Penta SG3

PENTALATERAL ENERGY FORUM
Penta flexibility work stream – Penta SG3 – Technical Background Paper – Intraday

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6/06/2016

INTRADAY

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Introduction

By 2030, renewable generation will deliver almost 50% of all electricity produced in Europe. Variable and distributed generation will significantly increase the strain on intraday and real-time system operation, thus **increasing the need for more flexibility**.

To cope with the increased need for flexibility, the pentalateral region witnessed a strong **development of intraday markets** during the past couple of years, both on organised markets and over-the-counter trading (OTC). They are complementary: while trading on a power exchange provides non-discriminatory access to transparent, liquid and secure cross-border intraday markets, OTC provides tailor-made products and possibilities to trade closer to real time, in particular for national products within a balancing zone.

Actual situation: description of current practice and work

Currently, a patchwork of cross-border intraday allocation mechanisms exists throughout Europe. While on some borders implicit allocation mechanisms are already in place, others rely exclusively on explicit allocation. Still others have no allocation mechanism. Established power exchanges, such as EPEX SPOT and APX[1], introduced technical solutions for **implicit continuous cross-border intraday trading in the pentalateral region**. On these markets, trading is possible 24 hours per day and seven days a week. This allows bringing together demand and supply close to real time, not only on a national level, but also across borders between pentalateral countries. The underlying technical solution used by power exchanges fully exploits the potential of implicit capacity allocation, while remaining open to explicit solutions in parallel.

Cross-border intraday trading offers **increased flexibility for market participants**, allowing them to trade around the clock up until a couple of minutes before delivery (so-called “lead time”). This way, they can reduce their balancing needs by reacting near real-time to various hazards, such as forecast deviations or an unplanned failure of a generation unit. Ultimately, this contributes to a decreasing need for balancing energy.

In general, liquidity on continuous intraday markets is to be found close to delivery. For this reason, EPEX SPOT together with transmission system operators and the clearing house ECC, has further **reduced the lead time** on its pentalateral markets in June 2015. Currently, intraday trading within Germany, France and Austria is possible until 30 minutes before delivery, and within France and Switzerland until 60 minutes before delivery. Intraday trading within Belgium and the Netherlands is possible until 5 minutes before delivery. Depending on the markets, cross-border trades are possible

[1] Cross-border intraday trading between Germany and France has been put in place by EPEX SPOT in 2010. This cross-border intraday solution was extended to Austria in 2012, and to Switzerland in 2013. The intraday markets of APX and Belpex in the Netherlands and Belgium have been coupled since February 2011. Currently, NordPool offers local continuous intraday trading in Germany (with access to Denmark).

up to 60 minutes before delivery between Germany, France, Austria and Switzerland, and 150 to 90 minutes before delivery between Belgium and the Netherlands[2].

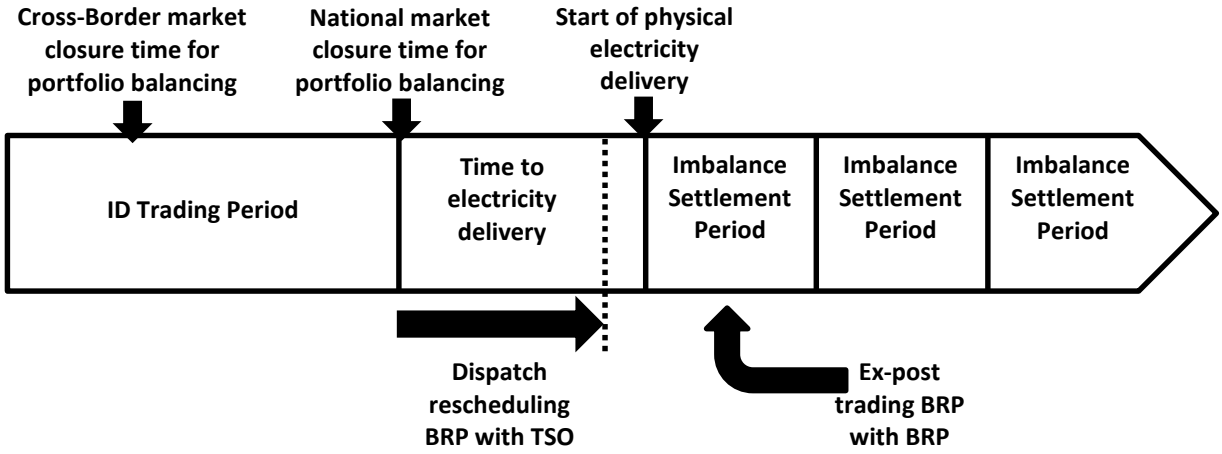
Regarding lead times there is some confusion. In general, a **lead time** is the latency between the initiation and execution of a process. In the context of this document we differentiate lead times according to the following terminology:

1) The delay between gate closure of ID market and the period of delivery is described as **"market closure time for portfolio balancing."** Mainly due to the processing time of process-involved IT systems, **intraday lead times may vary between power exchanges and OTC/bilateral agreements.** For example, the lead time between the latest execution of an order on the EPEX Spot ID market and the start of the imbalance settlement period is in some cases 60 minutes, but it may even be close to or even after the ISP. In the latter case, we refer to the option of **ex-post trading.**
2) The minimum lead time for a market party (mostly through the BRP) to notify a change in its forecast schedule for each connection is described as **"lead time for dispatch rescheduling."** This is used for grid security analyses. It tends to be longer than the intraday gate closure time. Indeed, TSOs usually require additional time to process the cross-border schedule exchange and other procedures compared to national transactions.

As executing cross-border exchanges currently has the same effect for the TSOs as notifying a change in dispatch forecast schedule, it is logical that the current gate closure for cross-border exchanges in the intraday time frame is aligned with the lead time for updates in the dispatch schedules.

As a result, **national lead times currently differ from cross-border lead times.**

The graph below outlines the interrelation of portfolio balancing, dispatch forecast rescheduling and imbalance settlement in the intra-day trading context.



Graph 1: Interrelation of portfolio balancing, dispatch rescheduling and imbalance settlement

[2] There are 12 gates for the cross-border nominations between Belgium and the Netherlands, i.e. one every 2 hours. As a consequence, the cross-border lead time is 60 minutes longer every 2 hours.

In the past years we have also seen the introduction of **new products covering flexibility needs of market participants**. In 2011, EPEX SPOT introduced as first European exchange the so-called 15-minute product on the continuous intraday market in Germany, which was successively extended to Switzerland in 2013 and Austria in 2015. In addition to continuous trading of 15-minute products, EPEX SPOT introduced a 15-minute call auction for the German intraday market in 2014: every day at 3PM, all 96 quarter hours of the following day can be traded in this dedicated auction. The existing volumes in this auction proofs that there is added value, at least for some market parties. It is not very likely that the PCR Day ahead auction will be done with 15 minutes instead of 60 minutes, at least not the coming years. 15 minute auctions allow for shaping due to the smaller granularity. An auction concentrates liquidity and creates a good price reference. An auction is considered easy in use (like no costly need to have somebody 24/7 at a trading desk) for market participants and provides them an efficient price. An auction provides level playing field across market parties regarding speed of trading, whilst this is in continuous markets less clear. An auction several hours after the day ahead auction enables market parties to include (some) more information. In an auction more complex blocks can be better included than in a continuous market.

The 15-minute product contributes to flexibility and incites system-beneficial behaviour. As such, it is a valuable tool for balance responsible parties, and allows handling generation ramps (e.g. for photovoltaic sources) or forecast deviations with an increased accuracy.

The Commission Regulation (EU) 2015/1222 establishing a guideline on capacity allocation and congestion management (**CACM regulation**) entered into force on August 14th 2015. The regulation "*sets out minimum harmonised rules for the ultimately single day-ahead and intraday coupling, in order to provide a clear legal framework for an efficient and modern capacity allocation and congestion management system, facilitating Union-wide trade in electricity, allowing more efficient use of the network and increasing competition, for the benefit of consumers*" (whereas 3).

This objective is achieved by setting requirements for Transmission System Operators (TSOs), Nominated Electricity Market Operators (NEMOs) and other parties to cooperate on the level of Capacity Calculation Regions (CCRs), on a pan-European level and across bidding zone borders. According to Article 7 CACM, **NEMOs shall act as market operators** in national or regional markets to perform in cooperation with TSOs single day-ahead and intraday coupling. All NEMOs shall in particular implement the market coupling operator functions (MCO functions), which include amongst others the development and maintenance of the algorithms, systems and procedures for single day-ahead and intraday coupling. To this end, all NEMOs shall submit by mid-April 2016 to all National Regulatory Authorities (NRAs) and the Agency (ACER) a plan that sets out how to jointly set up and perform the MCO functions.

As far as the intraday timeframe is concerned, existing initiatives are likely to become the vehicle to achieve the pan-European Intraday Target Model laid out in the CACM regulation. More specifically, the voluntary cross-border intraday project (**XBID project**), a joint initiative by power exchanges and transmission system operators from 12 countries, is presumably to become the single intraday market coupling solution. XBID is a major project that requires strong project management and governance.

In that context, smooth implementation of the agreed European-wide intraday platform goes hand in hand with a smooth implementation of the CACM governance. The XBID project is moving forward with the formal commitment from all parties: the signing of the contract for the XBID project and the support provided by regulators should provide a very firm footing from which to move forward. In its conclusions from October 2015 and March 2016, the Florence Forum "*welcomes the progress made so far and stresses the importance that the intraday project develops in a stable environment so that its implementation is a success, including local implementation projects"* and also "*acknowledges the significant progress being made on the integration of cross-border markets in the intraday and day-ahead timeframes, and considers that market coupling should be the foundation for such markets.*"

While the XBID project is on its scheduled path, the **Local Implementation Projects** (LIPs) equally continue making progress. A LIP consists of one or more borders, one or more TSOs and one or more power exchanges. LIP's main tasks are adapting local arrangements (i.e. procedures, shipping, contracts), adjusting IT system and securing equal treatment between power exchanges and implicit/explicit access. Of special relevance for the pentalateral area are the LIPs involving the borders France/Germany, Switzerland/Germany, Switzerland/France, Germany/Austria, France/Belgium, Netherlands/Belgium and Austria/Switzerland.

While the XBID project is expected to deliver the first go-lives in 2017, so-called "**Quick-Wins**" aim at enhancing the current intraday market design and easing cross-border access to interconnections, in order to reap early benefits of market integration for market participants. Quick-Wins for the Belgian borders to France & the Netherlands are progressing. Transmission system operators and power exchanges are working towards a technical solution to introduce cross-border intraday trading on the French-Belgian and Dutch-Belgian border, subject to regulatory approval and technical readiness.

Article 59 of the CACM regulation stipulates a cross-border gate closure time of at most 60 minutes: "*one intraday cross-zonal gate closure time shall be established for each market time unit for a given bidding zone border. It shall be at most one hour before the start of the relevant market time unit and shall take into account the relevant balancing processes in relation to operational security*". In the view of some TSOs, this is necessary to process the cross-border schedule exchange and other procedures. As a result, **national lead times differ from cross-border lead times.** In addition, intraday lead times vary between power exchanges and OTC. During discussions in the Penta SG III, several parties stated that shorter and harmonised lead times could reveal more flexibility and increase liquidity[3]. In its conclusions from March 2016, the Florence Forum "*acknowledges that, whilst cross-border day-ahead and intraday markets will see significant harmonisation as part of the implementation of the CACM regulation, there is significant scope for ensuring that national markets are appropriately designed to accommodate increasing proportions of variable generation. In particular, the Forum invites the Commission to identify those aspects of national intraday markets that would benefit from consistency across the EU, for example on within-zone gate closure time and products that should be offered to the markets*".

[3] This doesn't mean that all market players have to use these shorter lead times and shorter products. The existing responsiveness is better exposed in the market and this will lead to increased competition and more opportunities to adjust through the market.

Overview of the ID internal trading features in the PLEF countries as planned by 6 June 2016

Country	Smallest product	Lead time for dispatch rescheduling	Lead time PX	market gate closure (for portfolio rebalancing)	Other features
Austria	15 min	15 min	30 min	Real time	
Belgium	15 min	60 min	5 min	Ex-post trading	
France	30 min	60 min	30 min	Real time	
Germany/Luxembourg	15 min	15 min	30 min (EPEX), real time (NPS, within regional control area)	Ex-post trading	Call auction for 15 min products
Netherlands	15 min	60 min	5 min	Ex-post trading	
Switzerland	15 min	15 min	30 min	Ex-post trading	

Overview of the ID cross border trading features in the PLEF countries as planned by 6 June 2016

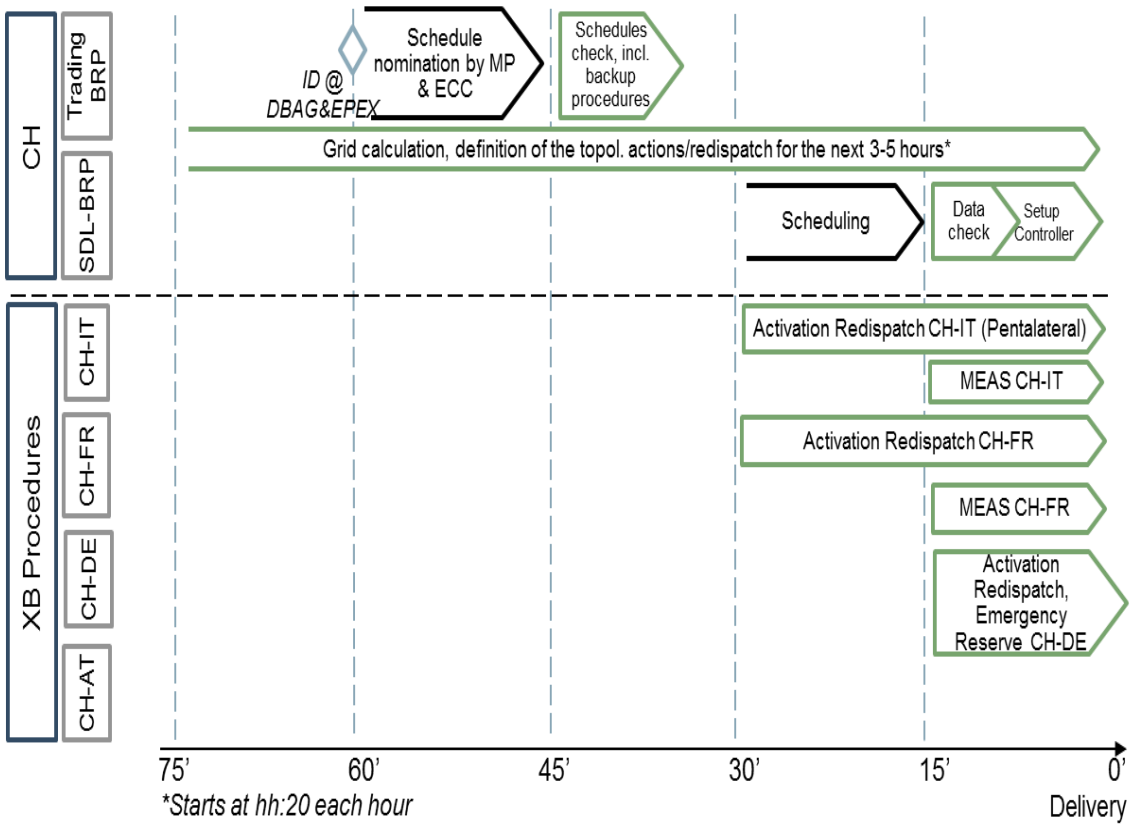
Border	Smallest product	Lead time PX	Lead time OTC/Bilateral	Other features
AT-CH	60 min	60 min	60 min	Implicit and explicit
CH-AT	60 min	60 min	60 min	Implicit and explicit
CH-FR	30 min	60 min	60 min	Implicit and explicit
FR-CH	30 min	60 min	60 min	Implicit and explicit
DE – CH	15 min	60 min	60 min	Implicit and explicit
CH – DE	15 min	60 min	60 min	Implicit and explicit
DE/LU/AT-FR	30 min	60 min	60 min	Implicit and explicit

FR-DE/LU/AT	30 min	60 min	60 min	Implicit and explicit
BE-FR*	60 min	60 min	Real time	Explicit
FR-BE*	60 min	60 min	Real time	Explicit
DE/LU/AT-BE**	n/a	n/a	n/a	
BE-DE/LU/AT**	n/a	n/a	n/a	
NL-DE/LU/AT	60 min	n/a	60 – 105 min	Explicit
DE/LU/AT-NL	60 min	n/a	70	Explicit
BE-NL***	60 min	120 min	n/a	Implicit, 12 gates/day
NL-BE***	60 min	120 min	n/a	Implicit, 12 gates/day

*The explicit allocation on the BE-FR border will be changed to implicit allocation.
**Unclear when capacity becomes available
***The NL-BE border will be improved: lead time PX will be shortened to 60 min and the amount of gates will be increased to 24/day.

The reason for the extended lead time of cross-border compared to national transactions is exemplary outlined in the following graph (for the case of Switzerland).

Graph: Exemplary TSO processes during the lead time period



Source: Swissgrid.

The market parties and European Commodity Clearing (ECC) nominate their cross border schedules at least 60 minutes prior to physical delivery. Once this is done, the involved TSOs need to check the schedules for plausibility and clarify reasons for potential deviations. The finalized schedules need then to be considered in the planning of back-up procedures, e.g. for the case of unexpected cross border capacity restrictions. Furthermore, the related data need to be integrated into continuously updated grid calculation models in order to derive potential topological or redispatch actions. Thirty minutes prior to delivery, the processes for the activation of cross-border redispatch and other ancillary service preparations start. This requires a coordinated interaction between the TSOs involved into the specific cross border transactions.

One of the big challenges to get to shorter lead times on the borders is the increased cooperation of TSOs. The operational processes need to be streamlined and automated for that on a regional level in order to achieve the same speed and operational conditions as for internal processes. Having the same lead times internal and cross border is the only way to reach a true level playing field on an international level and allow for effective competition of flexibility in the market.

Analysis and description of a desirable solution

During discussions in the Penta SG III, it was also recognized that **capacity allocation on a first come first served basis on the Swiss Northern Border can lead to inefficient market results**. Additional available capacities for the day-ahead period become calculated and published in the evening of the previous day. Some market participants with advanced, fast IT systems use their technological advantage in order to reserve as much as possible of this capacity. Empirical observations document that the free-of-charge transmission right are later on not utilized for physical electricity transmission. Therefore, some parties propose an opening auction for the capacity rights in the evening. The calculated capacity price would create an incentive to utilize the capacity and not to "over-reserve" free of charge. Furthermore, also (typically smaller) market participants with less advanced IT systems would have a chance to take advantage of the allocation of transmission rights in a fair and transparent way. However, this should be outweighed against the flexibility of the continuous trading target model. Auctions negatively impact the speed of continuous trading.

The evolution towards more intermittent renewable production coupled with diverse sources of flexibility might also require **shorter time frame products** than hourly products. In the end the product should be in line with the ISP (see balancing paper) of each region. Lead times have to be harmonized in order to reach a level playing field for all market players in the PLEF region. Only then flexibility can compete under the same conditions The same goes for XB features: smallest product should correspond to the ISP and PX lead times should be in line with internal lead times.

Furthermore implicit and explicit access on the borders should be possible as long as regulators allow for it and the enduring solution for XBID is implemented (complying with the CACM guideline). Obviously these features have to be the same for the complete PLEF region to allow for a true level playing field.

Overview of the ID internal trading features in the PLEF countries and cross border as desired and based on best practices.

Country and border	Smallest product	Lead time for dispatch rescheduling	Lead time PX	market gate closure (for portfolio rebalancing)	Other features
All countries	15 or 30 min (related to ISP)	30-60 min	5 min	Ex-post trading	

Path from the actual situation to the desired solution

It will be a challenge to reach the desired situation. Especially reducing different lead times will require far reaching automisation and integration of and operations by TSOs. However, intermediate steps in the right direction are possible and should be made in parallel with the work on the more difficult issues. Intermediate steps could be:

Implementation of implicit allocation on the DE-NL border
After Q3 2016 the DE-NL border will be the only border inside the PLEF region without implicit allocation, while all countries already use the same systems for ID trade. It should be possible to quickly move to implement this on the DE-NL border allowing for easy platform trade in the whole PLEF region. Obviously this shouldn't delay the overall XBID project. It should be regarded as an early implementation of something that is ready.

Align product size to the ISP
Another achievable step could be to align products on the ISP in all countries and on the borders. The EPEX systems are capable of that. It should not be a problem in countries that currently have an ISP that is longer than 15 minutes if block bids are efficiently handled. Tuning the products to the ISP will increase the possibilities for BRPs to balance themselves.

Define a road map to harmonize lead times
The harmonization of the different lead times is a more difficult issue. The PLEF should define a road map to get to the desired situation. Obviously this has to be seen in relation with the work on balancing and the work on integrating system operation processes.