking the capacity allocation to a cross zonal energy deal.

Implicit allocation allows part of the set of Orders from one Bidding Zone to become visible to traders in other Bidding Zones, which makes these Orders tradable, up to the volume of intra-day Cross Zonal Capacity made available on the Capacity Management Module platform by the TSOs (or when capacity is netted due to a trade in the opposite direction):

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[26] In some countries (e.g. Italy, Spain) there is skepticism on the liquidity of the continuous intra-day trading, that's why they are proposing the hybrid intra-day trading scheme, with both intra-day auctions and continuous trading.

[27] According to Article 64 to Article 67 of the CACM Regulation, the explicit allocation approach shall be considered as transitional intraday arrangement.

- If no capacity is available between two neighboring Bidding Zones (or insufficient capacity), no Orders are visible from one Bidding Zone to the other;

- When capacity is made available between two neighboring Bidding Zones, a trade may be defined from the source[28] Bidding Zone to the sink[29] Bidding Zone, depending on the prices of the Orders related to this trade.

The single intra-day coupling is based on a continuous matching process of Sell and Buy Orders. More specifically, the cheapest Sell Orders in source Bidding Zone are traded (or "matched") with the most expensive Buy Orders in sink Bidding Zone for each direction ("cross-zonal matching") (Example 9-1). Cross-zonal matching happens if no better trade is possible in the same Bidding Zone given the prices of available Orders in this Bidding Zone (i.e. cross-zonal matching is not prioritized over local matching, but only happens depending on prices and available Cross Zonal Capacity), and stops when all available capacity is used (or if there is still capacity but all tradable Orders have been matched). Orders of all NEMOs are collected in a Shared Order Book and matched locally or at cross-zonal level without any discrimination and in continuous manner (this applies irrespective of the number of NEMOs per Bidding Zone). In the single intra-day coupling for each Order, the originating NEMO is known as well as the originating area.

In addition to implicit allocation under single intra-day coupling, and according to the modalities defined in Article 64 of the CACM Regulation, the intra-day Cross-Zonal Capacity may be allocated on an explicit basis if the relevant National Regulatory Authorities (NRAs) approve derogation from the European Target Model.

In this case, the Capacity Management Module shall allow allocating the intra-day Cross-Zonal Capacity both in an implicit and explicit way without discrimination.

The topology of Bidding Zones and Scheduling Areas is represented by Market Areas and Delivery Areas. A Market Area holds one or more Delivery Areas. Depending on the configured topology, capacity is allocated on Borders, which connect Market Areas, or on DC Network Elements, which connect Delivery Areas.

The following equations are valid:

- Market Area = Bidding Zone

- Delivery Area = Scheduling Area

In Figure 9-4 a real example is highlighted that explains the topology in the Market Area of Germany/Austria/Luxemburg (DE/AT/LU) containing the six respective TSOs, namely, 50Hertz, Amprion, APG, CREOS, TenneT TSO and TransnetBW. In this configuration, the

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[28]Bidding Zone of the sell Order.

[29]Bidding Zone of the buy Order.

Market Area comprises six (6) Scheduling Areas. Each Scheduling Area corresponds to a unique TSO and to one or more NEMOs.

In line with Article 4 of the CACM Regulation, as far as the intra-day market segment is concerned, the following legal entities have been designated as NEMOs by the NRAs BNetzA, E-Control and ILR in the Market Area of DE/AT/LU:

- Austria: EPEX Spot SE, EXAA AG, Nord Pool AS

- Germany: EPEX Spot SE, Nord Pool AS

- Luxembourg: EPEX Spot SE

The Greek Market Area includes only one Scheduling Area and consequently only the Greek TSO controls it.
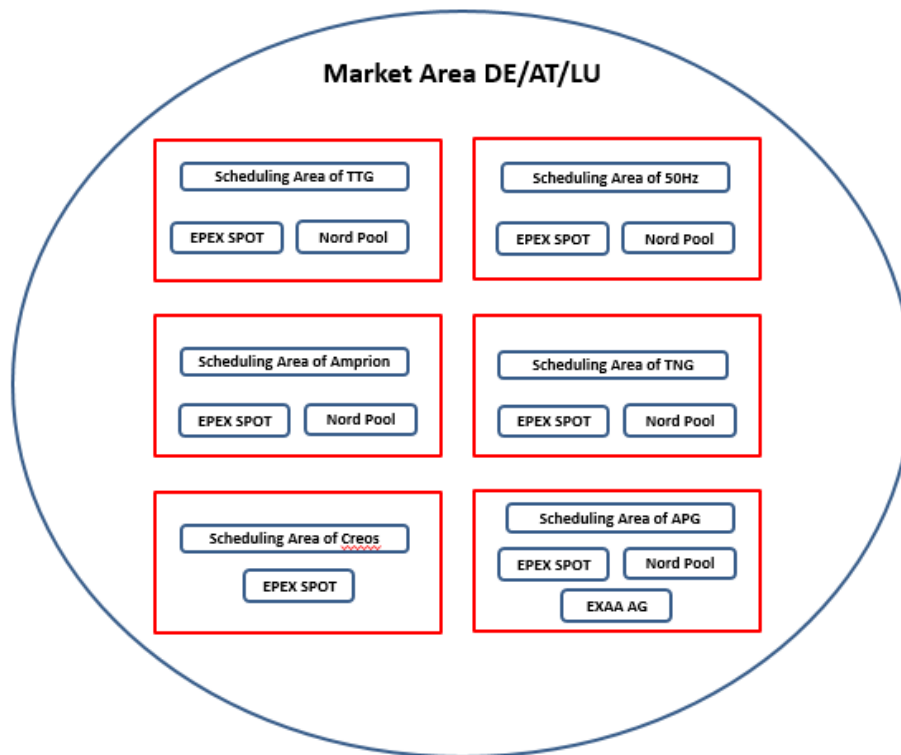

Figure 9-4:The topology of the DE/AT/LU Market Area

The following example introduces in a simple manner the rationale of cross-zonal matching:

➤ **Example 9-1**

Figure 9-5illustrates the above rationale with regard to two coupled Intra-Day Markets (e.g. the Greek Intra-Day Market and the respective Italian).

The Cross-Zonal Capacity from Italy to Greece is assumed 60 MW, Therefore, the 60 MW cheapest Sell Orders (red dotted borders in Figure 5-2) in the Italian Intra-Day Market are shown as Sell Orders in the Greek Intra-Day Market, and the 60 MW most expensive Buy Orders (green dotted borders in Figure 5-2) in the Greek Intra-Day Market are shown as Buy Orders in the Italian Intra-Day Market. Thus, intra-day cross border trades totaling 60 MW (available Cross Zonal Capacity) can be concluded based on the submitted Orders.
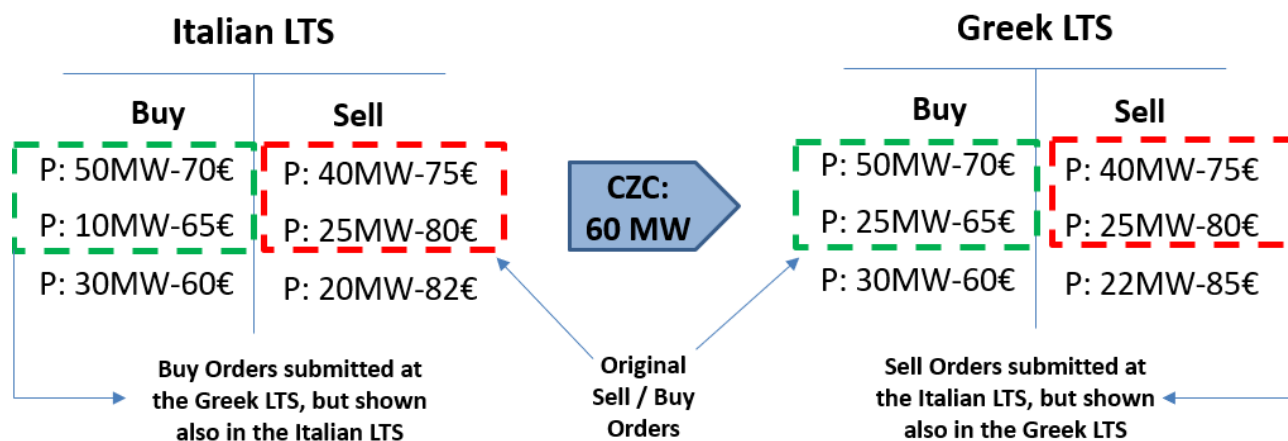

Figure 9-5: The local Order Books of Italy and Greece in example 9-1

NEMOs proposed to NRAs in the "All NEMO proposal for the Market Coupling Operator (MCO) Plan" that the delivery of the intraday market coupling MCO Function, in accordance with Article 36 (4) of the CACM Regulation, shall be based on the XBID Solution. Adoption by NEMOs of the XBID Solution as the basis for the Intra-Day MCO Function shall be contingent on agreement with TSOs (and NRAs where relevant).

The XBID Solution, being the new common European intra-day platform, means the solution (system, procedures, contract, etc.) to be implemented by the NEMOs and TSOs within the XBID Project for the Single Intra-Day Coupling according to the principles set forth in the CACM Regulation.

The XBID Solution provides functionalities to perform the continuous matching of Orders as well as the TSO functionalities in respect of capacity allocation taking into account the relevant available intra-day Cross Zonal Capacity (the Capacity Management Module or CMM), as well as the calculation of Scheduled Exchanges for shipping and settlement for TSOs (the Shipping Module or SM) and Central Counter Parties (CCPs) to ship and settle cross-zonal, cross-delivery area and cross-central counterparty trades.

The Intra-Day System is a centralized system supporting 24/7 trading of Global Products. Global Products are eligible for matching in the Intra-Day System, as opposed to Local

Products, which refers to all products available for trade in LIDAs that are matched solely in the respective Local Trading Systems (LTSs)[30].

The Intra-Day MCO Function shall be based on the Intra-Day System, which consists of the following modules:

a) **Shared Order Book (SOB)**[31]that supports the collection (entry), management and matching of Intra-Day Orders from all connected NEMOs LTSs via Public Message Interface (PMI). The relevant output of the Shared Order Book module includes the following: (a) matched Orders, and (b) local views on the Shared Order Book. It should be noted that this information is only available to the NEMOs.

b) **Capacity Management Module (CMM)[32]** that collects directly from TSOs the Cross-Zonal Capacity available at any instant for intra-day implicit trading, and ensures that the concluded intra-day trades respect such capacities. It also supports explicit Cross-Zonal Capacity allocation function where it is requested by relevant NRAs.The relevant output of the Capacity Management Module is the following: (a) Capacity allocation per border, and (b) net flow per border. It should be noted that this information is only available to the TSOs.

c) **Shipping Module (SM)**that computes the Scheduled Exchanges for shipping and settlement calculations for TSOs and Central Counterparties to ship and settle cross-zonal and cross-delivery area and cross-central counter party trades, where relevant. The output of the Shipping Module is the following: (a) each hand over between CCP and Shipping Agent for the source and the sink area,(b) each hand over between Shipping Agents on a border, and (c) each hand over between Shipping Agents within an (transit) area[33].

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[30]Typically, each local trading platform is operated by a Market Operator (NEMO), such as a Power Exchange. However, current arrangements in the European Intra-Day Markets indicate that it is also possible that a unique Market Operator operates a unique platform giving access to numerous different markets (as in the Nordpool Elbas intra-day mechanism). Nevertheless, the Market Operators (NEMOs) have the role of providing local services required for the operation of their anonymous and continuous local intra-day trading platforms. Each trading platform enables the visibility of all the Orders posted directly on the platform (for the same Bidding Zone) or on the platforms of other Bidding Zones (as far as there is sufficient Cross Zonal Capacity). The Market Operator (or a duly assigned CCP) is locally responsible for all the services linked to the actual conclusion of the trades. This includes clearing, invoice and settlement, financial warranties, etc. The local Market Operator sends all the Orders available on its platform to the SOBF, and receives from the same module all available cross border Orders, compatible with remaining Cross Zonal Capacities.

[31] Defined in Article 2 (24) of the CACM Regulation.

[32] Defined in Article 2 (40) of the CACM Regulation .

[33] This case refers to a situation when the imports in one area (transit area) are exported to other neighboring areas at the same Market Time Unit of a Trading Day.

The intra-day cross-zonal matching shall be based on the following principles:

- First-come first-served where the Orders with the highest buying price and the lowest selling price get served first, given also that the Cross-Zonal Capacity constraints are respected in case the Orders are submitted in separate Bidding Zones.

- Cross-Zonal Capacities and Order Books (OBK) are simultaneously updated in the CMM and SOB respectively on a continuous basis based on latest matching of Orders and creation, modification and deletion of Orders as well as capacity upgrades by TSOs.

- In addition, such simultaneous updates per Bidding Zone and towards the individual NEMO LTS connected to the Intra-Day Solution are exclusively provided via the central Intra-Day System.

- Input data (Orders) to the matching submitted from the various NEMO LTSs is centralized in one SOB to enable full cross matching between the connected OBKs and combined with, where existing, explicit capacity allocation requests[34] when it comes to utilization of Cross Zonal Capacities available via CMM.

- Input data in the form of intra-day Cross-Zonal Capacities between Bidding Zones to the matching is made available by the TSOs in CMM.

- All input data regarding Sell / Buy Orders coming from the respective NEMOs individual LTSs are shared in the SOB in a fully anonymized manner to ensure both that competing NEMOs do not know which Participants connected to another NEMOs LTS are placing the individual Orders and in general to protect the confidentiality of individual Participants' Orders.

- The solution will be designed to accommodate Complementary Regional Intra-Day Auctions (CRIDAs) in accordance with article 63 of the CACM Regulation (as further detailed in *Chapter 7*) and capacity pricing in accordance with article 55 of the CACM Regulation.

The Intra-Day Solution also requires implementation of interfaces between the Intra-Day System and other NEMO and TSO systems. This includes the following interfaces:

a) With NEMOs' LTSs. The SOB processes anonymized Orders with support of the CMM:

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[34]The explicit capacity allocation within the XBID solution is described in Section 6.2.2.4.

i. Participants do not connect to the SOB directly, but via one or more LTSs of NEMOs, in order to trade Global Products.

ii. Orders for Global Products are entered in NEMOs LTSs, which in turn connect to the SOB via the public message interface only by means of the intraday-dedicated Multiprotocol Label Switching (MPLS) network to transmit Orders for Global Products and to receive global trades.

iii. Matching of Global Orders is performed in the SOB, irrespective of whether the Global Orders have been entered for the same Bidding Zone or for different Delivery Areas.

iv. Matching of local Orders is performed in NEMOs LTSs and does not form part of the Intra-Day System or the Intra-Day MCO Function.

v. The SOB module maintains a consolidated Order Book for all Global Orders (not local Orders).

b) With TSOs in order for TSOs to provide and receive relevant information for pre-coupling and post-coupling processes.

c) With Participants to perform explicit allocation of Cross-Zonal Capacities, where it is requested by relevant NRAs.

d) With Central Counter Parties (Clearing Houses) acting under the responsibility of the NEMOs to ensure clearing and settlement of the matched Orders, as specified in the article 68 of the CACM Regulation.

Finally, each NEMO that is active in the Single Intra-Day Coupling shall be provided with access/connection to the SOB from the LTS of its own choice via a PMI/Application Program Interface (API) solution that secures equal access to and performance towards the SOB/CMM Order matching process.

9.4.2.2 Cross-zonal matching during the Continuous Intra-Day Trading

Continuous Intra-Day Trading consists of a sequence of process steps that need to respect agreed timings:

a) All NEMOs connected to the SOB/CMM via the common API and the LTS of its own choice will be able to continually feed Orders into the SOB and modify such Orders as long as the system is open for trading.

b) Intra-Day Cross-Zonal Capacities are continually made available by the corresponding TSOs (and by the Coordinated Capacity Calculator at a later stage when established) via the CMM from the Intra-Day Cross Zonal Gate Opening Time

until an agreed time for each Bidding-Zone to Bidding-Zone border when Cross Zonal Intra-Day Capacities cannot be changed any more for the Market Time Unit.

c) All instruments[35] on the Intra-Day System are traded continuously on every calendar day in accordance with the matching rules.

d) All NEMOs agree to respect the execution conditions available on the Intra-Day System.

e) At regular intervals (e.g. every 12 hours or every calendar day), the SM computes and sends Net Positions and cross-zonal and delivery areas information to the relevant parties in order to enable settlement.

f) Each TSO individually, or in coordinated manner with other TSOs, runs its own procedures required for cross-zonal scheduling (Bidding Zone to Bidding Zone or intra Bidding Zone where there are multiple Delivery Areas within a Bidding Zone). Scheduling is based on the output of SM and/or the CMM and shall respect the matched Orders.

It should be noted that the above-mentioned steps assume that the establishment of the Coordinated Capacity Calculator (CCC), as provisioned by the CACM Regulation Article 27 (2), will delay and consequently each TSO shall be responsible for providing the CZCs to the CMM. The case and the procedures, in which the entity of the CCC is established, are described in the following *Section*9.4.3.

9.4.2.3 Intra-Day Matching Concept

The Intra-Day matching concept is extensively described in Section 5.4 of this report.

9.4.2.4 Explicit capacity allocation in the XBID solution

❖ General provisions

According to Articles 64-67 of the CACM Regulation:

"*Where jointly requested by the regulatory authorities of the Member States of each of the bidding zone borders concerned, the TSOs concerned shall also provide explicit allocation, in addition to implicit allocation, that is to say, capacity allocation separate*

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[35]A product can be thought of as a unique set of trading features – the most important of which is the delivery duration (referred to as "Market Time Unit" in the documentation) – or, alternatively, as a template for a contract. A contract identifies the actual object of an order and a trade, and can also be referred to as an instrument.

from the electricity trade, via the capacity management module on bidding zone borders.

The TSOs on the bidding zone borders concerned shall jointly develop a proposal on the conditions that shall be fulfilled by market participants to participate in explicit allocation. The proposal shall be subject to the joint approval by the regulatory authorities of the Member States of each of the bidding zone borders concerned.

When establishing the capacity management module, discrimination shall be avoided when simultaneously allocating capacity implicitly and explicitly. The capacity management module shall determine which orders to select for matching and which explicit capacity requests to accept, according to a ranking of price and time of entrance.

The participating TSOs shall publish relevant information on the interconnections to which explicit allocation is applicable, including the cross-zonal capacity for explicit allocation.

A request for explicit cross-zonal capacity may be submitted by a market participant only for an interconnection where the explicit allocation is applicable. For each request for explicit capacity the market participant shall submit the volume and the price to the capacity management module. The price and volume of explicit allocated capacity shall be made publicly available by the relevant TSOs."

An explicit capacity request is a request (submitted by a Participant) to be allocated a certain amount of capacity on a given interconnection (the capacity of which is explicitly allocated using the XBID solution) in a given direction for a given time period. Participants can directly access the CMM to transmit explicit capacity requests. When an explicit capacity request is entered into the CMM of the XBID solution, it receives a timestamp.

❖ Priority setting between implicit and explicit allocation

Cross-border trading, which involves the implicit allocation of interconnector capacity, and explicit capacity allocation are processes that, in principle, compete for the same interconnector capacity (obviously, this is only true for those interconnectors that allow for explicit capacity allocation). If there is competition for the same capacity between regular matching and explicit allocation, it is the time stamp of the order that triggers regular matching and the time stamp of the explicit allocation request that determine which of these processes gets the capacity allocated. Both Order entry (and modification, activation, and activation of a new slice of an iceberg order) events and explicit capacity requests enter the XBID system through a single queue and get their timestamp assigned in this single queue. As a result, all Orders and all explicit capacity requests have unique timestamps, so that it

is always possible to sort them by time stamp unequivocally.

Batch matching is triggered by a capacity update. As soon as a batch matching round starts, both regular matching and explicit capacity allocation are suspended. This means that batch matching always takes precedence over both regular matching and explicit allocation. Regular matching and explicit allocation are only enabled again after all batch matching rounds belonging to a single capacity update event have been completed.

Important note: ADMIE and the neighboring TSOs in the Greek borders have not yet developed a proposal on the conditions that shall be fulfilled by market participants to participate in explicit allocation, in accordance with Article 64 paragraph 2 of the CACM Regulation. For this reason, it follows that explicit allocation within the XBID solution may not be implemented in the Greek borders in the foreseeable future.

9.4.3 Pre-Coupling, Coupling and Post-Coupling Processes of the Cross Zonal Intra-Day Market Model

In this *Section*, we describe the roles of the main European stakeholders, along with their main responsibilities during the pre-coupling, coupling and post-coupling operations in the continuous Intra-Day Market, as described in the CACM Regulation.

According to the current regime, TSOs shall provide the daily Cross Zonal Capacities to the Capacity Management Module (CMM). The CMM is defined in Article 2 (40) of the CACM Regulation as a system which contains up-to-date information on available Cross-Zonal Capacity for the purpose of allocating intraday Cross-Zonal Capacity. The CMM then makes the capacities available for the NEMOs in each Bidding Zone.

Furthermore, the Shared Order Book (SOB) allows for the simultaneously matching of all Orders received by the NEMOs active in the Single Intra-Day Coupling solution, regardless of how many NEMOs are active within a single Bidding Zone. The Shipping Module (SM), being a post-coupling operation, computes the scheduled exchanges for shipping and settlement calculations for TSOs and central counter parties to ship and settle cross-zonal and cross-delivery area and cross-central counter party trades, where relevant. Some TSOs can also receive this information from the CMM.

But, this regime shall be changed in order to be compliant with the following Articles of the CACM Regulation:

- Article 7(2) where the interface between the MCO and pre-coupling is set – processing input data on CZC provided by CCC;

- Article 30(3) – defining that each CCC shall provide the validated CZC and Allocation Constraints for the purpose of allocating capacity;

- Article 58(1) – where each CCC shall ensure that CZC and Allocation Constraints shall be provided to relevant NEMOs through the CMM in the time to ensure the publication of CZC and of Allocation Constraints to the market.

When the CCC is established according to the Article 27(2)of the CACM Regulation, the CCC shall make sure that the NEMOs will have the Cross-Zonal Capacities and Allocation Constraints available at the same time and at the latest 15 min before Intra-Day Cross Zonal Gate Opening Time as stated in Article 58 of the CACM Regulation. In line with Article 59 of the CACM Regulation, the Intra-Day Cross Zonal Gate Opening Time has been set equal to 22:00 CET (or 23:00 EET) in the day preceding the Delivery Day.

For capacity allocation in accordance with Article 30(3) the CCC shall provide the CZCs and Allocation Constraints to all relevant NEMOs. According to Article 7(2) of the CACM Regulation the relevant NEMOs are responsible for transferring the provided CZCs and Allocation Constraints to the MCO Function (XBID Solution), in order to calculate the single Intra-Day Market results that shall comprise at least the Net Positions and the execution status of Orders. It should be noted that, the relevant NEMOs are also responsible for gathering the Orders submitted by the Participants via the Local Trading Systems and for forwarding them to the SOB. According to the "Methodology for the Calculation of Scheduled Exchanges resulting from Single Intra-Day Coupling"[36] the Intra-Day Market MCO Function shall be capable of finding results (execution status of Orders, prices per trade and single Net Position for each Bidding Zone and Market Time Unit) normally within 5 minutes. The pre-coupling operation concerning the capacity calculation and the dissemination of the CZCs is presented in *Figure 9-6*,while *Figure 9-7* presents the pre-coupling operation corresponding to the submission of Global Orders in the Local Trading Systems.

The post-coupling phase starts with the delivery of the results according to Article 60 of the CACM Regulation. All NEMOs performing the Intra-Day MCO Function shall deliver the results to the Scheduled Exchange Calculators (SEC), CCCs, TSOs and NEMOs as shown in *Figure 9-8*.

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[36]https://www.entsoe.eu/Documents/Network%20codes%20documents/Implementation/cacm/161214_Att3_I D%20Scheduled%20Exchanges%20Calc%20Methodology%20-%20AllTSOapproved%20-%20FINAL.pdf
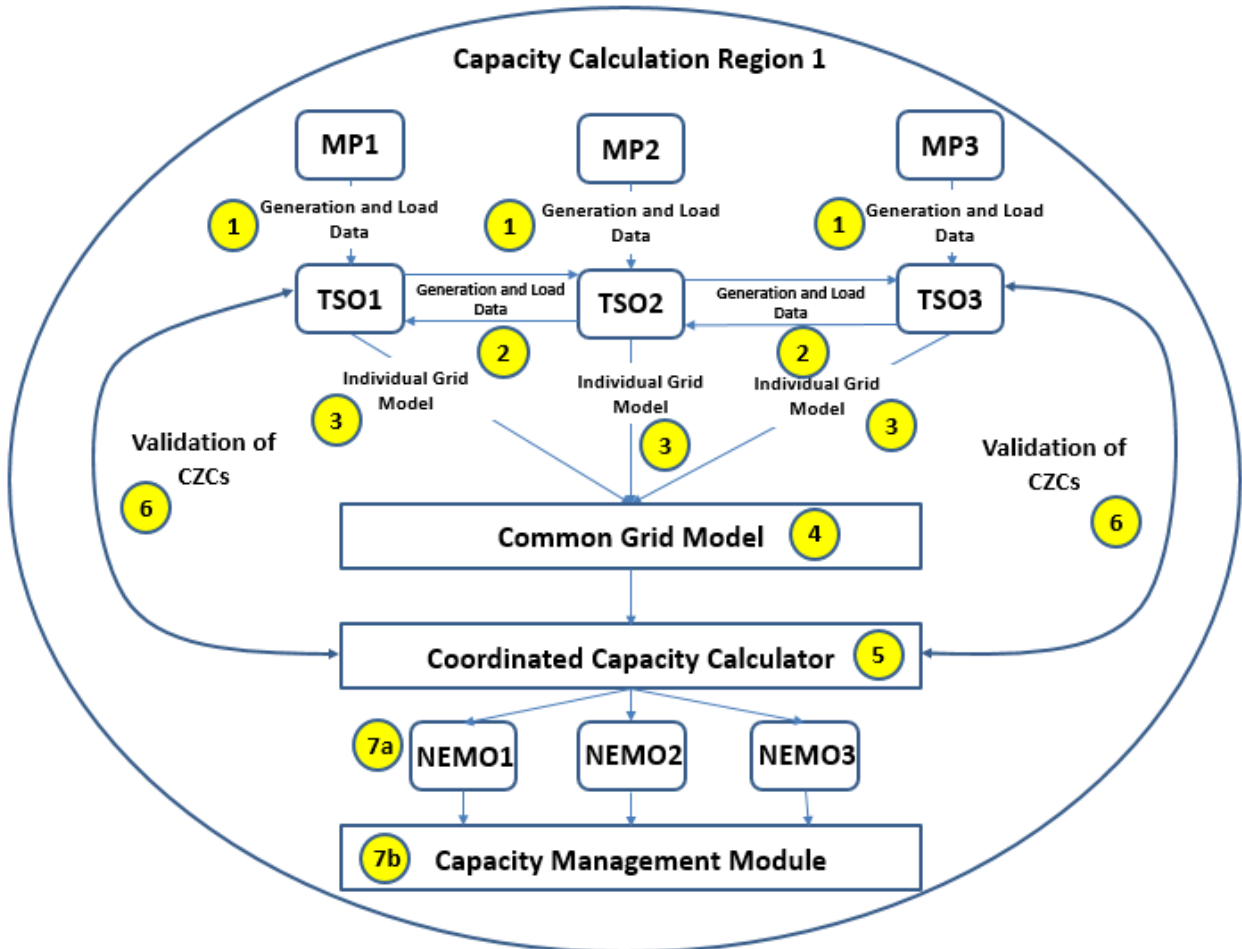
Figure 9-6:Pre-Coupling Operations concerning the Regional Capacity Calculation
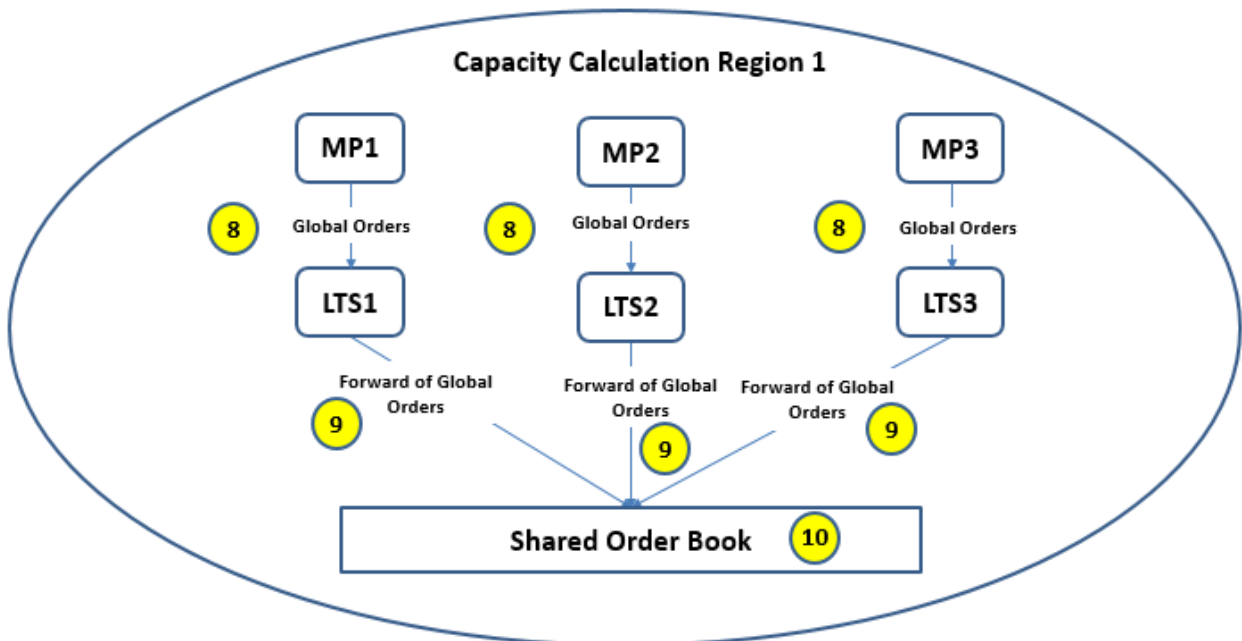

Figure 9-7:Pre-Coupling Operations concerning the submission of Global Orders in the LTSs
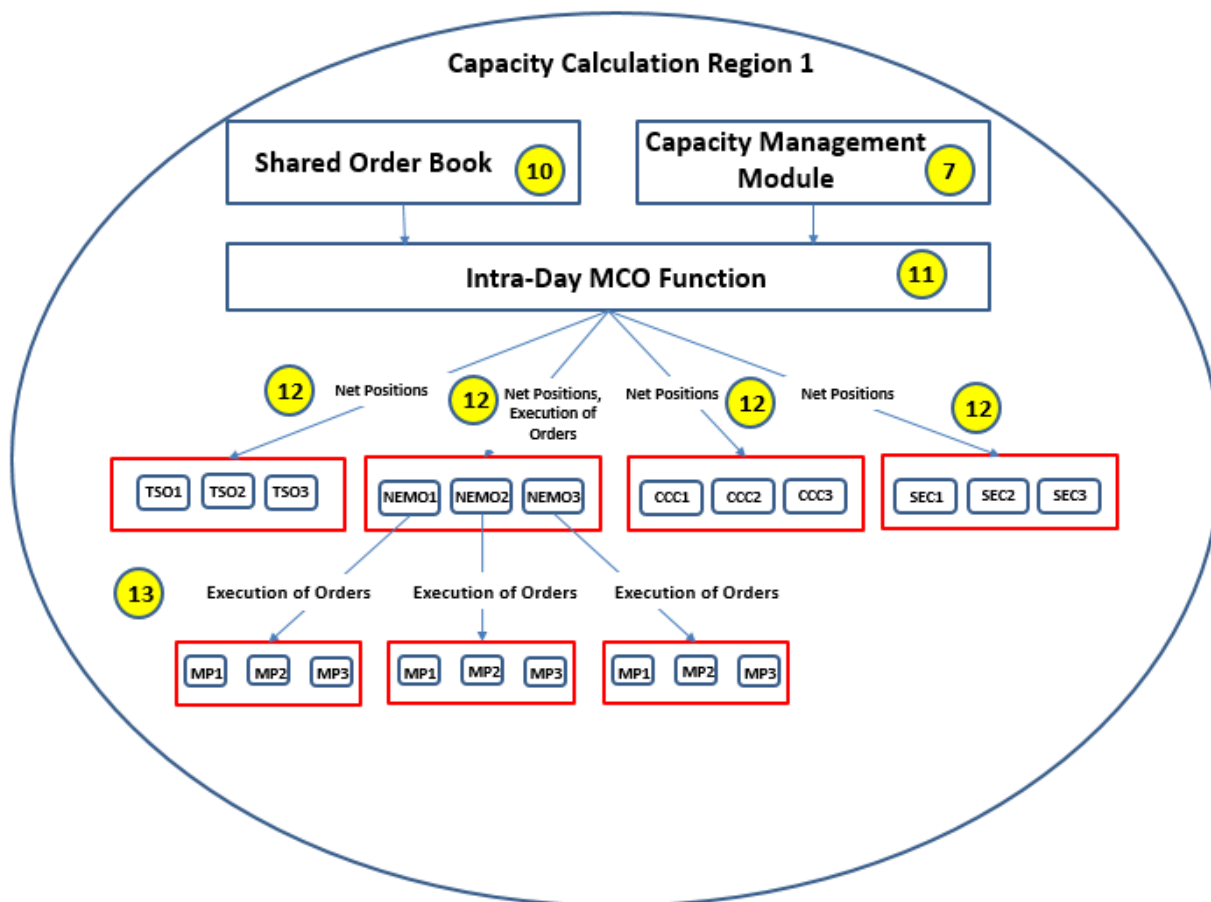
Figure 9-8:Post-Coupling Operations concerning the derivation of the Market Coupling results

More specifically, as per Article 52 of the CACM Regulation, all NEMOs, as part of their Intra-Day MCO Function, shall ensure that the continuous single intraday coupling delivers the Net Positions. Net Positions can be derived from the results of the single intraday coupling:

- The Net Position of a NEMO Trading Hub[37] is equal to the aggregation and netting of matched Buy and Sell Ordersin the NEMO Trading Hub.

- The Net Position of a Scheduling Area is equal to the aggregation and netting of matched Buy and Sell Orders in the Delivery Area.

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[37] To enable several NEMOs to provide single Intra-DayMarket coupling services within a Bidding Zone, the Bidding Zones are divided into hubs. This approach is used since there is currently no solution in place for merging Order Books within a Bidding Zone. There will be one hub per NEMO per Bidding Zone and each hub will be connected to the Order Book of the concerned NEMO. Between the different hubs within the Bidding Zone and between each hub and its Bidding Zone there are in effect infinite capacities, i.e. there are no limitations on how many transactions can take place between the different hubs/Order Books within the Bidding Zone.

- The Net Position of a Bidding Zone is equal to the aggregation and netting of matched Buy and Sell Orders in the Market Area.

Additionally, the single intraday coupling delivers all basic information to calculate any kind of Scheduled Exchange (more details can be found in *Section*9.4.4) belonging to the Net Positions resulting from the Single Intra-Day Coupling.

- Internal commercial schedules are the result of aggregating and netting the hand over:

  - between CCPs in the same area;

  - between a CCP and a Shipping Agent and

  - between Shipping Agents in the same area.

- External commercial schedules are the result of aggregating and netting the hand over between Shipping Agents on a border.

The aggregation and netting shall be done at the level of Scheduling Area as well as Bidding Zones.

It should be noted that the validation of the Intra-Day Market Coupling results inherently performed by the matching algorithm makes sure that all the network constraints and the characteristics (price, volume, duration, etc.) and matching rules for the Orders, are respected when matching of Orders and pricing results are determined.

As far as the Clearing and Settlement procedures are concerned, according to Article 7(1) of the CACM Regulation, the NEMOs shall be responsible for acting as Central Counter Parties (CCP) (under a respective contract with a Clearing House) for clearing and settlement of the exchange of energy in accordance with Article 68(3). The CCP shall clear the contracts resulting from the intra-day trade with the Participants. In order for the CCP to be able to clear contracts with Participants, NEMOs shall provide information on the matching results. Based on this information, in markets where portfolio-based participation in the Intra-Day Market is active, the CCP will provide nominations to the TSOs. In the Greek market the final Market Schedule of each Entity (e.g. Generating Unit) shall be transferred from the NEMO to the TSO, as detailed in Chapter 7.

9.4.4   Scheduled Exchanges Calculation Procedure

As per Article 56(3) of the CACM Regulation, the Scheduled Exchange calculation shall be based on Net Positions for each market time unit.

Article 56(2) of the CACM Regulation stipulates that the Intra-Day Scheduled Exchange

Calculation Methodology proposal[38] shall "*list the information which shall be provided by the relevant NEMOs to the Scheduled Exchange Calculator*".

Therefore, in the ID Scheduled Exchange Calculation Methodology, "Relevant NEMOs" shall be defined as "NEMOs responsible for the market coupling operator function". The Relevant NEMOs shall provide the following information, resulting from the single intraday coupling to the Scheduled Exchange Calculator(s) and all TSOs for each Market Time Unit, in order for the Scheduled Exchange Calculator(s) to perform the ID Scheduled Exchange Calculation:

- Rounded and unrounded Net Position per Scheduling Area;

- Rounded and unrounded Net Position per Bidding Zone;

- Rounded and unrounded Net Position per NEMO Trading Hub;

- Allocated capacities, in the form of allocated flows into and out of individual relevant DC network elements (difference in flows in/out reflecting losses where applicable);

- Allocated capacities, in the form of allocated flows on relevant Bidding Zone borders (flows in/out reflecting losses where applicable).

The Scheduled Exchange Calculator(s) shall receive the list of the above-mentioned information by 3 minutes after Intra-Day Cross Zonal Gate Closure Time which has been set equal to 60 minutes before the start of the relevant Market Time Unit in accordance with "All TSOs' proposal for intraday cross-zonal gate opening and gate closure times".

9.4.4.1 Downstream Uses for Scheduled Exchanges

There are three identified uses for Scheduled Exchanges (resulting from intra-day coupling) as follows:

❖ **Shipping and Scheduling**

As described above, the results of the market coupling process are at least Net Positions per Bidding Zone, while cross-zonal schedules (usually referred to as Scheduled Exchanges) are derived in the post-coupling phase. These Scheduled Exchanges serve as a basis for the shipping process, in which financial (commercial) and physical exchanges take place on the respective Bidding Zone or Scheduling Area border. Tasks related to cross-border physical and financial shipping could be performed together or separately by any

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[38] The proposal is available online at the following link:

https://www.entsoe.eu/Documents/Network%20codes%20documents/Implementation/cacm/161214_Att3_ID%20Scheduled%20Exchanges%20Calc%20Methodology%20-%20AllTSOapproved%20-%20FINAL.pdf

legal entity, which could be different entities on each border, i.e. by CCPs or Scheduling Agents (of a Shipping Agent). There are two shipping categories that can be elaborated as follows:

- Physical shipping in general means the task of transferring Net Positions between different Central Counter Parties in different Scheduling Areas in a form of Scheduled Exchange. The Scheduled Exchange is equal to the Net Position as long as no other additional bilateral exchanges (in AC and/or DC) for this Scheduling Area and for this market coupling process occur. The Shipping process may consist of local (internal) and cross-border (external) shipping phase.

- Financial shipping means all activities related to the financial clearing and settlement of Scheduled Exchanges between two different Central Counter Parties. Shipping fees and Congestion Income are based on this shipping information.

There are two possible interpretations for the delivery of the single intraday coupling results specified under Article 60(1) and pertaining to Article 52(1) of the CACM Regulation:

- Each TSO receives the Net Position for each Bidding Zone, each Scheduling Area and each NEMO Trading Hub and then each TSO must forward the Net Positions to other TSO coordination entities (e.g. Scheduled Exchange Calculators).

- Each TSO receives the Net Positions for each Bidding Zone, Scheduling Area and NEMO Trading Hub and TSO entities (e.g. Scheduled Exchange Calculators) also receive Net Positions for each Bidding Zone, Scheduling Area and NEMO Trading Hub.

In line with Article 3(f) of the CACM Regulation, the Scheduled Exchange Calculator(s) shall be developed on the assumption that each TSO shall receive all Net Positions (and other results) and TSO entities shall receive all required Net Positions (and other results). This assumption is made on the basis that CACM Regulation ensures and enhances the transparency and reliability of information.

In addition, any items listed by TSOs as a requirement from NEMOs shall be delivered to each TSO and TSO entities[39] e.g. "allocated capacities, in the form of allocated flows, on relevant Bidding Zone borders".

According to Article 8(2g), the TSOs shall, where required, establish Scheduled Exchange Calculators for calculating and publishing Scheduled Exchanges on borders between Bidding Zones[40]. Upon completion of the Scheduled Exchanges calculation, the Scheduled Exchange Calculator, in line with Articles 8 and 61 of the CACM Regulation shall notify

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[39] TSO entities constitute entities that undertake and perform tasks on behalf of a TSO (e.g. a Scheduled Exchange Calculator, for TSOs who intend to calculate the Scheduled Exchanges).

[40] Based on an assessment carried out in the explanatory note concerning the "Methodology for the Calculation of Scheduled Exchanges resulting from single intraday coupling", the Scheduled Exchange Calculator shall be established at least at Capacity Calculation Region level.

relevant NEMOs, Central Counter Parties, Shipping Agents and TSOs of the agreed Scheduled Exchanges. This is illustrated in Figure 9-9 below.
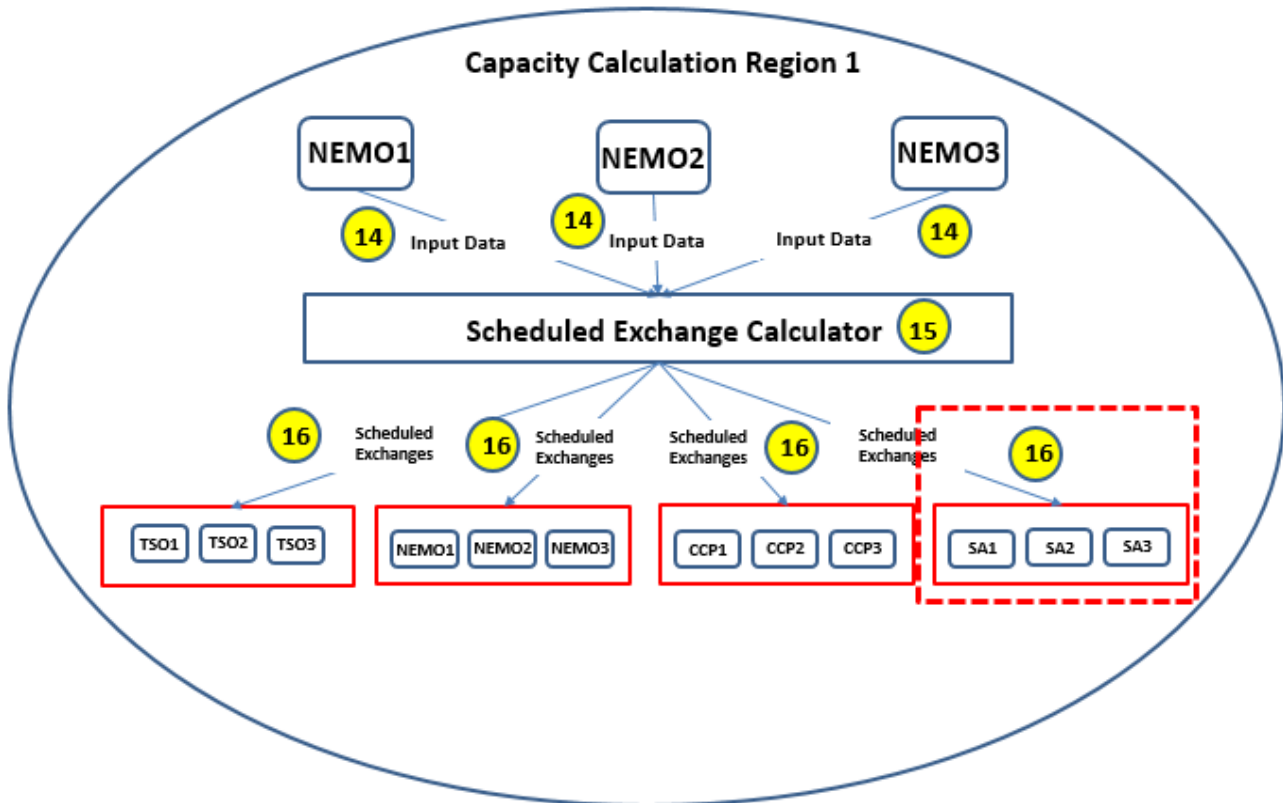
Figure 9-9:Post-Coupling Operations concerning the calculation of the Scheduled Exchanges

According to Article 2(43) of the CACM Regulation, the Shipping Agent transfers the Net Position(s) between different Central Counter Parties.

A separate role "Scheduling Agent" is required to notify (for unit-based participation, as in Greece) or nominate (for portfolio-based participation, as in most central European markets) schedules to TSOs. This creates a link between the market operation and the system operation. Figure 9-10 below illustrates the role of the Scheduling Agent in relation to the CCPs and the Shipping Agents.

Both the internal commercial trade schedules between Shipping Agents and CCPs and the internal commercial trade schedules between Shipping Agents and other Shipping Agents are nominated to the TSOs responsible for operating the Scheduling Area. In addition, the external commercial trade schedules are nominated to the TSOs operating the Scheduling Area, by the Scheduling Agents of the Shipping Agents, as:

- Multilateral exchanges between the Scheduling Area and a group of other Scheduling Areas; and

- Bilateral exchanges between the Scheduling Area and another Scheduling Area.

Scheduled Exchanges determine the volumes to be settled between NEMOs both physically and financially. This means that Scheduled Exchanges determine the cross-border nominations to be taken into account by TSOs.

❖ **Congestion Income Distribution**

At the present time, Congestion Income is not collected from the Intra-Day Markets where continuous trading is applied. In the future, following developments on the methodology for Cross Zonal Intra-Day Capacity Pricing[41], Congestion Income will likely be introduced.

Upon introduction of this concept, it is likely that the same approach as for day-ahead will be applied. Therefore, the link between Scheduled Exchanges and Congestion Income Distribution in the future could be described as follows.

In Article 2 (16) of the CACM Regulation, Congestion Income is defined as "*the revenues received as a result of capacity allocation*". Congestion Income originates in the situation where transmission capacity between Bidding Zones or on Critical Network Elements is not sufficient enough to fulfill the demand.

"Market Congestion" means a situation in which the economic surplus for single intraday coupling has been limited by Cross Zonal Capacity or Allocation Constraints.

For the intraday market timeframe, according to Article 68(8) of the CACM Regulation, Congestion Income will be collected by Central Counter Parties or Shipping Agents (in case of implicit allocation) or by allocation platforms (in case of explicit allocation, where applicable).After the collection by the above-mentioned entities, based on the rules described in the Congestion Income Distribution Methodology[42], the Congestion Income is assigned to each Bidding Zone border and then, it is distributed to the TSOs on each side of a Bidding Zone border (as illustrated in Figure 9-10), or via the relevant TSOs to third party asset owners (where applicable).

Finally, Table 9-1 presents analytically the pre-coupling, coupling and post-coupling processes that are enumerated in Figures 9-6, 9-7, 9-8, 9-9 and 9-10.

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[41]The Congestion Income Distribution Methodology is available online at the following link:
https://www.entsoe.eu/Documents/Network%20codes%20documents/Implementation/cacm/170407_CID_methodology_NRAs_RA_FINAL.pdf

[42] The Methodology is available online at the following link:
https://www.entsoe.eu/Documents/MC%20documents/160629_CID%20methodology_Final.pdf
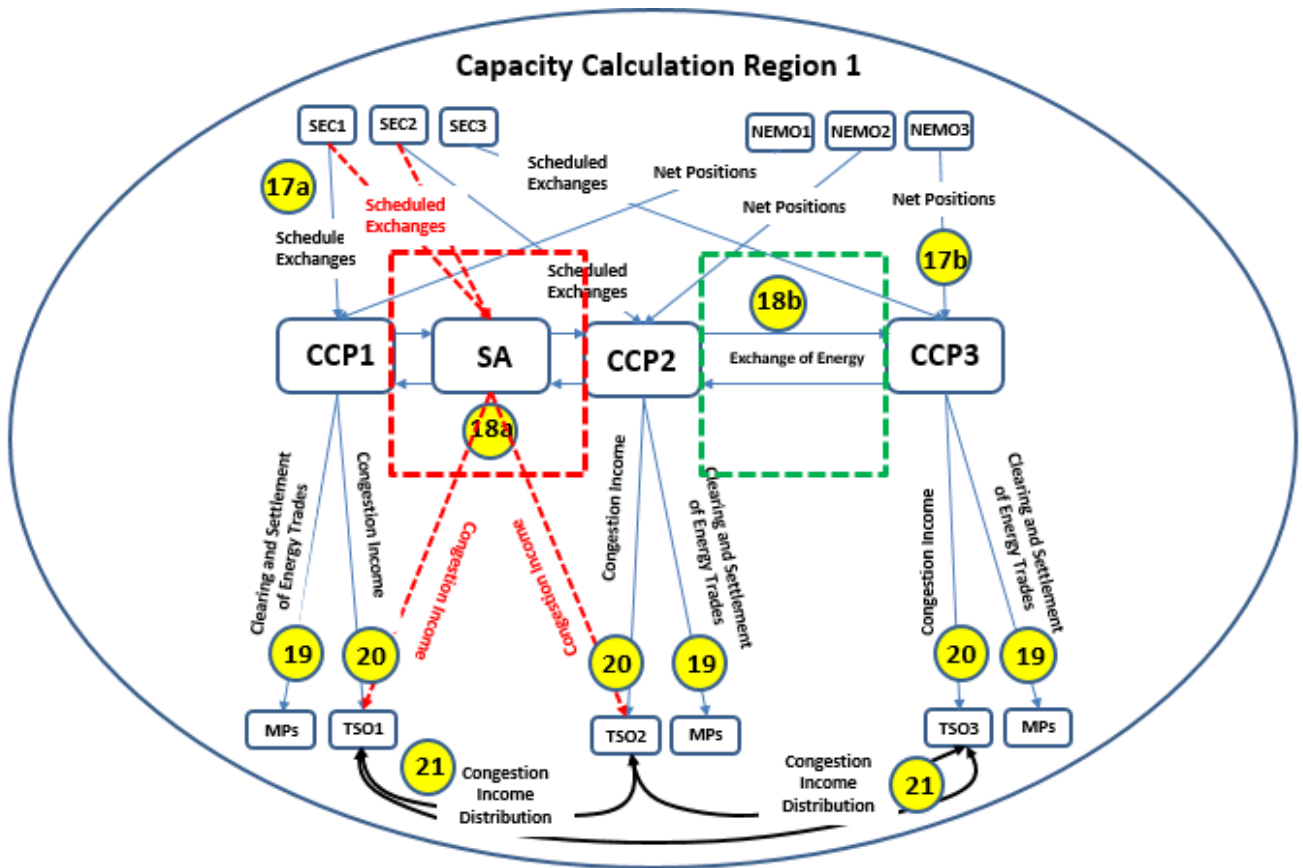
Figure 9-10: Post-Coupling Operations concerning the Clearing and Settlement of Trades

No	Process	From	To	Description	CACM Regulation
1	Generation and Load Data Provision	Participants	TSOs	Each Generating Unit or Load unit shall provide the data specified in the generation and load data provision methodology to the TSO responsible for the respective control area.	Article 28 (1)
2	Share of Generation and Load Data between TSOs	TSO	TSO	Each TSO shall use and share with other TSOsthe information to be provided by Generation Units and Loads to TSOs.	Article 16 (5)
3	Creation of Individual Grid Model	TSO	-	Each TSO in the Bidding Zone shall provide an Individual Grid Model for its control area.	Article 19 (1)
4	Creation of the Common Grid Model	TSO responsible for merging the Individual Grid Models	-	Each TSO shall deliver to the TSOs responsible for merging the Individual Grid Models into a Common Grid Model the most reliable set of estimations practicable for each Individual Grid Model	Article 28 (4)
5	Regional Capacity Calculation Process	Coordinated Capacity Calculator	-	Each Coordinated Capacity Calculator shall perform an operational security analysis applying operational security limits by using the Common Grid Model created.	Article 29 (2)
6	Validation of Cross Zonal Capacities	Coordinated Capacity Calculator	TSOs	Each TSO shall validate the results of the regional capacity calculation for its Bidding Zone borders or Critical Network Elements	Article 30 (1)
7	Provision of Validated Cross Zonal	Coordinated Capacity Calculator	NEMOs	Each Coordinated Capacity Calculator shall ensure that Cross-Zonal Capacity and Allocation Constraints shall be provided to relevant	Article 58 (1)

No	Process	From	To	Description	CACM Regulation
	Capacities			NEMOs.	
7b	Transfer of Validated Cross Zonal Capacities	NEMOs	Capacity Management Module	Each NEMOshall process input data on cross-zonal capacity and allocation constraints provided by coordinated capacity calculators.	Article 7 (2)
8	Order Submission	Participants	Local Trading Systems	Participants shall submit all Orders to the relevant NEMOs before Intra-DayMarket gate closure time.	Article 59 (5)
9	Transfer of Orders	NEMOs	Shared Order Book	Each NEMO shall forward the Orders received to the Intra-Day MCO Function.	Article 59 (7)
10	Collection of all Orders	Shared Order Book	-	Shared Order Book means a module in the continuous intraday coupling system collecting all matchable Orders from the NEMOs participating in single intraday coupling and performing continuous matching of those Orders	Article 2 (24)
11	Determination of the Single Intra-Day Coupling Results	Intra-Day MCO Function			
12	Sending of the Results	Intra-Day MCO Function	TSOs, NEMOs, CCCs and SECs	All NEMOs performing MCO functions shall deliver the continuous trading matching algorithm results to all other NEMOs, all TSOs and scheduled exchange calculators.	Article 60 (1)
13	Sending of Orders'	NEMOs	Participants	Each NEMO shall inform Participants on the execution status of their Orders.	Article 60 (4)

No	Process	From	To	Description	CACM Regulation
	Execution				
14	Sending of Input Data for the Calculation of the Scheduled Exchanges	NEMOs	SEC	Each NEMO shall provide the relevant SEC with the necessary information for the calculation of the Scheduled Exchanges.	Article 56 (2)
15	Calculation of the Scheduled Exchanges	SEC	-	Each SEC shall calculate Scheduled Exchanges between Bidding Zones for each Market Time Unit.	Article 61 (1)
16	Sending of the agreed Scheduled Exchanges	SEC	TSOs, NEMOs, CCPs, SAs	Each SEC shall notify relevant NEMOs, CCPs, SAs and TSOs of the agreed Scheduled Exchanges.	Article 61 (2)
17a	Sending of the Scheduled Exchanges in terms of the Clearing and Settlement	SEC	CCP	Each SEC shall notify relevant CCPs of the agreed Scheduled Exchanges.	Article 61 (2)
17b	Sending of the Net Positions in terms of the Clearing and Settlement	NEMO	CCP		
18a	Share of	CCP	CCP	CCPs shall act as counter party to each other for	Article 68 (3)

No	Process	From	To	Description	CACM Regulation
	Exchanges of Energy			the exchange of energy between Bidding Zones with regard to the financial rights and obligations arising from these energy exchanges.	
18b	Share of Exchanges of Energy	SA	CCPs	A SA may act as a counter party between different CCPs for the exchange of energy, if the parties concerned conclude a specific agreement to that effect.	Article 68 (6)
19	Clearing and Settlement of Energy Trades	CCP	Participants	The CCPs shall act as the counter party to Participants for all their trades with regard to the financial rights and obligations arising from these trades.	Article 68 (1)
20	Transfer of Congestion Income	CCP or SA	TSOs	All CCPs or SAs shall ensure that collected Congestion Incomes are transferred to the TSOs.	Article 68 (8)
21	Congestion Income Distribution	TSO	TSO	TSOs shall distribute Congestion Incomes.	Article 73 (3)

Table 9-1: Information exchange and continuous trading processes pursuant to the provisions of the CACM Regulation

9.5   CRIDA information exchange and processes

Similarly to Table 9-1, in this Section the information exchange and processes implemented for the CRIDAs are presented in Table 9-2. Even though the CACM Regulation provisions concern exclusively the continuous intra-day trading sessions, in the last column of Table 9-2 the relevant articles of the CACM Regulation have been included also for the CRIDA processes, since such processes are performed in the same way as in the continuous trading sessions.

No	Process	From	To	Description	CACM Regulation
1	Generation and Load Data Provision	Participants	TSOs	Each Generating Unit or Load unit shall provide the data specified in the generation and load data provision methodology to the TSO responsible for the respective control area.	Article 28 (1)
2	Share of Generation and Load Data between TSOs	TSO	TSO	Each TSO shall use and share with other TSOsthe information to be provided by Generation Units and Loads to TSOs.	Article 16 (5)
3	Creation of Individual Grid Model	TSO	-	Each TSO in the Bidding Zone shall provide an Individual Grid Model for its control area.	Article 19 (1)
4	Creation of the Common Grid Model	TSO responsible for merging the Individual Grid Models	-	Each TSO shall deliver to the TSOs responsible for merging the Individual Grid Models into a Common Grid Model the most reliable set of estimations practicable for each Individual Grid Model	Article 28 (4)
5	Regional Capacity Calculation Process	Coordinated Capacity Calculator	-	Each Coordinated Capacity Calculator shall perform an operational security analysis applying operational security limits by using the Common Grid Model created.	Article 29 (2)
6	Validation of Cross Zonal Capacities	Coordinated Capacity Calculator	TSOs	Each TSO shall validate the results of the regional capacity calculation for its Bidding Zone borders or Critical Network Elements	Article 30 (1)
7a	Provision of Validated Cross Zonal	Coordinated Capacity Calculator	NEMOs	Each Coordinated Capacity Calculator shall ensure that Cross-Zonal Capacity and Allocation Constraints shall be provided to relevant	Article 58 (1)

No	Process	From	To	Description	CACM Regulation
	Capacities			NEMOs.	
7b	Transfer of Validated Cross Zonal Capacities	NEMOs	CRIDA solution platform	Each NEMO shall process input data on cross-zonal capacity and allocation constraints provided by coordinated capacity calculators.	Article 7 (2)
8	Order Submission	Participants	Local Trading Systems	Participants shall submit all Orders to the relevant NEMOs before CRIDA gate closure time.	Article 59 (5)
9	Transfer of Orders	NEMOs	CRIDA solution platform		
10	Determination of the CRIDA Results	CRIDA solution platform			
11	Sending of the Results	CRIDA solution platform	TSOs, NEMOs, CCCs and SECs	The NEMO operating the CRIDA solution platform shall deliver the auction results to all other NEMOs, all TSOs and Scheduled Exchange Calculators.	
12	Sending of Input Data for the Calculation of the Scheduled Exchanges	NEMOs	SEC	Each NEMO shall provide the relevant SEC with the necessary information for the calculation of the Scheduled Exchanges.	Article 56 (2)
13	Calculation of the Scheduled Exchanges	SEC	-	Each SEC shall calculate Scheduled Exchanges between Bidding Zones for each Market Time Unit.	Article 61 (1)

No	Process	From	To	Description	CACM Regulation
14	Sending of the agreed Scheduled Exchanges	SEC	TSOs, NEMOs, CCPs, SAs	Each SEC shall notify relevant NEMOs, CCPs, SAs and TSOs of the agreed Scheduled Exchanges.	Article 61 (2)
15a	Sending of the Scheduled Exchanges in terms of the Clearing and Settlement	SEC	CCP	Each SEC shall notify relevant CCPs of the agreed Scheduled Exchanges.	Article 61 (2)
15b	Sending of the Net Positions in terms of the Clearing and Settlement	NEMO	CCP		
16a	Share of Exchanges of Energy	CCP	CCP	CCPs shall act as counter party to each other for the exchange of energy between Bidding Zones with regard to the financial rights and obligations arising from these energy exchanges.	Article 68 (3)
16b	Share of Exchanges of Energy	SA	CCPs	A SA may act as a counter party between different CCPs for the exchange of energy, if the parties concerned conclude a specific agreement to that effect.	Article 68 (6)
17	Clearing and Settlement of Energy Trades	CCP	Participants	The CCPs shall act as the counter party to Participants for all their trades with regard to the financial rights and obligations arising from these trades.	Article 68 (1)

No	Process	From	To	Description	CACM Regulation
18	Transfer of Congestion Income	CCP or SA	TSOs	All CCPs or SAs shall ensure that collected Congestion Incomes are transferred to the TSOs.	Article 68 (8)
19	Congestion Income Distribution	TSO	TSO	TSOs shall distribute Congestion Incomes.	Article 73 (3)

Table 9-2: Information exchange and CRIDA process