DESIGN NOTE FOR THE COORDINATION OF ASSETS:

PART II – SCHEDULING AND REDISPATCHING

Market Development

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EXECUTIVE SUMMARY

Receiving active power schedules and having flexibility at disposal for redispatching purposes is vital for ELIA's operational management of the grid. The European Guideline on Electricity Transmission System Operation introduces **the role of Scheduling Agent** as the party delivering schedules to the TSO. ELIA also assigns to the Scheduling Agent the responsibility for bidding flexibility on the asset to ELIA to be used for redispatching. Given the strong link between scheduling and flexibility, **the Grid User must act as Scheduling Agent or delegate the task to the Flexibility Service Provider/Balancing Service Provider.**

ELIA must receive **active power schedules in Day-ahead and in Intraday of Power-Generating Modules and Energy Storage Devices types B/C/D;** those smaller than 25MW may deliver ON/OFF schedules rather than MW schedules. **MW schedules are used as a baseline for activation of flexibility for redispatching and balancing.** The level on which the schedule is delivered must be at least coherent with the connection points to ELIA's grid (requiring for example the schedules per Power Unit rather than for the Power-Generating Module as a whole). If flexibility would be offered separately on a lower level of delivery points, then the schedules must be provided on the same level.

Power-Generating Modules and Energy Storage Devices types B/C/D must also **bid the available flexibility on the asset.** Together with the schedules and bids, the Scheduling Agent must provide the available Pmax and Pmin. The bidding requirements will take **into account the coordinability level of the asset,** which can be set differently per direction (incremental/decremental), depending on operational mode (running or shut-down), and also for a specific period. **Fully coordinable** assets respond quickly and typically also bid for balancing. **Limited coordinable** assets have flexibility to offer but with slower response times. **Non-coordinable** assets have no flexibility that can be utilized in normal conditions.

TSO-connected demand facilities and demand facilities in CDS connected to the ELIA grid are exempted from delivering schedules in Day-ahead and in Intraday if they do not offer flexibility for redispatching. Flexibility on demand can be **voluntarily bid** for redispatching in which case scheduling obligation on the delivery point applies.

The information must be delivered **for each quarter-hour of day D,** starting from day D-1 after the Day-ahead market closure. ELIA can in advance request a specific schedule on a Power-Generating Modules/Power Unit or an Energy Storage device: **a Must-Run schedule** (at Pmin) or a **May-Not-Run schedule** (at 0MW or a specific maximum value). Such requests are remunerated to the Scheduling Agent based on a negotiated cost-based price offer. Real-time deviations from Must-Run or May-Not-Run schedules are not permitted.

Schedules and bids with Intraday update obligation can be amended until the scheduling deadline, a time dependent on the assets characteristics and set in such a way that ELIA has sufficient time to analyze the impact of the schedule amendment and if necessary counter the physical impact on the grid by activating the asset's flexibility in opposing direction as a congestion bid. For fully coordinable assets the scheduling deadline will be closer to real-time than for limited coordinable assets. **Schedule amendments during Intraday in zones with congestion risk do not necessitate specific approval by ELIA:** ELIA will respond via redispatching if necessary to avoid congestion caused by the schedule amendment. Real-time deviations from the schedule in zones with congestion risk are however not accepted. **Although not to be frequently used,** amendments by the Scheduling Agent of a schedule that was set based on a

previous request by ELIA (either by activating flexibility, by requesting a Must-Run schedule or a May-Not-Run schedule) must first be submitted to ELIA with a request for approval. Schedules of assets with Intraday scheduling obligation are amended in case ELIA activates flexibility.

Assets subject to Intraday scheduling obligation (Power-Generating Modules/Power Units and Energy Storage Devices and Demand delivery points bidding in flexibility for redispatching) are **expected to follow the schedule in real-time.** Although authorized in the framework of portfolio balancing or reactive balancing, deviations are not permitted if causing or aggravating congestion risks. If nonetheless observed, in such circumstances ELIA will command the Scheduling Agent to **instruct the asset to return to its schedule** (which is regarded by ELIA as a congestion bid without remuneration, BRP perimeter correction, or compensation on the Belgian imbalance). The Scheduling Agent must inform ELIA when instructing an asset to deviate from the schedule towards a new set point. ELIA will pro-actively request to return-to-schedule when the situation requires.

The **scheduling obligation requires the installation of real-time metering.** Existing asset without real-time metering installed will not be obliged to do so. Those assets are nonetheless equally subject to deliver firm schedules and susceptible to return-to-schedule requests, which will be verified by ELIA ex post.

The Scheduling Agent must offer flexibility in an explicit way (the bids must include a volume and price) rather than ELIA having to derive the available flexibility based on other information. Using different bid properties, flexibility can be bid representing different circumstances: start-up bids on not running assets, incremental/decremental/shut-down bids on running assets, bids per power unit which together represent the flexibility of the power plant as it is configured at that moment, ... The bid size is to be offered as a block bid, showing the available energy per quarter-hour. However, ELIA foresees an alternative for Power-Generating Modules and Energy Storage Devices type B and for Demand Facilities, which can bid the flexibility in the form of a scheduling limit (representing the maximum or minimum schedule per quarter-hour that can be requested by ELIA).

Congestion bids are remunerated based on the requested energy at a cost-reflective price. This allows ELIA to keep congestion management cost efficient while providing the market the freedom to update schedules regardless of the congestion risks in the zone. Activations (including return-to-schedule requests) are ex post verified. Large underdelivery will be penalized.

The congestion bid will be corrected in **the perimeter of the Grid User's BRP**[1] based on the delivered energy. ELIA will also **correct for the net impact of the congestion bids on the Belgian imbalance, u**sing the least costly flexibility that ELIA expects to be available. ELIA may activate compensation bids on limited coordinable assets, non-reserved balancing flexibility, or use the flexibility on the Day-ahead and Intraday markets.

[1] There is no Transfer of Energy applicable on congestion bids.

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TERMINOLOGY

The table below provides a list of **definitions and concepts referred to in the design notes on the coordination of assets**. Some definitions are copied from external sources, such as the European Guidelines; in this case the reference is added in the description.

Asset
An asset in this note refers to a demand facility or a power generating module (PGM) (GL SO, ref [1]), extended to the notion of energy storage units. The asset is part of the ELIA control area, directly or indirectly via a connection in a distribution system or closed distribution system. An asset is explicitly listed in the connection agreement with the relevant system operator.
Availability plan
(GL SO, ref [1]) “the combination of all planned availability statuses of a relevant asset for a given time period”
Availability status
(GL SO, ref [1]) “the capability of [an asset or grid element] to provide a service for a given time period, regardless of whether or not it is in operation”
(Physical) Congestion
(GL CACM, ref [5]) “any network situation where forecasted or realised power flows violate the thermal limits of the elements of the grid and voltage stability or the angle stability limits of the power system”
Connection agreement
(NC RfG, ref [4]) “a contract between the relevant system operator and either the power-generating facility owner, demand facility owner, distribution system operator or HVDC system owner, which includes the relevant site and specific technical requirements for the power-generating facility, demand facility, distribution system, distribution system connection or HVDC system”
Connection Point (CP)
(NC RfG, ref [4]) “the interface at which the power-generating module [own addition: or power unit], demand facility, distribution system or HVDC system is connected to a transmission system, offshore network, distribution system, including closed distribution systems, or HVDC system, as identified in the connection agreement” The connection point separates the transmission grid from installations of which the tripping only has an effect on the grid user connection to the concerned point. The connection agreement indicates the physical location and the voltage level of the point of connection to the grid**.**

(Cross-border) relevant demand facility
(GL SO, ref [1]) “a demand facility which participates in the outage coordination and the availability status of which influences cross-border operational security”
Day-ahead procedure
The time frame of the Day-ahead procedure for the coordination of assets is from 12:00 to 18:00 hour on day D-1
Delivery Point (DP)
A (virtual) point on an electricity grid or within the electrical installations of a grid user connected to TSO or DSO grid where the concerned ancillary service is delivered. This is associated with a metering system that enables ELIA to control and assess the delivery of the service.
Demand Facility
(NC DCC, ref [3]) “a facility which consumes electrical energy and is connected at one or more connection points to the transmission or distribution system. A distribution system and/or auxiliary supplies of a power generating module do not constitute a demand facility.” Note that a Demand facility can contain one or more Demand units. Note that following the definition of an Asset, the Demand Facility as such is explicitly identified in the Connection Agreement with the relevant system operator. Examples of a Demand Facility: - a commercial building (e.g., shopping mall) - a factory - each of the factories on an industrial site (if a connection point per factory)
Demand unit
(NC DCC, ref [3]) “an indivisible set of installations containing equipment which can be actively controlled by a demand facility owner or by a CDSO, either individually or commonly as part of demand aggregation through a third party” Note that a Demand unit can be (a set of) installation(s) behind a Delivery Point for the delivery of ancillary services to ELIA, but the requirements in this design note are at the level of the Demand facility. Examples of a Demand Unit: - a motor on an industrial site - an air conditioning system or refrigerator - a charging station for electric vehicles

ELIA grid

ELIA operates the following grids:

- Belgian transmission grid: above 70kV to 380kV high-voltage transmission system (legal monopoly for ELIA)
- Local or regional transmission grids until 70kV in Flanders (Plaatselijk Vervoernet), Wallonia, and the Brussels-Capital region

Throughout the design note "TSO" or "TSO-connected" in the Belgian context refers to these grids.

Energy Storage device

In this design note an Energy storage device is considered as a device used with the purpose to store electrical energy that is to be injected into the system at a later time for the grid user's own use or as a service offered to the system operator for balancing or congestion management. The requirements described in the iCAROS design notes are not applicable on emergency assets that operate in parallel with the grid less than 5 minutes per calendar month while the system is in normal system state.

Properties of an energy storage device:

- An energy storage device has a limited energy reserve which implies a maximum period of consecutive quarter-hours during which the device can be continuously charged (loading) or discharged (injecting).
- The energy storage device can be charged by taking energy off the grid or by injection from a Power Generating Module.
- The energy storage device has a permanent connection point to the TSO or (C)DSO grid (directly or locally via a demand facility).

(NC RfG, ref [4]) A specific type is Pump-Storage, i.e., a hydro unit in which water can be raised by means of pumps and stored to be used for the generation of electrical energy.

Note that following the definition of an Asset, an Energy storage device as such is explicitly identified in the Connection Agreement with the relevant system operator.

ELIA proposes to apply the same classification as for Power Generating Modules (of which types B, C, D are considered as significant):

- Type D:
  - All energy storage devices ≥ 75MW
- Type C:
  - Energy storage device between 25 – 75 MW
- Type B:
  - Energy storage device between 1 – 25 MW
- Type A:
  - Energy storage device smaller than 1MW

Forced Outage

(GL SO, ref [1]) "the unplanned removal from service of a relevant asset for any urgent reason that is not under the operational control of the operator of the concerned relevant

asset”

Grid User

the grid user is regarded as the owner of the asset or as the user of the asset (in case the owner is another party with whom the grid user has a contract) (in coherence with the definition of grid user in the proposal for the new Federal Grid Code)

Intraday procedure

The time frame of the Intraday procedure for the coordination of assets is from day D-1 18:00 until real-time.

Outage Planning Agent

(GL SO, ref [1]) “an entity with the task of planning the availability status of a relevant power generating module, a relevant demand facility or a relevant grid element”

Note that for the coordination of assets (described in the iCAROS design notes) also non-relevant assets (i.e., assets that have no relevant cross-border impact) can be subject to the responsibilities of an outage planning agent.

Note that there are also outage planning agents for outage planning of grid elements. However, the iCAROS design notes concern only power generating modules, demand facilities and storage devices. The coordination of grid elements is agreed between relevant system operators.

⇨ The definition of the Outage Planning Agent as applying to the coordination of assets described in the iCAROS project:

“an entity with the task of planning the availability status of a power generating module, an energy storage device, or a demand facility”

⇨ See “Design note for the coordination of assets: Part I – Outage Planning.”

Power Generating Module (PGM)

(NC RfG, ref [4]) “either a synchronous power-generating module or a power park module”

“‘synchronous power-generating module’ (SPGM) means an indivisible set of installations which can generate electrical energy such that the frequency of the generated voltage, the generator speed and the frequency of network voltage are in a constant ratio and thus in synchronism;”

“‘power park module’ (PPM) means a unit or ensemble of units generating electricity, which is either non-synchronously connected to the network or connected through power electronics, and that also has a single connection point to a transmission system, distribution system including closed distribution system or HVDC system;”

The Power-Generating Modules are classified in four types: PGM type A/B/C/D.

- PGM type D:
  - All PGM connected to 110kV or higher
  - All PGM ≥ 75MW
- PGM type C:

- PGM between 25 – 75 MW and connected below 110kV

- PGM type B:
  - PGM between minimum threshold – 25 MW and connected below 110kV
  - The minimum threshold is between 0.25 – 1 MW (to be confirmed)

- PGM type A:
  - PGM smaller than PGM type B minimum threshold and connected below 110kV

Note that following the definition of an Asset, a Power-Generating Module as such is explicitly identified in the Connection Agreement with the relevant system operator. A Power-Generating Module can have one or more connection points to the grid. Several Power-Generating Modules can also share a connection point to the grid.

PGM type B/C/D are defined as Significant Grid Users (SGU) in the European Guideline for Transmission System Operations (ref [1], therefore applicable for the requirements for operational data exchange in the framework of the coordination of assets.

The requirements described in the iCAROS design notes are not applicable on emergency assets that operate in parallel with the grid less than 5 minutes per calendar month while the system is in normal system state.

Power Unit (PU)

A physical installation which can generate electrical energy and that can be part of a set of installations forming a Power-Generating Module. Contrary to a Power-Generating Module, a Power Unit has only 1 connection point to the grid.

(See the section “Questions & Answers” for examples)

Scheduling Agent

(GL SO, ref [1]) “the entity or entities with the task of providing schedules from market participants to TSOs, or where applicable third parties”

⇨ Note that the Scheduling Agent in the iCAROS framework is extended towards all assets with the obligation to deliver active power schedules in Day-ahead and Intraday, and these do not necessarily reflect internal and external commercial trade schedules.

⇨ See “Design note for the coordination of assets: Part II – Scheduling and Redispatching.”

Setpoint

(NC RfG, ref [4]) “the target value for any parameter typically used in control schemes”

Significant Grid User (SGU)

The Significant Grid Users in the European Guidelines on Electricity Transmission System Operation (GL SO, ref [1]) and therefore applicable to the requirements on operational information exchange and this design note are:

- existing and new Power Generating Modules type B/C/D (ELIA-connected & (C)DSO-connected) - existing and new ELIA-connected demand facilities; - existing and new ELIA-connected closed distribution systems; According to the Guidelines also the following are Significant Grid Users, however not applicable in this design note[2]: - existing and new demand facilities, closed distribution systems and third parties if they provide demand response directly to the TSO in accordance with the criteria in Article 27 of Commission Regulation (EU) 2016/1388 (3); - providers of redispatching of power generating modules or demand facilities by means of aggregation and providers of active power reserve in accordance with Title 8 of Part IV of this Regulation;
Week-ahead
(GL SO, ref [1]) "the week prior to the calendar week of operation"
Year-ahead
(GL SO, ref [1]) "the year prior to the calendar year of operation"

[2] It concerns Power Generating Modules type A and Demand facilities that deliver ancillary services other than outage planning, scheduling, and flexibility for redispatching. The operational requirements are described in the design of the concerned ancillary service.

1. Introduction

In order to operate the grid in a secure and optimal way it is necessary that particular assets send a minimum set of information enabling ELIA to identify potential risks and adapt the dispatching of these assets in order to mitigate these risks**. Historically the Access Responsible Party (ARP) via the CIPU[3] contract provided ELIA with information on a range of large production units used for maintenance planning, congestion management, and balancing.** Shifts in the regulatory context (European guidelines and connection codes), in the energy landscape (decommissioning of thermal units; rise of decentralized & intermittent production), the emergence of new types of market players, stakeholder concerns with the existing contractual/operational/legal framework, and evolving needs for ELIA's grid operations motivate **a review of the organization for the delivery of ancillary services.**

The changing context is explained in the document "Future roles and responsibilities for the delivery of ancillary services," describing the current and future roles and responsibilities regarding the delivery of the different products. The note highlights **the evolution of one CIPU contract signed by the Grid User's ARP towards a set of procedures for which ELIA enters into contracts with a variety of roles, among which the Balance Responsible Party (BRP, formerly ARP) but also the Outage Planning Agent, the Scheduling Agent, the Balancing Service Provider (BSP), the Restoration Service Provider (RSP), the Defense Service Provider (DSP) and the Voltage Service Provider (VSP).** For each role the document refers to the relevant European legal context and explains the interdependencies with other roles. The final objective is to create a unique operational, contractual and regulatory framework for each role applicable to all types of assets (including, when applicable, assets not subject to CIPU).

The creation of **a new framework with different roles does not exclude the possibility that, in line with the current practice,** a single entity is responsible for the delivery of the different ancillary services associated to a single connection point. The new framework creates the possibility for the grid user to appoint different entities for the different relevant roles associated to its connection point without being obliged to spread the responsibilities. In its design proposal ELIA has avoided direct links (whether contractual or operational) between the different roles. However, as explained in the document "Future roles and responsibilities for the delivery of ancillary services," the Grid User has a key role to play in the coordination of the different entities to assure coherence between their operations. ELIA may also ex ante restrict the delivery of incoherent data.

The underlying document gives a closer look at the responsibilities of the Scheduling Agent and the modalities related to Scheduling and Redispatching on Power-Generating Modules/Power Units, Energy Storage Devices, and Demand Facilities. It is the result of an analysis to redesign the coordination of assets (thereby replacing the CIPU contract) discussed with relevant stakeholders in the iCAROS[4] Task Force. The iCAROS project focuses on the procedures relating to outage planning[5],

[3] CIPU refers to "Coordination of the Injection of Production Units".

[4] iCAROS refers to "integrated Coordination of Assets for Redispatching and Operational Security".

[5] See the "Design note for the coordination of assets: Part I – Outage Planning".

scheduling and redispatching (this document), and the use of ancillary services in congested areas[6].

For production units that were previously subject to scheduling obligation in the CIPU contract there are two important modifications: (1) the **possibility to modify schedules** in Intraday regardless of congestion risk (see section 6.3 in specific) and (2) the **explicit bidding** of flexibility to be used for redispatching (see section 8.4 in specific). The **impact is more profound** for existing and new **assets (other production, storage, demand) for which scheduling and bidding flexibility for redispatching is new,** either on mandatory or voluntary basis.

The current note proposes a design for the coordination of assets connected to the ELIA grid and to ELIA-connected CDS, regardless of whether the asset is directly connected to the ELIA grid or locally on the site of a demand facility or CDS.

The inclusion of assets connected to DSO grids is subject to a separate trajectory between ELIA and Synergrid and will be presented at a later time.

1.1. Document structure

This document describes in more detail the design of scheduling and bidding for redispatching, both responsibilities of the Scheduling Agent. The document includes also a description of the interdependencies with other roles and hence the coordination which needs to be organized by the Grid User in case different entities become active at a single connection point.

Not all Significant Grid Users are subject to both scheduling and bidding obligations; therefore not all chapters are relevant for each Significant Grid User.[7]

The structure of the document is the following.

- First there is an **overview of the purpose of scheduling and redispatching** for ELIA as well as of the new regulatory and contractual context in which the services are organized.
- The **responsibilities of the Scheduling Agent** are explained: scheduling and bidding for redispatching, its role vis-à-vis ELIA as well as its influence on the actions of other market parties.

Then both scheduling and bidding for redispatching are elaborated on:

- First for **scheduling**:
    - the set of assets subject to scheduling obligation (Power-Generating Modules/Power Units and Energy Storage Devices)

[6] See the "Design note for the coordination of assets: Part III – Congestion Risk Indicator".

[7] For more information see the sections "Obligations on Asset Level" in both the chapters on scheduling (6.1) and on flexibility bidding for redispatching (8.1). Note that ELIA applies the same principles on energy storage as on Power-Generating Modules.

- the procedure for data exchanges in terms of content and timing
- amendments to schedules by ELIA or by the Scheduling Agent
- the verification of exchanged schedules in real-time and liabilities

- Secondly, a specific case related to scheduling, namely Must-Run and May-Not-Run requests by ELIA, including the associated remuneration mechanism
- The third and final block describes following topics for **bidding for redispatching**:
  - mandatory and voluntary bidding for redispatching per asset type (Power-Generating Modules/Power Units, Energy Storage Devices, and Demand Facilities)
  - a specific characteristic taken into account: the coordinability level, meaning the extent to which an asset (usually from a technical perspective) has flexibility to offer.
  - the procedure for data exchanges in terms of content and timing
  - the modalities for activating flexibility for redispatching purposes
  - the associated remuneration for the activation of flexibility for redispatching purposes
  - activation controls and liabilities
  - Before concluding, the document explains the principle of avoiding an impact of redispatching on the Belgian imbalance position (via compensation bids)

Finally the note provides an overview of the aspects of the design that ELIA will propose to include in the new **Federal Grid Code**.

1.2. Indicative timeline

Substantial aspects of the design are enforced in the European Guideline on Electricity Transmission System Operation (Commission Regulation (EU) 2017/1485). The timeline is therefore largely affected by the entry into force of the guideline (14/09/2017) and the trajectory for the adaptation of the Federal Grid Code.

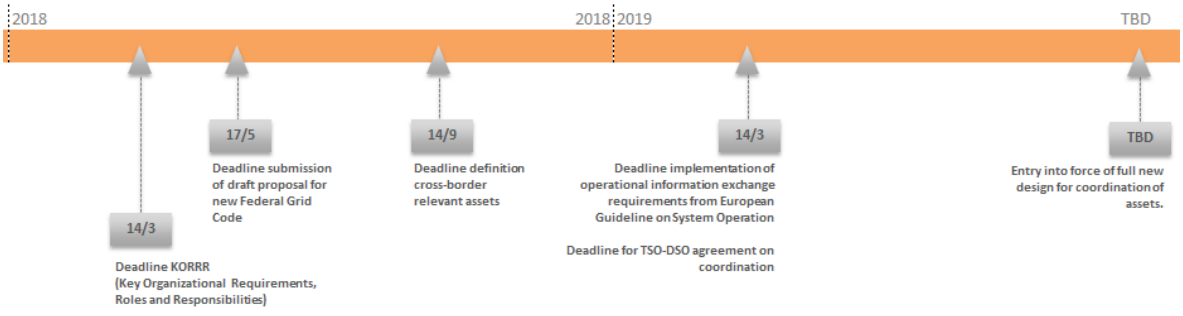

Figure 1.1. Indicative timeline of regulatory & implementation milestones

This design document will be translated into requirements for the new Federal Grid Code, which will be submitted to the competent authority on May 17th 2018.

The European Guideline on Electricity Transmission System Operation commands the joint creation by all TSOs of *"Key Organizational Requirements, Roles and Responsibilities"*

(KORRR), a legally binding agreement among all TSOs imposed in article 40 of the European Guideline on Electricity Transmission System Operation. KORRR enforces rules on operational information exchange for the implementation of the related articles in the Guideline with a focus on responsibilities of TSOs, DSOs, as well as Significant Grid Users The KORRR must be submitted for approval to all EU regulating authorities 6 months after entry into force of the Regulation, therefore 14/03/2018 at the latest.[8]

The formal implementation deadline of the articles on operational information exchange of the European Guideline for Electricity Transmission System Operation is on 14/03/2019. However, as it is doubtful that all the design requirements can be achieved before this deadline, ELIA will together with all relevant stakeholders and regulators investigate a potential alternative yet ambitious implementation timeline.

The underlying document explains future design principles, not the details for operational implementation and concrete IT impact. During 2018 ELIA will together with the concerned stakeholders create a more specific implementation plan, including regulatory, contractual and IT-related aspects. Also links with other frameworks and regulations (e.g., for purpose of Transparency on European level[9]) will be investigated.

[8] For more information on KORRR: see Annex 2.

[9] As prescribed in Commission Regulation (EU) No 543/2013 of 14 June 2013 on submission and publication of data in electricity markets and **amending Annex I to Regulation (EC) No 714/2009** of the European Parliament and of the Council.

2. Purpose of Scheduling and Redispatching for ELIA

Active power schedules provide ELIA information on the operating mode and level of electricity production or consumption of assets, and as a result their impact on the load flows in the grid. **ELIA uses the schedules received during Day-ahead and Intraday:**

- in load flow calculations to analyze the system security and to detect potential risks before real-time and the need for national and/or cross-border redispatching;
- for the calculation of cross-border capacities;
- to determine the technical trigger for the activation of strategic reserve;
- for maintenance planning;
- for the assessment of the unavailability risk of ancillary services (e.g., availability of active and reactive power reserves).

Schedules provide an important input in the work of ELIA to properly prepare and operate a secure grid during day D and assure the security of supply.

The Day-ahead markets are having an important role in the optimization of the dispatch of power plants. Before Day-ahead Elia therefore does not ask to receive schedules of Significant Grid Users but performs security analyses based on its own generation and load forecasts corrected with information received from the Outage Planning Agent (as shown in Figure 2.1).

ELIA enforces the real-time execution of the schedules only at moments when there are congestion risks in the area. At other moments assets may still be deployed by the BRP for portfolio and reactive balancing purposes[10].

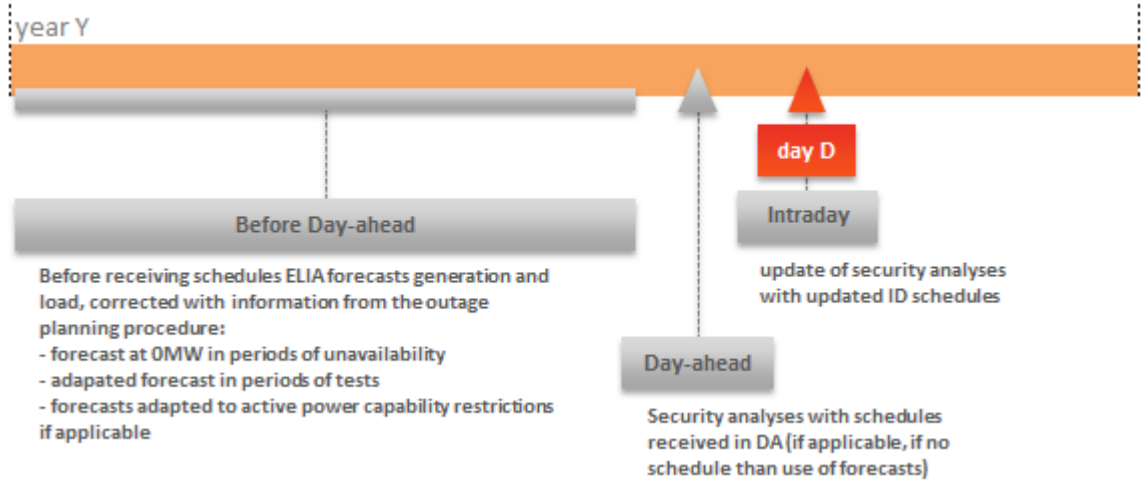

Figure 2.1. Timeline indicating which input ELIA uses for security analyses

[10] For more information on the quality and enforcement of schedules: see section 6.4.

Note that starting from Day-ahead ELIA no longer uses the information received in the Outage Planning procedures for those assets for which ELIA receives MW schedules.

The only **overlap between the Outage Planning and Scheduling** procedures is in case of forced full or partial unavailabilities. ELIA will use this information as soon as the Outage Planning Agent delivers it, even in the (short) period before the Scheduling Agent is able to update scheduling and bidding information in a coherent manner.

Depending on the circumstances **the security analysis may indicate the need to launch remedial actions**[11]. Remedial actions are, for example:

i. A **rescheduling of maintenance** works on the grid and/or a modification in outage planning of an asset or grid element[12]. Conditional maintenance works (e.g., paint work on pylons) can be cancelled relatively late.

ii. Topological measures

iii. Schedule reservations before the Day-ahead market to guarantee that an asset is in running mode or not **('Must-Run' or full or partial 'May-Not-Run')**

iv. **Redispatching**: If redispatching is needed as a remedial action, ELIA activates a congestion bid on a Power Generating Module, demand facility, or storage unit in the congested zone to reduce the congestion risk ('activation of a congestion bid'). ELIA will correct the effect of the congestion bid on the imbalance position of the BRP. When possible ELIA will correct the effect of the congestion bid on the system imbalance in Belgium by activating flexibility in the other direction in another zone without congestion risks ('activation of a compensation bid'.)

ELIA can decide to launch a remedial action when the security analysis indicates a potential congestion for an N or N-1 situation.[13] The decision depends on the level of the (forecasted) congestion, the time remaining, and the list of available remedial actions for the specific situation. ELIA aims to deploy the solution that is **most beneficial from a technical as well as economical** point of view.

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[11] See reference [6]:

A4-D1. Remedial action. *Remedial action refers to any measure applied in due time by a TSO in order to fulfil the n-1 security principle of the transmission power system regarding power flows and voltage constraints.*

A4-D1.1. Preventive remedial action. *Preventive remedial actions are those launched to anticipate a need that may occur, due to the lack of certainty to cope efficiently and in due time with the resulting constraints once they have occurred.*

A4-D1.2. Curative remedial action*. Curative remedial actions are those needed to cope with and to relieve rapidly constraints with an implementation delay of time for full effectiveness compatible with the Temporary Admissible Transmission Loading. They are implemented after the occurrence of the contingencies.*

[12] See "Design note for the coordination of assets: Part II – Outage Planning"

[13] Specifically the security analysis verifies whether, for a list of contingencies, the security on the grid can be maintained with a limited impact on neighboring grids. If there is sufficient time ELIA can prepare or launch remedial actions to preventively avoid the actual occurrence of the congestion in real-time. At times unforeseen congestions occur in real-time forcing ELIA to take remedial actions curatively. Given the time constraint the type of remedial actions is then more limited.

See reference [6] for more information on contingencies. Here are some definitions:

"A1-D1. Contingency. *A contingency is defined as the trip of one single or several network elements that cannot be predicted in advance. A scheduled outage is not a contingency. An "old" lasting contingency is considered as a scheduled outage."*

"A1-D3. Contingency list. *The contingency list of each individual TSO is defined as the list of all internal normal and exceptional contingencies considered relevant according to the TSO´s risk assessment. The contingency list includes also the external normal and exceptional contingencies that have to be taken into account by the security calculation due to the potential effect on an element of the responsibility area."*

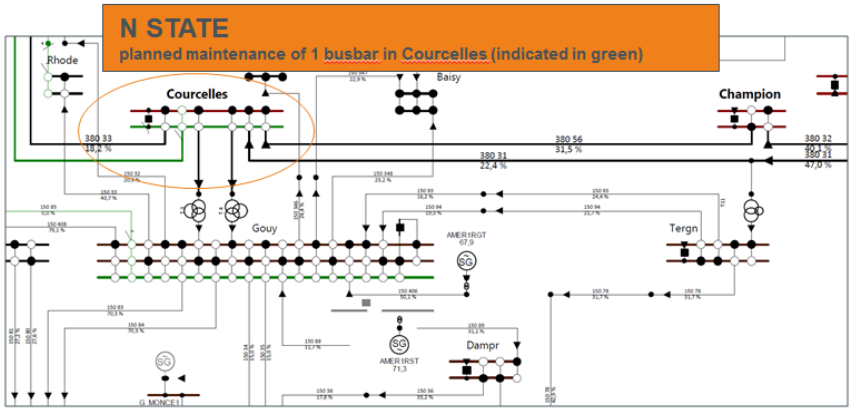
Example of a real case of a preventive remedial action

- **Before Day-ahead:**

  ELIA planned a conditional outage for maintenance of one of the two bus bars in Courcelles on day D. A conditional outage means that the outage may be cancelled in Day-ahead or Intraday if the circumstances require it.

  ⇨ As a result the zone of Hainaut was fed by only three transformers:
  Two transformers in Gouy (which are connected to Courcelles)
  One transformer in Tergné

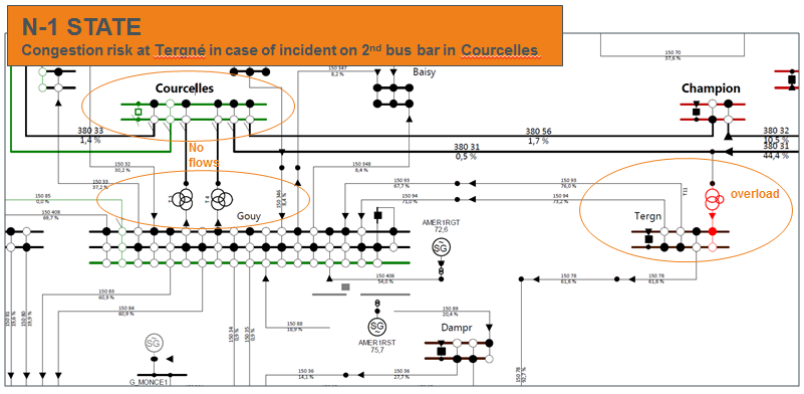
  There was no planned unavailability of a power unit in Hainaut announced.



- **Day-ahead:** ELIA receives schedules from the large power units indicating that only 1 out of 3 will be in operation on day D.

  The security analyses indicated that due to the loss of the second bus bar in Courcelles (one of the contingencies on the list) no more electricity would flow through the substation at Gouy.

  ⇨ Hainaut would be supplied via the Tergné substation where the one transformer would have an overload: load flow at 126% of nominal capacity of the transformer.



  ⇨ The possible remedial actions at that time were:
  - Cancel the conditional outage for maintenance in Courcelles
  - Activate a start-up congestion bid on the power units in Hainaut which were not scheduled to operate yet available.

  ⇨ ELIA decided to cancel the outage: as it was conditional it could be cancelled without a substantial technical or financial impact.

3. Regulatory and Contractual Framework

This chapter provides an overview of the hierarchical regulation and documentation in which the different aspects of the proposed design are or will be embedded.

Historically the exchange of schedules and bids (solely for production units) was laid out only in the Federal Grid Code and the CIPU contract. The CIPU contract entailed a list of procedures for coordination of assets starting from Year-Ahead with the procedure for outage or 'revision' planning. The contract specified the modalities that were principally described in the Federal Grid Code on the calendar for information exchanges and the possibilities for both ELIA and the provider (Access Responsible Party) to modify outage plans in mutual agreement.

Now the basic operational requirements for outage planning of (internal and cross-border) relevant assets are foreseen in the European Guideline on Electricity Transmission System Operation. In addition part of the design for the coordination of assets will be included in the new Federal Grid Code, regulated Terms & Conditions, and non-regulated procedural agreements (see Figure 3.1). The design principles will therefore be laid out in several layers of regulation and operational agreements with generalized rules applicable for all providers.

Figure 3.1. Hierarchy of regulatory and contractual documentation (T&C = Terms & Conditions)

European Guideline on Electricity Transmission System Operation

The European Guideline on Electricity Transmission System Operation contains several sections which provide the fundamental principles for the development of a contractual framework for Scheduling and Redispatching. The articles that are of particular relevance are listed in Annex 1.

The guideline imposes on TSO-connected and (C)DSO-connected Power-Generating Modules type B/C/D and TSO-connected Demand Facilities to deliver schedules of active power output in Day-ahead and Intraday. The TSO is given the possibility to exempt TSO-

connected demand facilities and (C)DSO-connected Power Generating Modules from scheduling obligation (but not so for TSO-connected Power-Generating Modules). The guideline introduces the role of the "Scheduling Agent" as the party responsible for delivering scheduling.

As indicated the guidelines also enforces rules via the *Key Organisational Rules, Roles and Responsibilities (KORRR)* and the methodology which will determine the criteria for cross-border relevance assets.

Federal Grid Code

The core rules and principles of the coordination of assets will be laid out in the Federal Grid Code so as to provide a sustainable future framework for coordination of assets and in particular outage planning and congestion management. Explicit requirements of the European Guideline will not be repeated in the Federal Grid Code, however if allowed, exemptions on guideline obligations can be stated.

ELIA's proposal of the design aspects that are to be referred to in the Grid Code are added at the end of this document (chapter "Summary & Impact on Federal Grid Code").

Terms & Conditions for the Scheduling Agent

While the Federal Grid Code declares the core rules and principles, the detailed elaboration of design principles is to be described in Terms and Conditions. After a public consultation, the Terms and Conditions are to be submitted to the regulatory authority with a request for approval.

Procedures for the Scheduling Agent

In compliance with the framework provided by European and national grid codes and terms and conditions, the practical modalities for the Scheduling and Redispatching will be described, taking into consideration the specific context of the signatory.

Connection agreement

The Grid User must formalize in the Connection Agreement which party is to take on the role of Scheduling Agent for the assets in the Connection Agreement that are subject to scheduling obligation as described in this design note.

4. Responsible Party: Scheduling Agent

European Guideline on Electricity Transmission System Operations

Article 3 Definitions

Definition 90: 'scheduling agent' means the entity or entities with the task of providing schedules from market participants to TSOs, or where applicable third parties;

Article 110 Establishment of scheduling processes

[...] 3.For each power generating facility and demand facility subject to requirements for scheduling set out in the national terms and conditions, the concerned owner shall appoint or act as a scheduling agent. [...]

According to articles 3 and 110 of the European Guideline on Electricity Transmission System Operation **the Scheduling Agent delivers the requested schedules to ELIA**. In addition to scheduling, **ELIA also assigns the responsibilities with respect to bidding for redispatching to the Scheduling Agent:**

- Congestion is a local problem requiring a solution in typically one direction. Activations of flexibility for **redispatching imply a request for a new schedule** (case for electricity generation; vice versa for electricity consumption):
  - an incremental activation enforces a new minimum schedule
  - while a decremental activation enforces a new maximum schedule

  Congestion bids are formulated as a request to adapt the schedule, regardless of whether ELIA receives a schedule on the asset in Day-ahead and/or Intraday.
- In case of Intraday scheduling obligation, ELIA updates the schedule accordingly when activating flexibility. This update is important as **the Scheduling Agent is bound in real-time to follow the schedule of an asset with Intraday scheduling obligation, and should therefore be informed of the activation.** Given the impact of congestion bids on the responsibility of the Scheduling Agent both actions are assigned to the same role.

In addition, **depending on the coordinability of an asset[14] the same flexibility can be activated by ELIA for redispatching and for balancing.** Therefore there is a close link between the roles of Scheduling Agent and of the Flexibility Service Provider (FSP)/Balancing Service Provider (BSP). As a Grid User may only enter into an agreement with one other party (i.e., FSP/BSP) to manage its flexibility on a delivery point, **either the Grid User should take on the role of Scheduling Agent or the Grid User may delegate the task to the Flexibility Service Provider (FSP)/Balancing Service Provider (BSP) for the concerned delivery point.** The two options are presented in Figure 4.1.

The Scheduling Agent will be subject to the rules described in the national Terms & Conditions for the Scheduling Agent and will take on the rights and obligations of Scheduling and Redispatching towards ELIA. Therefore the appointed Scheduling Agent is the contact person for ELIA with respect to information exchanges, modifications,

[14] For more information on coordinability (fully, limited and non-coordinable assets): see section 8.2.

activations of flexibility, settlement.[15] However, even when the Grid User appoints a third party as Scheduling Agent, the Grid User remains responsible for assuring that the Scheduling Agent delivers the service in compliance with the European Guideline[16] and remains jointly and severally liable for the consequences of non-compliance.

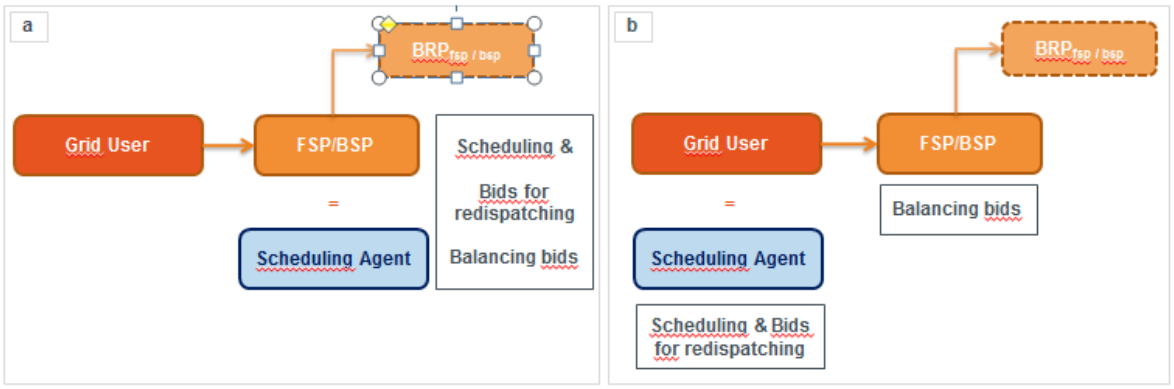


Figure 4.1. Grid User or FSP/BSP as Scheduling Agent

Note that there are specific cases to elaborate on:

1. In case the **flexibility for balancing** is offered by a Balancing Service Provider that is not the Grid User and falls under the ***Transfer of Energy*** regime (which cannot be applied for redispatching), the Grid User would take on the role of Scheduling Agent to bid flexibility for redispatching (therefore: Figure 4.1b).

2. In case of **flexibility that is not offered for balancing[17] (limited coordinable assets)** but for redispatching the Grid User may decide to offer the flexibility to ELIA on its own, or the Grid User may appoint another party which in this case is also a type of Flexibility Service Provider (without applicability of the *Transfer of Energy* regime). (Same options as Figures 4.1 but without the task of bidding for balancing.)

3. In case of **assets without flexibility (non-coordinable assets)**: as there is no flexibility to provide[17], there is no Flexibility Service Provider. Therefore the Grid User here takes on the role of Scheduling Agent in case of scheduling obligation.

4. In case of **assets without a default Intraday scheduling obligation**[18], i.e. Demand Facilities which do not offer flexibility for redispatching: starting from the moment that demand flexibility would be bid for redispatching purposes to ELIA, this would be voluntarily offered by the Grid User or by the Flexibility Service Provider (FSP)/Balancing Service Provider (BSP) as Scheduling Agent.[19]

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[15] Note that the Scheduling Agent may operationally delegate the exchange of information to a third party without delegating the contractual agreement of taking on the role towards ELIA. For example, the Grid User is Scheduling Agent (and therefore the contact person for ELIA for all aspects such as settlement and liabilities) but a third party may be given access to the data platform to deliver schedules and bids.

[16] As imposed in KORRR.

[17] Except perhaps to be used in extreme cases when the system is not in a normal state.

[18] For information about scheduling obligations on asset level see section 6.1 and for information about redispatching obligation on asset level see section 8.1.

[19] See the "Questions and Answers" section for examples.

5. Interdependencies with other parties

ELIA's design proposal includes independent contractual structures but acknowledges the logical operational links between the information received from each role. However certain aspects need to be coordinated in an indirect way via the Grid User or will be organized by ELIA.

Impact of Outage Planning Agent – Coordinated by ELIA/Grid User:

- The Outage Planning Agent delivers ELIA the information on whether or not a particular asset will be available for exchanging energy in the electricity markets. The availability status therefore defines the operational margin of the Scheduling Agent during a specific day.

  ELIA may block the Scheduling Agent to submit schedules and/or bids incoherent with the availability plan. They need to contact the Grid User for the reason of this.

  See chapter 6 in this document.

- ELIA agrees with the Outage Planning Agent on periods for maintenance and tests, during which the flexibility on the asset cannot be commercialized.

  ELIA may restrict bidding possibilities and notify the Scheduling Agent if a restriction is applicable for a particular delivery point. The Scheduling Agent (if BSP) needs to contact the Grid User in order to detect the reason for this.

  See chapter 8 in this document.

Impact of Outage Planning Agent and Balancing Service Provider (BSP)– Coordinated by ELIA/Grid User:

- The different information must be exchanged on a coherent level ('delivery point') for all services to allow a correct coordination. For example, if outage planning and schedules are required per Power Unit within a Power-Generating Module, then the flexibility must be offered per Power Unit as well.

  ELIA will not accept incoherent levels for data exchange. ELIA will restrict the delivery of schedules and flexibility bids on the data entry platforms. The Scheduling Agent can be blocked from providing information. The Scheduling Agent should contact the Grid User for the reason of this.

  See chapters 4 & 6 in this document.

- The schedule is amended following an activation of a balancing bid on Power-Generating Modules (or its Power Units) type C & D so the Scheduling Agent is aware of the activation and knows the reference for real-time during the next quarter-hour.

ELIA will adapt the schedule.

Impact on Balancing Service Provider (BSP) – Coordinated by ELIA/Grid User:

- ELIA may reserve a May-Not-Run schedule, during which the flexibility on the asset cannot be commercialized by the BSP (via reserved balancing capacity or freely offered balancing energy). However, in specific circumstances in which the May-Not-Run reservation is revoked by ELIA, the flexibility should be available to be offered by the BSP.

  ELIA expects the Grid User to coordinate between the Scheduling Agent and the BSP. ELIA will restrict the delivery of balancing services by the BSP in case of an agreed May-Not-Run. ELIA will penalize the BSP in case of unavailability of the flexibility when ELIA revokes the May-Not-Run. The BSP needs to contact the Grid User in order to detect the reason for this.

  See chapter 7 in this document.

- In case ELIA receives a DA/ID MW schedule for an asset (Power Generating Module/Power Unit or Energy Storage device), then ELIA will use the MW schedule as the baseline for activations of flexibility for balancing purposes.

  Applied by ELIA based on regulated rules.

  See chapter 8 in this document.

- Non-reserved flexibility offered for balancing may also be activated for redispatching purposes (via the Scheduling Agent).

  ELIA will set balancing bids as 'unavailable' if balancing bids have not been updated since a redispatching occurred on one of the delivery points of the balancing bid.

  See chapter 8 in this document.

Impact on Balance Responsible party (BRP)[20] – Coordinated by Grid User/ELIA:

- ELIA may reserve a Must-Run or May-Not-Run schedule on an asset, which restricts the possible nomination on the level of the access point (logical coherence).

  ELIA may block nomination programs: in case of inconsistencies with schedules ELIA will contact the BRP. The BRP need to contact the

[20] Note that both the BRP and Scheduling Agent deliver information on active power exchanges to the TSO which should be coherent, although they represent a different content:
- The schedules of a Scheduling Agent represent the generation or consumption of an asset.
- The nominations of a BRP represent the estimation of net injection or net offtake at the access point.

To distinguish both, ELIA will use the term 'schedule' for indicating generation and consumption schedules of the Scheduling Agent and the term 'nomination' for indicating the information on net injection and net offtake received from the BRP.

Grid User in order to detect the reason for inconsistency.

See chapter 7 in this document.

- Upwards or downwards modulation of assets for portfolio or reactive balancing purposes[21] is not always possible if restrictions are active on schedules due to congestion risks.

  Coordination to be agreed between Grid User, Scheduling agent and BRP.

  See chapter 6 in this document.

- BRP perimeter correction in case of activation of flexibility for redispatching (not in application scope of Transfer of Energy).

  Performed by ELIA based on regulated rules.

  See chapter 8 in this document.

Impact <u>of and on</u> 'Voltage Service Provider'– Coordinated by ELIA/Grid User:

- According to the technical requirements for the provision of voltage regulation, the availability of the service depends on the level of active power output (the schedule).

  The Voltage Service Provider needs to contact the Grid User in order to detect the reason for the services (un)availability.

[21] This paragraph is not applicable to balancing bids to the TSO as this is done by the BSP.

6. Scheduling

This chapter explains the modalities regarding schedules of active power production and consumption in Day-ahead and Intraday and the responsibilities of the Scheduling Agent therein. The chapter gives an overview of the assets subject to schedule obligation, the rules for exchanging schedules (content and timing), and the enforcement of the schedule quality.

6.1. Obligations on Asset Level[22]

The current note proposes a design for the coordination of assets connected to the ELIA grid and to ELIA-connected CDS, regardless of whether the asset is directly connected to the grid or locally on the site of a demand facility.

ELIA requires schedules of Power Generating Module (or the Power Unit level) and of Energy storage units in both Day-ahead and Intraday, and also of Demand facilities or delivery points that offer flexibility for redispatching. Demand facilities are exempted from the delivery of schedules if they do not offer flexibility for redispatching. Two types of schedules are discussed: MW schedules and ON/OFF schedules.

6.1.1. Power Generating Modules & Energy Storage

European Guideline on Electricity Transmission System Operations

CHAPTER 4 Data exchange between TSOs, owners of interconnectors or other lines and power generating modules connected to the transmission system

Article 46 Scheduled data exchange

1.Each SGU which is a power generating facility owner of a type B, C or D power generating module connected to the transmission system shall provide the TSO with at least the following data:

(a) active power output and active power reserves amount and availability, on a day-ahead and intra-day basis;

(b) without any delay, any scheduled unavailability or active power restriction;

[...]

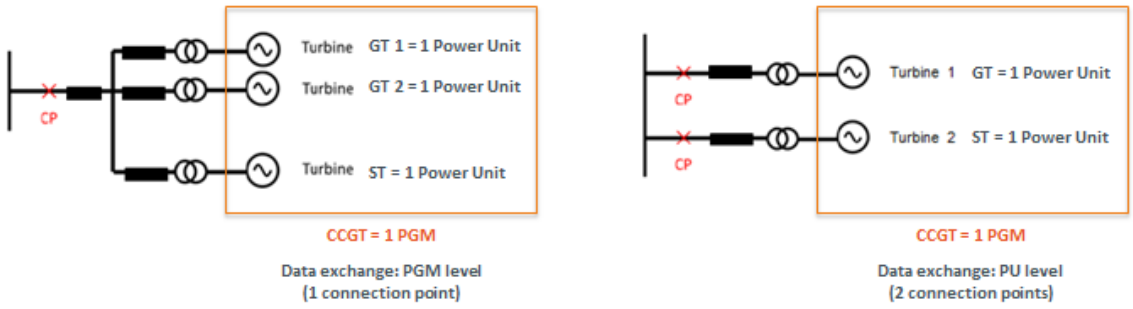
In article 46 the European Guideline on Electricity Transmission System Operation requires that ELIA receives the **scheduled active power output of the Power Generating Modules type B, type C, and type D, and this in both Day-ahead and Intraday.** The Guideline does not foresee any possibility for making exemptions. ELIA confirms the need to receive schedules of both large and small Power Generating Modules given that the amount of smaller production in the Belgian production park increases. The total impact of those units per grid node may become substantial and therefore any information on their availability and operating mode may improve the quality of the security analyses.

Schedules are delivered per Power Generating Module or, if the Power Generating Module consists of several power units connected to the ELIA grid via different connection points,

[22] See question Q4 in the "Questions & Answers" section on examples of schedules.

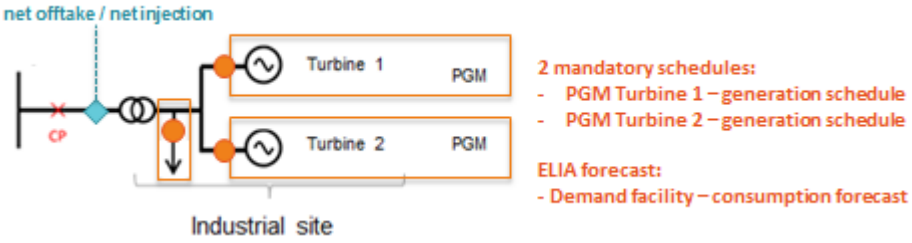
then the schedules are delivered **per power unit (PU).** The power unit level is important for ELIA as the schedules serve as input of security and load flow analyses which assess the systems contingencies on bus bar or connection point level.

Example of data exchanges on PGM or PU level



Example of data exchanges for an industrial site with both demand facility and PGM

Assume an industrial site with both demand facilities (no DSR) and local production units. Note that schedules and forecasts represent gross values—i.e., consumption or generation of electricity—and not the net offtake off or net injection in the grid[23]



The schedule gives **a value in MW for each quarter-hour of day D** representing the average generated power during the concerned quarter-hour, regardless of whether the Power Generating Module feeds a local offtake or directly injects onto the electricity grid.

Example of a MW schedule

…	18:15	18:30	18:45	19:00	19:15	19:30	19:45	20:00	20:15	20:30	20:45	21:00	21:15	…
…	49,00	49,50	50,00	51,00	51,00	51,00	51,30	51,70	51,70	51,70	51,70	50,70	50,00	…

[23] The net offtake/net injection are used on the level of the access point as given in the nominations of the Balancing Responsible Party. For more explanation on the difference between nominations and schedules: see "Future roles and responsibilities for the delivery of ancillary services."

The Scheduling Agent should also for each quarter hour indicate **the available maximum capacity and the available minimum capacity** (without causing a shut-down of the unit) valid given the specific circumstances of the day (such as temperature).

ELIA applies the **same principles on energy storage as on Power-Generating Modules**, the difference being that t**wo schedules are required which give a value in MW for each quarter-hour of day D**:

- **One schedule** represents the average consumed power of the **loading of the energy storage device** during the concerned quarter-hour, regardless of whether the energy storage device is charged by a locally connected Power Generating Module or by taking electricity off the grid (as is the case with pump-storage).
- **One schedule** represents the average generated power of the **discharge of the energy storage device** during the concerned quarter-hour, regardless of whether it feeds a local offtake or directly injects onto the electricity grid.

Alternative for PGM/storage type B and PGM/storage type D with an installed capacity of less than 25MW:

ELIA may exempt Power Generating Modules and energy storage devices smaller than 25 MW from delivering schedules in MW format and **provide the Scheduling Agent the choice to deliver MW schedules or ON/OFF schedules.**

An **ON schedule** indicates that the asset is **in running mode and therefore able to generate electricity**. For a Power Generating Module running on renewable resources, the actual generation could be 0MW even in case of an ON schedule; this would, for example, be the case if there is no wind or sunshine[24]. An **OFF schedule** indicates that the asset is **not in operation, yet is available for start-up.** In this case ELIA calculates a MW forecast for the asset and the ON/OFF schedule determines for which quarter-hours the forecast can be used or must be changed by the value 0 MW. The OFF schedule is not to be confused with a (planned or forced) outage expressed via the status 'unavailable' in the outage planning procedure.

All other requirements applicable to scheduling are equal, regardless of whether the provided schedule is a MW schedule or an ON/OFF schedule, unless explicitly mentioned otherwise.

Example of an ON/OFF schedule

...	18:15	18:30	18:45	19:00	19:15	19:30	19:45	20:00	20:15	20:30	20:45	21:00	21:15	...
...	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	...

[24] Note that ELIA can make the distinction in real-time between 0MW in an ON schedule and 0MW in an OFF schedule based on information of flexibility bids (whether or not start-up or shut-down bids are offered).

Level of coordinated data exchange across procedures

This design note provides the minimum requirements of ELIA, including the level on which data is exchanged: per Power Generating Module or Power Unit (depending on connection) and per Energy Storage device.

If scheduling or bidding for redispatching is exchanged on a more detailed level, then the outage planning information must be exchanged on the same detailed level. The levels across procedures must remain coherent.

The same interdependence exists with bidding for balancing (by the Balancing Service Provider (BSP)): If the BSP requests prequalification on a subdelivery point of an asset with Outage Planning and/or Scheduling obligation then the outage plans and schedules must be delivered on the level of the subdelivery point (pre-condition for prequalitification).

Example:

> A wind park may be connected to the ELIA grid via one connection point. If the park's flexibility is commercialized by multiple Balancing Service Providers (e.g., two BSP each for half of the wind mills) then the schedules and outage planning must be coherent with the split.
>
> For an OCGT with both gas turbines connected to the same connection point, ELIA requires outage plans, schedules, and flexibility bids on the level of the OCGT. The Grid User (coordinating between Outage Planning Agent and Scheduling Agent) may decide to provide the info on the PU level of the gas turbines but this must be done for all procedures.

The Grid User is responsible for reaching an agreement among the different agents on the level of coordinated data exchange.

Note that participation to a particular ancillary service may require the exchange of schedules as well. Such obligations are to be specified in the design of the respective ancillary service.

6.1.2. Demand Facilities

European Guideline on Electricity Transmission System Operations

CHAPTER 6 Data exchange between TSOs and demand facilities

Article 52 Data exchange between TSOs and transmission-connected demand facilities

[...]

2.Unless otherwise provided by the TSO, each transmission-connected demand facility owner shall provide the following data to the TSO:

(a) scheduled active and forecasted reactive power consumption on a day-ahead and intraday basis, including any changes of those schedules or forecast;

[...]

According to article 52 of the European Guideline on Electricity Transmission System Operation ELIA-connected demand facilities are by default obliged to deliver active power schedules to ELIA in Day-ahead and Intraday, unless ELIA is providing exemptions.

ELIA exempts all demand facilities from schedule delivery in Day-ahead and Intraday provided that there is no demand flexibility offered for redispatching purposes. Demand schedules cannot be expected to be firm as managing power consumption of a demand facility is not the core business of the grid user but impacted by multiple external factors (in contrast to power generating assets). Contrary to Power-Generating Modules the schedule cannot be enforced in Real-time. Moreover, ELIA expects its load forecasts (if needed corrected with the (un)availability planning received from the Outage Planning Agent) to provide equally qualitative input in security analyses.

In case of demand side flexibility offered for redispatching, a scheduling obligation in Day-ahead and Intraday does apply on the level of the delivery point. The schedule gives **a value in MW for each quarter-hour** representing the average consumed power during the concerned quarter-hour.

Example of a MW schedule

...	18:15	18:30	18:45	19:00	19:15	19:30	19:45	20:00	20:15	20:30	20:45	21:00	21:15	...
...	49,00	49,50	50,00	51,00	51,00	51,00	51,30	51,70	51,70	51,70	51,70	50,70	50,00	...

6.2. Data exchanges

Each day the Scheduling Agent must deliver to ELIA schedules for assets with obligations as described in the previous section. Schedules provide a value per quarter-hour. Updates in Intraday must be received before the scheduling deadline.

Note that the Scheduling Agent has to provide schedules that are coherent with the outage planning information received from the Outage Planning Agent. ELIA may block the Scheduling Agent to submit incoherent schedules.

In case of status 'available', a schedule is to be delivered with value ≥ 0MW or value ON or OFF. The schedule cannot represent a MW value larger than the structural installed capacity or than the restriction on active power capability communicated in the Outage Planning procedure. On assets with a status 'available' ELIA can reserve a schedule via Must-Run or May-Not-Run Requests: see chapter 7.

In case of status 'unavailable', a schedule is to be delivered with value 0 MW or value OFF.

In case of status 'testing', a schedule is to be delivered with value ≥ 0MW or value ON or OFF. A schedule of the test is to be delivered with value ≥ 0MW or value ON or OFF. The schedule cannot represent a MW value larger than the structural installed capacity or than the restriction on active power capability communicated in the Outage Planning procedure.

6.2.1. Time granularity

The schedule gives a value for the active power output (in MW or ON OFF) for each quarter-hour of day D.

Example of MW and ON/OFF schedules

...	18:15	18:30	18:45	19:00	19:15	19:30	19:45	20:00	20:15	20:30	20:45	21:00	21:15	...
...	49,00	49,50	50,00	51,00	51,00	51,00	51,30	51,70	51,70	51,70	51,70	50,70	50,00	...

...	18:15	18:30	18:45	19:00	19:15	19:30	19:45	20:00	20:15	20:30	20:45	21:00	21:15	...
...	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	...

6.2.2. Neutralization period and Scheduling deadline

The Scheduling deadline serves as **a deadline in Intraday for the Scheduling Agent to amend the schedule for quarter-hour QH.**

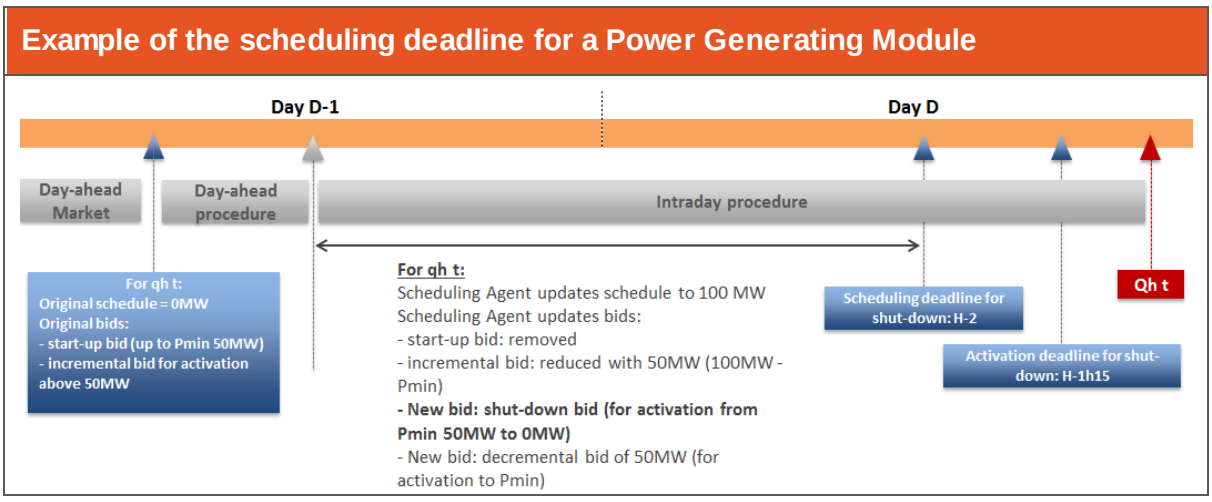
Scheduling deadline on asset Z =
Neutralization period + activation deadline for redispatching on asset Z

First a closer look on the 'neutralization period'. When a Scheduling Agent amends a schedule, ELIA needs a minimum time to analyze its impact on grid security, for example by running a new security analyses.

Neutralization period for schedule amendments = number of minutes
The number of minutes is yet to be determined[25] but will be the same for all assets as it depends on the time needed by ELIA to analyze the impact of a schedule amendment.

Secondly, if a schedule amendment would require ELIA to respond via redispatching because the schedule amendment would cause congestion, at least the flexibility on the asset[26] with the amended schedule must still be capable of accepting congestion bids which will cancel the foreseen schedule amendments (as there is no guarantee that other flexibility is available in the zone). Note that a schedule amendment is logically accompanied by an amendment of the redispatching bids on the same asset (see Chapter 8). The bid property representing the deadline for activation of the updated bid serves to determine the scheduling deadline valid at that moment. The scheduling deadline will therefore be different for each asset as it depends on the deadline for ELIA to activate flexibility for redispatching on the concerned asset.

Example of the scheduling deadline for a Power Generating Module



[25] Historically a period of 45 minutes has been used.

[26] Provided that the asset has flexibility that can be deployed for redispatching purposes. This depends on the coordinability level of the asset, as explained in section 8.2.

6.2.3. Timeline

The figure and table below give the timeline applicable to asset Z (as scheduling deadline may differ per asset).

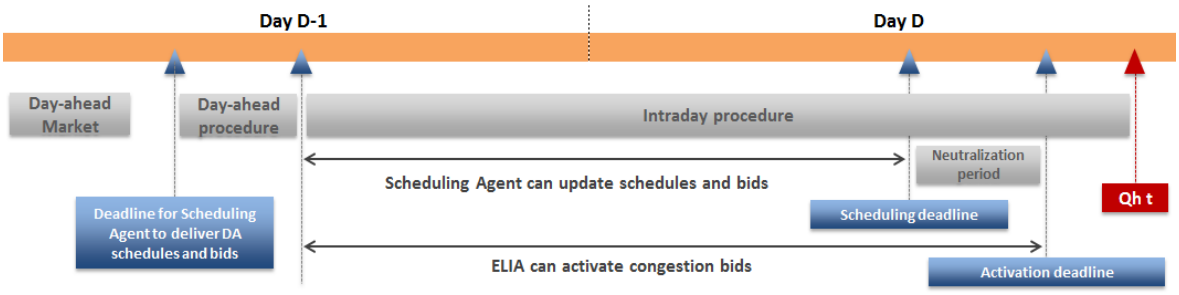


Figure 6.1. Timeline across Day-ahead and intraday procedures indicating actions and deadlines for ELIA and the Scheduling Agent

Day-ahead procedure: The Scheduling Agent provides the schedules to ELIA before hour H[27] of day D-1. ELIA can verify the quality of the schedule at this time and contact the Scheduling Agent in case of unexpected schedule information. This is an obligation for Power-Generating Modules and energy storage devices, not for Demand Facilities as described in the previous section.

Intraday procedure: When necessary the Scheduling Agent must update the schedule for day D during Intraday. This is an obligation for Power-Generating Modules and energy storage devices, not for Demand Facilities.

Day-ahead procedure	
Day D-1 between the closure of the DA market and hour H[28]	The Scheduling Agent provides the schedules to ELIA.
Day D-1 between hour H and hour H+t[29]	ELIA can verify the quality of the schedules and contacts the Scheduling Agent in case of unexpected schedule information. In case the Scheduling Agent has delivered an erroneous schedule (e.g., wrong data entry: 10MW instead of 100MW), the Scheduling Agent must contact ELIA as quickly as possible to be able to submit a corrected schedule.

[27] Historically (CIPU-contract) the deadline for delivering schedules in Day-ahead is at 15:00 of day D-1.

[28] Historically (CIPU-contract) the deadline for delivering schedules in Day-ahead is at 15:00 of day D-1.

[29] Historically (CIPU-contract) the end of the Day-ahead procedures is at 18:00 of day D-1.

Intraday procedure	
Between day D-1 hour H+t and day D before scheduling deadline of asset Z	The Scheduling Agent may submit an amended schedule for asset Z for day D . ELIA may activate flexibility for redispatching purposes on asset Z and amend the schedule for day D.
Day D after scheduling deadline of asset Z	ELIA may activate flexibility for redispatching purposes on asset Z (see Chapter 8) and amend the schedule for day D. ELIA may activate flexibility for balancing purposes on asset Z (see the design for balancing products) and amend the schedule for day D.

6.3. Amendments to Schedules in Intraday

Typically amendments to schedules result from a trade on the Intraday electricity market or a review of the running modes in the portfolio of the Scheduling Agent in response to a forced outage or portfolio optimization.

Scheduling Agents of assets with scheduling obligation in both Day-ahead and Intraday are obliged to inform ELIA of schedule amendments without delay. Some schedule amendments require a validation by ELIA as described in this section.

Given the asset obligations as explained in section 6.1 this section applies to Power Generating Modules/Power Units and Energy Storage devices, not to Demand Facilities.

6.3.1. Amendments informed by the Scheduling Agent

The Scheduling Agent must inform ELIA without delay of any schedule modification of an asset for quarter-hour in the permitted periods as described previously.

Unless in the cases described in the next section, the schedule amendment does not require approval of ELIA. ELIA will therefore allow the generators to grasp the opportunities in the Intraday market, regardless of whether the asset is located in a zone with or without congestion risks. ELIA will analyze the impact of the schedule amendment and if the circumstances require it, activate flexibility on the asset or on another asset in the zone to reduce congestion risks.

Deviations from schedules closer to real-time will nonetheless be restricted in congested areas.

6.3.2. Amendments requested by the Scheduling Agent for approval by ELIA

The Scheduling Agent may modify the schedule of an asset for quarter-hour QH in the permitted periods as described in previous sections.

In the following cases the schedule amendment must be **requested to ELIA for approval** as they imply an annulment or modification of a previous agreement between ELIA and the Scheduling Agent:

- A schedule amendment **in the opposing direction of an earlier requested activation** of flexibility for redispatching on the concerned asset for the concerned period.

- A schedule amendment in violation of a Must-Run or May-Not-Run agreement with ELIA (see chapter 7).

ELIA will analyze the impact of the requested amendment and inform the Scheduling Agent of its decision whether or not to agree with the modification, the reason, and possibly the associated cost for ELIA to validate the request. Note that the activation or Must-Run/May-Not-Run was requested for a reason; therefore the possibility for a schedule amendment in these cases is left open to be able to respond to exceptional needs or a concurrence of circumstances, but should not be called upon frequently.

The Scheduling Agent is to update the schedule accordingly without delay after agreement with ELIA on the terms of the amendment.

6.3.3. Amendments by ELIA

When **ELIA activates flexibility** on an asset with Day-ahead and Intraday scheduling obligation for redispatching or balancing purposes (mFRR activation), **ELIA will update the schedule** accordingly. The new schedule represents the reference for the active power exchanges of the asset in real-time.

As ELIA activates flexibility that has been bid by the Scheduling Agent (for redispatching) or by the Balancing Service Provider (for balancing), the schedule modification by ELIA does not require approval by the Scheduling Agent as the approval is intrinsically included in the bid.

6.4. Verification & Liability: Return-to-Schedule Requests

Given the asset obligations as explained in section 6.1 this section applies to Power Generating Modules/Power Units and Energy Storage devices (both offtake and injection mode) and to demand delivery points offering flexibility for redispatching purposes.

In general the schedules are expected to be firm. ELIA can enforce the Scheduling Agent to return to the schedule, but will only do so when the deviation aggravates or causes a congestion risk. ELIA will compare the last communicated or validated schedule with metered activity in real-time. In line with the current practice, ELIA requires assets that are technically capable to inform ELIA between the scheduling deadline and real-time of expected real-time deviations. The Scheduling Agent must send ELIA the new set point instructed to an asset. ELIA pro-actively activates a return-to-schedule request which implies a refusal of the new set point.

Impact on balancing by the BRP

The schedule firmness therefore does not imply that the flexibility on the asset cannot be deployed by the BRP for reactive or self-balancing. However, when doing so the BRP should take into consideration the risks for congestion.[30]The design is consistent to the current practice[31] that the ARP/BRP can only use physical assets which can immediately return to their original position. ELIA should in case of congestion be able to request to return-to-schedule pro-actively and in real-time if non-forecasted congestion would occur.

[30] ELIA communicates the congestion risk via the "Congestion Risk Indicator: see "Design note for the coordination of assets – Part III."

[31] See ARP contract for more information.

As the MW schedule serves as a baseline for activations, a Return-to-Schedule request implies a return to the baseline and therefore **an activation request[32] of 0 MWh**. Consequently there is:

- no remuneration for the activation,
- no correction of the BRP perimeter,
- and no compensation on the Belgian imbalance position.

Figure 6.2 visualizes the situations where a Scheduling Agent can be commanded to return to its original generation schedule (example for power units and the injection modus of storage):

- If the real-time metering shows a deviation below the schedule in a zone with too much offtake.
- If the real-time metering shows a deviation above the schedule in a zone with too much injection.

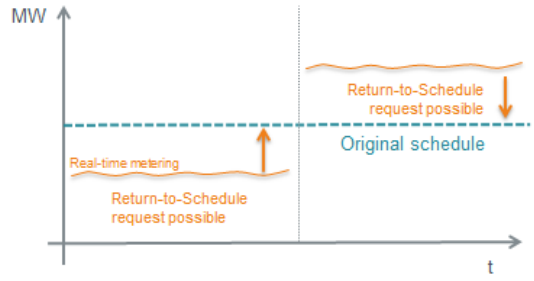


Figure 6.2. Return-to-schedule: case with not activation of flexibility

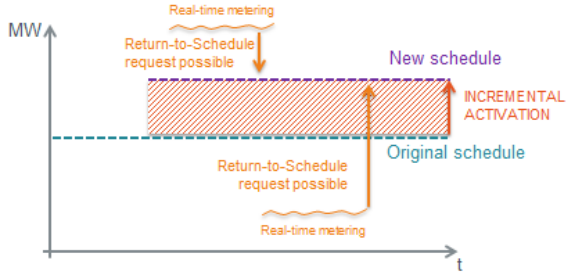


Figure 6.3. Return-to-schedule: case with activation of flexibility

If the schedule had been amended by ELIA following the activation of flexibility for redispatching or balancing, the return-to-schedule principle equally applies in both directions with the new schedule as baseline. Figure 6.3 shows the case of an incremental activation of flexibility.

In case of an ON/OFF schedule the same principle applies. ELIA can activate a Return-to-Schedule request using the scheduled ON or OFF as baseline for the activation, therefore

- no remuneration for the activation,
- no correction of the BRP perimeter,
- and no compensation on the Belgian imbalance position.

Impact of schedule quality on other roles

Impact on the Balancing Service provider

The schedules of Power Generating Modules/Power Units and energy storage devices are used

- To verify whether the full available flexibility on the asset is being offered to ELIA (in case of bidding obligation)

[32] For more explanation on redispatching activations, see section 8.3.

- As baseline for the activation of flexibility for mFRR

  (Same as for redispatching but this belongs within the responsibilities of the Scheduling Agent itself.)

A real-time deviation from the schedule will therefore lead to a wrong representation in the bid of the amount of flexibility that is available or of the volume that is requested in an activation.

Impact on the Balance Responsible Party

As the Return-to-Schedule request represents an activation of 0 MWh without correction of the BRP perimeter in accordance with the real-time change, it may have a negative impact on the BRP but the ELIA design urges to respect schedule firmness and serves to avoid the need for return-to-schedule requests.

For more explanation on roles and responsibilities see the document "Future roles and responsibilities for the delivery of ancillary services".

6.4.1. Special case: Assets without real-time metering obligation

Intraday scheduling obligation goes hand in hand with real-time metering. ELIA acknowledges that not all existing assets with Intraday scheduling obligation have real-time metering devices installed. According to article 54 of the European Guideline for Electricity Transmission System Operation the Grid User must inform ELIA about its technical capabilities (incl. the installment of metering devices) as well as any planned modifications to these capabilities.

ELIA will not require an existing asset to install real-time metering for the purpose of schedule monitoring.

A lack of real-time metering does not exempt the asset from its scheduling obligation. ELIA will use other metering for monitoring and may yet activate return-to-schedule requests, which will be verified ex post.

In compliance with the European Network Code on Requirements for Grid Connection of Generators (articles 14.5(d), 15.1, 16.1), new Power-Generating Modules will have real-time metering devices installed as specified by ELIA, so there is no limitation in technical capabilities on the monitoring of schedules.

6.5. Conclusions on Scheduling

For all Power Generating Modules, energy storage devices type B/C/D, and demand delivery points offering flexibility for redispatching ELIA must receive schedules in Day-ahead and updates in Intraday. Power Generating Modules and energy storage devices with an installed capacity below 25MW may provide an ON/OFF schedule as an alternative to the default MW schedule. Demand facilities without demand side flexibility offered for redispatching are exempted from delivering schedules in both Day-ahead and Intraday.

ELIA requires data minimum at the level coherent with the bus bars. The Scheduling Agent (in coordination with the Grid User and Outage Planning Agent) may decide to provide more detailed information. The schedules represent the gross generation or consumption of the asset.

The Scheduling Agent must deliver the schedules in Day-ahead for each quarter-hour of day D. Schedules on Power-Generating Modules/Power Units and Energy Storage Devices must without delay update schedules in Intraday: an approval by ELIA is only required when ELIA had previously activated a congestion bid on the concerned asset, or if the asset's schedule is determined by a Must-Run or May-Not-Run request.

In real-time ELIA will monitor whether schedules on Power-Generating Modules/Power Units, Energy Storage Devices, or demand delivery points offering flexibility for redispatching are followed. In case of a deviation that creates or aggravates a congestion risk, ELIA will activate a Return-to-Schedule activation.

7. Must-Run & May-Not-Run Schedule Requests by ELIA

The Scheduling Agent of a Power-Generating Module or Energy Storage Device typically determines the active power schedule of an available asset based on the opportunities in the Day-ahead electricity market.

Before the opportunities in Day-ahead are known, ELIA may have reasons to 'reserve' a particular schedule as waiting until Day-ahead may come with too high uncertainties to, for example, plan maintenance works or manage the availability of ancillary services.

This possibility applies to **Power Generating Modules or energy storage devices** with a status '**available', not on Demand Facilities**.

There are two types of such reservations: Must-Run Requests and May-Not-Run Requests.

ELIA can request such schedules until one hour before the Gate Closure Time of the Day-ahead market.

7.1. Must-Run Requests

Specifically a **Must-Run Request (MR)** means that ELIA requests to the Scheduling Agent to set a schedule in Day-ahead of **an active power output equal to the minimal power** of the asset: ELIA therefore requests to start-up the asset even if the Day-ahead market would not create the opportunity.

A typical reason for a Must-Run request is when ELIA desires certainty that needed flexibility for congestion bids on day D will be available for activation. Assuring a timely start-up via a Must-Run Request may in extreme cases be preferable. Although currently ELIA rarely needs Must-Run Requests, the option must be foreseen.

The Scheduling Agent may in Day-ahead or Intraday deliver a schedule with active power output above the minimal power: this is an indication of market opportunities and therefore a cancellation of the Must-Run agreement (which does not require approval by ELIA but does result in a repayment to ELIA of the Must-Run remuneration). Also real-time deviations above the Must-Run schedule will ex post result in a cancellation of the Must-Run by ELIA and therefore a reimbursement. The Grid User/Scheduling Agent should take into consideration that if they want to dispatch the PGM into the market and hence the unit would run above Pmin, also the costs that ELIA was willing to pay for the Must-Run should be considered in their decision making process. The market transaction should cover the same cost for running the unit as if the Must-Run was not requested. To avoid that the Must-Run request by ELIA causes market disturbance, the reimbursement to ELIA is needed and logic. The reimbursement would concern the quarter-hours of the day that the unit is running above Pmin, as well as the quarter-hours that would have been needed for start-up/shut-down.

A Must-Run reservation does not relieve the Scheduling Agent of its bidding obligation: incremental bids must be offered and even shut-down bids must remain available (in case ELIA would revoke the Must-Run).

ELIA will take into account a margin around the minimal power for acceptable deviations that will not be regarded as an annulment of the Must-Run agreement.

7.1.1. Amendments by the Scheduling Agent

If the Scheduling Agent wants to decrease the active power output below the Pmin value during a period with an agreed Must-Run schedule, this modification requires an approval by ELIA. The modification can be requested **until Intraday before the** scheduling deadline [33] of the concerned asset. If approved, the Scheduling Agent must reimburse the earlier remuneration received from ELIA for the Must-Run.

Note that the Must-Run was requested for a reason; ELIA requests Must-Run schedules before Day-ahead because waiting until the reception of the schedules after the Day-ahead market is too uncertain. The possibility for a schedule amendment is left open to be able to respond to exceptional needs or a concurrence of circumstances, but should not be called upon frequently. The approval of a late annulment of a Must-Run is therefore unlikely or can be accompanied by an additional cost to make the flexibility available on another asset. ELIA will nonetheless analyze the impact of the requested amendment and inform the Scheduling Agent of its decision whether or not to agree with the modification, the reason, and possibly the associated cost for ELIA to validate the request.

If in real-time the asset does not abide a Must-Run schedule (active power below Pmin, taking into account a margin for acceptable deviations) ELIA will activate a return-to-schedule request. If not followed the Scheduling Agent must reimburse ELIA the remuneration of the Must-Run reservation as well as pay for additional costs caused by the non-abidance. This latter can include **liabilities** for not following the return-to-schedule activation and the **costs of actions** taken by ELIA to correct for the situation (e.g., the cost of an incremental bid on another asset; see section 7.3).

7.1.2. Amendments by ELIA

Until one hour before the Gate Closure Time of the Day-ahead market ELIA may cancel an earlier Must-Run request in which case the Scheduling Agent must reimburse the earlier remuneration received from ELIA.

During Intraday ELIA can revoke a Must-Run when necessary (and activate a shut-down). This activation implies **a physical cancellation of the Must-Run, but not a contractual one** (no reimbursement of the remuneration). The shut-down bid will be settled according to the principles explained in the chapter on redispatching.

7.2. May-Not-Run Requests

Specifically a **May-Not-Run Requests (MNR)** means that ELIA requests to the Scheduling Agent to set a schedule in Day-ahead of an active power output equal to 0 MW or 'OFF' schedule: ELIA therefore requests the asset to remain **shut down** even if the Day-ahead market would create the opportunity for the asset to generate electricity.

In certain circumstances, for example during a period of reinforcement works on the local grid or to avoid that balancing capacity is offered in zones with congestion risk, a complete shut-down may not be necessary but ELIA may request **a partial May-Not-Run.** ELIA would set the maximum active power that may be produced on a certain level.

The May-Not-Run Request is not to be confused with the status 'unavailable'. The May-Not-Run is a request for a schedule of 0MW or OFF on an asset that has a status 'available'. **The asset must remain available for start-up redispatching or balancing**

[33] For more information on scheduling deadline: see section 6..2

purposes. A May-Not-Run request therefore does not free the Scheduling Agent of its bidding obligation.

ELIA makes use of such requests to facilitate operational planning of maintenance works and network cuts. Waiting until the schedules are received in Day-ahead is not always efficient as ELIA would have to change its operational maintenance planning too late in time. In addition without a May-Not-Run agreement, the Scheduling Agent may amend a schedule in Intraday without need for approval by ELIA. A timely agreement that the asset may not run for a certain time on day D is therefore more practical and more secure for ELIA.

7.2.1. Amendments by the Scheduling Agent

If the Scheduling Agent wants to start-up the asset during a period with an agreed May-Not-Run schedule, this modification requires an approval by ELIA. The modification can be requested **until Intraday before the scheduling deadline** [34] of the concerned asset. If approved, the Scheduling Agent must reimburse the earlier remuneration received from ELIA for the May-Not-Run.

Note that the May-Not-Run was requested for a reason; ELIA requests May-Not-Run schedules before Day-ahead because waiting until the reception of the schedules after the Day-ahead market is too uncertain. The possibility for a schedule amendment is left open to be able to respond to exceptional needs or a concurrence of circumstances, but should not be called upon frequently. The approval of a late annulment of a May-Not-Run is therefore unlikely or can be accompanied by an additional cost, for example, to reschedule planned maintenance at ELIA side. ELIA will nonetheless analyze the impact of the requested amendment and inform the Scheduling Agent of its decision whether or not to agree with the modification, the reason, and possibly the associated cost for ELIA to validate the request

Real-time deviations from the May-Not-Run schedule are not permitted: if observed ELIA will immediately take action (incl. activating a return-to-schedule request). If not followed the Scheduling Agent must reimburse ELIA the remuneration of the May-Not-Run reservation as well as pay for additional costs caused by the non-abidance. This latter can include **liabilities** for not following the return-to-schedule activation and the **costs incurred** by ELIA due the start-up which may create an insecure situation on the grid (see next section).

7.2.2. Amendments by ELIA

Until one hour before the Gate Closure Time of the Day-ahead market ELIA may cancel an earlier May-Not-Run request in which case the Scheduling Agent must reimburse the earlier remuneration received from ELIA.

During Intraday ELIA can activate a start-up bid on the May-Not-Run asset when necessary. This activation implies **a physical cancellation of the May-Not-Run, but not a contractual one** (no reimbursement of the remuneration). The start-up bid will be settled according to the principles explained in the chapter on redispatching.

Interdependency with Outage Planning amendments:

A cancellation by ELIA of a May-Not-Run schedule would typically be the case when the

[34] For more information on scheduling deadline: see section 6.2

Outage Planning Agent changes the availability status of the asset from “available” to “unavailable” in a period with a reserved May-Not-Run schedule. If ELIA agrees with the status change, this would imply a cancellation of the May-Not-Run request and a reimbursement of the remuneration by the Scheduling Agent to ELIA.

In uncertain circumstances ELIA may, however, prefer to keep the asset available for activation (despite the May-Not-Run reservation). For example, ELIA has requested the May-Not-Run to plan a ‘conditional’ maintenance at a station (e.g., paint works). A ‘conditional maintenance’ can be cancelled relatively late if the management of the grid requires it so and ELIA needs to activate the asset to start-up despite the May-Not-Run reservation.

7.3. Remuneration of Must-Run and May-Not-Run Schedules

ELIA remunerates the Scheduling Agent for a Must-Run or May-Not-Run Reservation of a schedule before Day-ahead. The Scheduling Agent must reimburse the remuneration to ELIA in case the schedule reservation is cancelled (by ELIA or by the Scheduling Agent) (see previous section).

The remuneration is based on negotiable price offers, which may include an agreement for a reusable price methodology that can be applied on multiple requests during a longer period. If ELIA would experience an increasing need for Must-Run or May-Not-Run requests, the remuneration mechanism can be redesigned to avoid a contractual overload due to negotiations.

The Scheduling Agent may agree with the Must-Run or May-Not-Run schedule reservation requested by ELIA in return for a remuneration of the associated costs. The Scheduling Agent must make a price offer to ELIA which can agree with the price with or without negotiation. The remuneration should be reasonable, directly related to the requested schedule, and demonstrable.

Reasonable remuneration: The remuneration concerns an additional cost or loss of revenue that cannot be recovered elsewhere, based on certain information available at the moment of mutual agreement on the reservation of the Must-Run or May-Not-Run schedule.

Remuneration directly related to the amendment: The remuneration must be for a cost directly linked to the Must-Run or May-Not-Run schedule reservation. Therefore, it concerns a cost that would not be incurred if the Must-Run or May-Not-Run schedule was not requested.

Demonstrable remuneration: The remuneration must be supported by documents (invoice, price offer of a contractor, a reliable source of, for example, reference prices) justifying the amount at the moment of the price offer.

Non-exhaustive list of remuneration examples for MR/MNR requests
A **Must-Run Remuneration** should reflect the estimated incurred loss for letting a supposedly non-profitable asset in operation. - The remuneration typically includes the variable production cost of running the Power Generating Module or energy storage device at the Pmin level for the duration of the request. Note that if during the period that ELIA requested a Must-Run the Power

Generating Module or the energy storage device generates more active power than the Pmin, the Scheduling Agent must reimburse the remuneration of the Must-Run request to ELIA as this indicates that the asset can grasp opportunities in the market. As an upward deviation from Pmin does not work against the Must-Run Request of ELIA, such a deviation does not require an approval by ELIA ex ante, but will be verified ex post.

A **May-Not-Run Remuneration** should reflect the estimated incurred loss for not letting a supposedly profitable asset in operation.

- The remuneration typically includes an estimation of the opportunity cost, based on the probability that the asset would be in operation in response to the market situation and the expected profit margin, and potentially loss of Guarantees of Origin (green certificates).

  The methodology to estimate the lost cash flow should be agreed by both parties.
- The Scheduling Agent should be able to provide Elia with documentation to support the improbability of the requested schedule based on opportunities in the Day-ahead or Intraday markets, and the estimated opportunity cost.

If the **Scheduling Agent requests to annul the schedule reservation** then the approval by ELIA would imply a reimbursement by the Scheduling Agent to ELIA of the **remuneration for the initial agreement plus potential additional costs.** The reimbursement may only apply to a part of the initial remuneration: during the initial agreement ELIA and the Scheduling Agent will discuss as part of the negotiation which costs of the Scheduling Agent would be regarded as sunk costs in case of an annulment.

Additional costs will depend on ELIA's capability of finding an alternative for the schedule reservation; the closer to day D, the more difficult to find or the more expensive the alternative may be. The remuneration for the additional costs should also be reasonable, directly related to the requested amendment, and demonstrable. When an annulment is requested relatively late, the cost may have to be agreed on ex post.

Non-exhaustive list of examples of reimbursement of MR/MNR remuneration

For a schedule amendment which implies an annulment of a previous redispatching activation, ELIA may charge

- the reimbursement of the remuneration for the redispatching activation
- and potentially additional costs: for example,
  - the surplus cost of activating the requested energy on another (more expensive) asset

For a schedule amendment which implies **an annulment of a Must-Run Request** in Intraday, ELIA may charge

- the reimbursement of the Must-Run remuneration
- and potentially additional costs: for example,
  - the surplus cost of activating the requested energy on another (more expensive) asset
  - the costs of reserve restoration caused by the annulment

For a schedule amendment which implies **an annulment of a May-Not-Run Request** in Intraday, ELIA may charge

- the reimbursement of the May-Not-Run remuneration
- and potentially additional costs: for example,
    - cost associated to the annulment and rescheduling of planned operational maintenance (personnel costs, a new appointment of a contractor, ...).

7.4. Conclusion on Must-Run and May-Not-Run requests

Before Day-ahead ELIA may request to the Scheduling Agent that a Power-Generating Module or Energy Storage device remains shut down (May-Not-Run request) or is started up (Must-Run request). ELIA pays for the request based on a negotiated cost-based price.

The request may later on be cancelled by ELIA or by the Scheduling Agent but specific conditions apply (e.g. approval by ELIA and reimbursements of the remuneration and potential additional costs).

Must-Run or May-Not-Run agreements that are not respected in real-time may lead to an **insecure situation** on the grid. The Scheduling Agent will be held **liable** for any consequences and will have to remunerate to ELIA the **costs of the actions** taken by ELIA to prevent or correct the insecure situation on the grid.

8. Redispatching

This chapter explains how schedules submitted by the scheduling agent, as explained in chapter 6, can be modified on demand of Elia. More specific overview is given regarding bidding obligations, the modalities for bidding the flexibility (content and timing), the use of flexibility by ELIA (including remuneration), and the impact on market parties of activations of the flexibility by ELIA for redispatching.

8.1. Obligations on Asset Level

> ***European Guideline on Electricity Transmission System Operations***
>
> ***Article 22 Categories of remedial actions***
>
> *1.Each TSO shall use the following categories of remedial actions:*
>
> *[...] (e) redispatch transmission or distribution-connected system users within the TSO's control area, between two or more TSOs; [...]*

In compliance with article 22 of the European Guideline on Electricity Transmission System Operation ELIA may redispatch flexibility on the transmission and distribution grids as a remedial action in case of congestion risk. As explained before, the present document elaborates only on the design principles for the coordination of assets connected to the ELIA grid and to ELIA-connected CDS. The inclusion of assets connected to DSO grids is subject to a separate trajectory between ELIA and Synergrid and will be delivered at a later time.

As congestion is a local issue, bids for redispatching must be offered on a nodal level. That is why portfolio bids (with delivery points spread across Belgium) are of little use for national congestion management. The solution for an overload risk on a specific grid element requires remedial actions on the node linked to the concerned grid element.

As explained in chapter 4 bidding for redispatching and scheduling both belong to the responsibility of the Scheduling Agent as activation of a congestion bid is an imposition of a new schedule.

8.1.1. Power Generating Modules & Energy Storage

ELIA imposes to receive bids reflecting the flexibility that is available on Power-Generating Modules type B, C, and D[35]; these are the same Power-Generating Modules with scheduling obligation in Day-ahead and Intraday. The bidding obligation is irrespective of whether the schedule is delivered in MW or in ON/OFF format.

The information is delivered at **the same level as the schedule**, that is per Power-Generating Module or, if the Power-Generating Module consists of several power units connected to the ELIA grid via different connection points, then the information is delivered per Power Unit (PU). The coherence with the schedule is important as a congestion bid

[35] "Bidding all available flexibility" is not to be interpreted as providing an exhaustive list of possible configurations/bids on an asset. ELIA will search for a pragmatic implementation of the bidding process to avoid that the Scheduling Agent has an unnecessary workload. This will be clarified in more detail during implementation together with the market stakeholders and the regulator.

activation on a Power-Generating Module implies a modification of the schedule by ELIA (given the Intraday firmness of the schedule).

As explained further on in this document, the degree of coordinability of the concerned PGMs will be considered: the bidding obligation may be theoretical and case-by-case exemptions can be given, for example for non-coordinable units which have no flexibility to be deployed.

ELIA applies the **same principles on energy storage as on Power-Generating Modules**, the difference being that storage flexibility can be offered as an increase or a decrease of the loading or an increase or a decrease of the discharging of the storage device.

8.1.2. Demand Facilities

Flexibility on demand facilities can **voluntarily** be bid for redispatching. By default ELIA considers demand facilities as non-coordinable, unless indicated otherwise. Demand flexibility cannot be simply determined but depends on the concrete characteristics of the business processes and Demand Units within a Demand Facility. Bidding can therefore not be generally obliged.

In general the flexibility for redispatching has to be bid on the same level as the connection point of the ELIA-connected or CDS-connected Demand Facility or a more detailed level (e.g. a Demand Unit) monitored via submetering.

Interdependency with Balancing bids from the Balancing Service Provider

- The bidding rules for balancing would be the following:PGM type C and D as well as pumped storage type D also have a bidding obligation for balancing at the unit-level, same as for redispatching
- Contrary to redispatching, PGM type B do not have an obligation to bid for balancing but can be offered voluntarily, either individually or as a delivery point part of a portfolio together with flexibility on other assets.
- demand flexibility may be offered voluntarily for balancing, either individually or as a delivery point part of portfolio together with flexibility on other assets.
- storage type C & B may be offered voluntarily for balancing, either individually or as a delivery point part of portfolio together with flexibility on other assets..

In case the flexibility on an asset is offered for both balancing and redispatching, close coordination is needed when the flexibility is activated. The activation of the (full or partial) flexibility for redispatching implies that the Balancing Service Provider (BSP) must update the bid for balancing. Whether offered individually or as part of a larger balancing portfolio bid, based on the locational information of each delivery point, ELIA can map the related redispatching and balancing bids.

This mapping can be signaled in the IT system so it is visible for both ELIA and the BSP that the balancing bids due to a redispatching activation a balancing bid may need to be updated.

ELIA will set balancing bids as 'unavailable' if balancing bids have not been updated since a redispatching occurred on one of the delivery points of the balancing bid.

8.2. Coordinability level

Not all Power-Generating Modules have the same degree of flexibility and responsiveness. ELIA distincts three levels of coordinability: fully coordinable, limited coordinable, and non-coordinable.

The coordinability level is important to determine whether or not flexibility can be offered and to what extent an asset can be forced to produce active power according to a schedule. The coordinability level depends on the characteristics of the asset itself, not on the installation of metering or modulation equipment. A formalization of the level of coordinability (and the influencing factors) for all assets with bidding obligation is needed. The reason for coordinability limitations must be shown to ELIA. Based on the agreed coordinability level the Scheduling Agent may be relieved from offering bids to ELIA.

Coordinability levels

- In case of **full coordinability** the asset can modify its active power output (following return to schedule or activation of congestion bid) without specific technical restriction.

  Assets which are bidding in balancing services will be considered as coordinable units.

- In case of **limited coordinability** the asset can respond to activations by ELIA during Intraday but only under specific conditions, such as:
  - The activation must be requested more than a quarter-hour in advance as the asset requires a longer start-up or ramp-up if already in operating mode.
  - The level of responsiveness may also fluctuate through time due to technical reasons or links with the business processes of a demand facility a local Power-Generating Module may require a lead time of 8 hours in advance for a start-up on one day, while on other days this may be reduced to 3 hours in advance.
- In case of **non-coordinability** the asset does not have flexibility that can be activated by ELIA for redispatching or balancing purposes. In extreme circumstances ELIA may, however, contract the Scheduling Agent to discuss possible remedial actions utilizing the asset. The status of non-coordinability does not affect the responsibility of the scheduling agent to send correct & accurate Day-ahead and Intraday schedules of the concerned asset.

The coordinability level on an asset can be different:

- **per direction**: an asset can have a higher or lower degree of responsiveness of incremental or decremental changes.
- **between operating and non-operating mode**: an asset may be slow to start-up (limited coordinable) but once in operating mode the response time may be fast enough to be considered as fully coordinable.

- **in periods with active power capability restrictions:** if a temporary active power capability restriction[36] results in a limitation of the coordinability level of the asset, the Scheduling Agent is to inform ELIA of the implications without delay.

Examples of coordinability

- Assets offering flexibility for standardized balancing products are typically fully coordinable in incremental direction (for upward balancing) and/or in decremental direction (for downward balancing).
- Slow-running gas turbines may be limited coordinable in both start-up and shut-down phase, but fully coordinable when in full operating mode.
- A wind or solar park may be non-coordinable in incremental direction yet fully coordinable in decremental direction.
    - Or if the wind park would set wind mills in operation depending on the opportunities in electricity markets, the park may be fully coordinable for a start-up but non-coordinable in incremental direction when already in operating mode.
- Process-driven generators may be limited coordinable in incremental direction and non-coordinable in decremental direction or vice-versa depending on the functionality of the generators in the business process of the grid user (does the business process provide fuel for the generator or does the generator feed the business process?).
- A back-up generator may be coordinable in incremental direction, but non-coordinable in decremental direction.

8.3. Activations of congestion bids

As explained in chapter 3 in certain circumstances Elia needs to activate congestion bids in order to operate the grid in a secure way.

Congestion is a local problem indicating that the load flow, the net offtake, or the net injection is too high for the grid elements to transmit within the limits of grid security in N or N-1 situations. **The active power to be exchanged is compared with the capacities of lines, cables, and transformers in the grid providing a maximum threshold** that cannot be crossed in N or N-1 situations. As a result activations of flexibility in the framework of congestion management are activations which serve to solve the (potential) congestion on a particular grid element. The total offtake or injection to transmit is capped by the maximum threshold of the capacity of the grid.

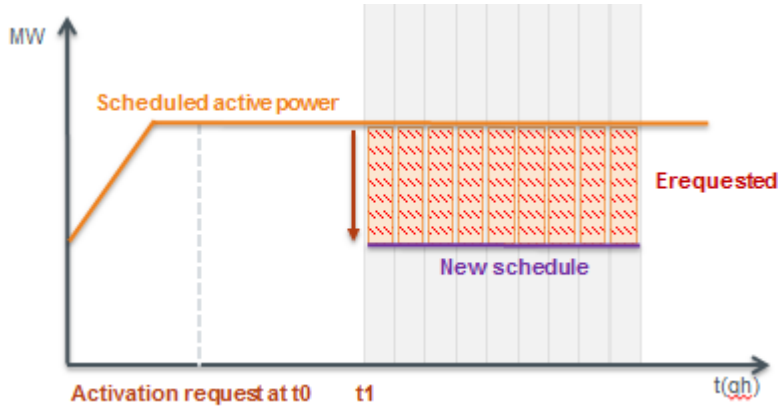
Similarly the activations of flexibility translate this cap into maximum thresholds on the level of the asset located in the congested zone: an activation of a congestion

[36] Notified to ELIA by the Outage Planning Agent

bid sets a new schedule on the asset. The new modified schedule that is communicated to the Scheduling Agent will set a restriction on the active power exchange of the concerned asset. The activation of an incremental congestion bid enforces a new minimum of active power which needs to be reached for production (maximum for demand flexibility) whereas the activation of a decremental congestion bid enforces a new maximum of active power for a PGM (minimum for demand flexibility).

The figure below shows an activation of a congestion bid by ELIA. At quarter-hour t0 ELIA requests to activate the flexibility starting from qh t1. The activation sent to the Scheduling Agent indicates the new schedule for the quarter-hours following qh t1.

Example of an activation for redispatching: a new schedule of a Power Unit



In the case of a decremental activation on a Power Unit (as in the example), the new schedule represents a maximum power output. The **implications** are the following:

- The **activation control** will verify whether this restriction was respected rather than verifying whether the requested energy was delivered (see section 8.6).
- **Schedule amendments** requested by the scheduling agent for time intervals where a congestion bids is activated by Elia require an approval by ELIA.
- Logically Elia will not activate balancing bids in the opposing direction of activated congestion bids[37] as this would neutralize the requested congestion bids.

An activation of flexibility requires **a baseline** in order to properly calculate the requested energy, which in the case of congestion management is used to determine:

- the remuneration for the activation of the congestion bid (see section 8.5)
- the need for activation of compensation bids (see section 8.7)

[37] See the "Design note for the coordination of assets: Part III – Congestion Risk Indicator".

8.3.1. Assets with Intraday MW schedule obligation

For all assets with an Intraday scheduling obligation, the latest applicable MW schedule of the concerned asset's active power will serve as the baseline for congestion activations.

This principle is logic as the activation of a congestion bid leads to a modification of the schedule. In other words the activation of congestion bid implies a change from a schedule initially send by the scheduling agent to a new binding schedule created by Elia.

Considering the importance of qualitative schedules in Day-ahead and Intraday, as a general rule, the schedule is regarded as the best available baseline for flexibility activations. The schedule will be used by ELIA as a baseline in case:

- the asset is subject to the Intraday scheduling obligation (Power-Generating Module, energy storage devices, and demand flexibility offered for redispatching)

  and

- the schedule is of the type **'**MW schedule'.

Therefore the use of the schedule as a baseline is mandatory for **Power-Generating Modules and Energy Storage devices type C & D** and mandatory for Power-Generating Module and energy storage devices **type B** for which the Scheduling Agent chooses to deliver schedules of the type **'MW schedule'** and not the type 'ON/OFF schedule', as well as for demand facilities/delivery points on which flexibility is offered for redispatching

For information, in the above case, ELIA also intends to use the same MW schedule as a baseline for mFRR activations.

8.3.2. Assets without Intraday MW schedules obligation

For **all other flexibility**—i.e., flexibility on Power-Generating Modules and energy storage devices type B with ON/OFF schedules—a baseline will have to be determined (eg. **"X of Y" method).** The requirements regarding baselining methodologies for baselining shall be part of the contractual and regulatory framework.

As flexibility can be activated for redispatching well in advance (starting from day D-1 after the Day-ahead procedure) and can be activated for a longer period of time, it is clear that the "last quarter-hour" method (as currently used for mFRR) cannot be used.

8.3.3. Annulment of a congestion activation

ELIA can revoke an earlier congestion activation fully or partially until the activation deadline of the activated bid for the concerned quarter-hour. As a result the remuneration and BRP perimeter correction will be cancelled as well.

The annulment of a congestion activation is a needed option, yet not expected to be used frequently. Until now ELIA has not cancelled activations as congestion bids are typically activated either closer to real-time, or if activated more in advance, then the reasons for activation indicate a certain need.

Impact on the Balancing Responsible Party

A Balancing Responsible Party (BRP) is not accountable for a portfolio 'imbalance' created by a congestion activation by Elia. When ELIA activates a flexibility bid for redispatching, the effect on the balance position of the BRP of the Grid User must be neutralized:

- ELIA corrects the perimeter of the BRP with the value of the delivered energy.
- ELIA informs the BRP of the activation in the BRP perimeter at the level of the perimeter, not at the level of the Grid User.

There is no Transfer of Energy applicable on congestion activations.

8.4. Bidding of flexibility for redispatching: Timing & Content

The timeline for bidding flexibility for redispatching is the same for all flexibility types, regardless of asset type and mandatory or voluntary character of bidding. On day D-1 ELIA receives the congestion bids **for each quarter-hour of day D** from the Scheduling Agent during the Day-ahead procedure.

Although bids for redispatching are firm at all times, the Scheduling Agent may update them until the scheduling deadline, i.e., the deadline for updates of schedules and bids on the concerned asset. For sake of consistency, each update of the schedule needs to be accompanied with an update of bids.

Flexibility will be offered to ELIA via explicit bids, in other words the scheduling agent is sending a volume and price per bid. This mechanism is different than today's implicit mechanism where Elia calculates the available volume based on the schedules, available Pmax and available Pmin. The main reason for this change is the fact that the Guideline for Electricity Balancing requires also an explicit bidding mechanism for balancing. Elia believes that it is not efficient that two fundamentally different mechanisms are used for the activation of flexibility on the same asset.

8.4.1. Bid updates

Starting from day D-1 bids are firm: a guarantee of availability of the bid. Firmness is required because ELIA can activate flexibility for redispatching purposes starting in day D-1 after the closure of the Day-ahead procedure. If the availability of the bid can no longer be guaranteed, the bid should be amended. The Scheduling Agent must communicate bid updates to ELIA without delay.

The Scheduling Agent would **logically update a bid when amending a schedule:** for example, an incremental schedule update means a decrease of incremental flexibility offered and an increase of the decremental flexibility offered on the same asset.

An update of a bid can, however, also be caused by actions of another role:

- **By the Outage Planning Agent: a modification in the outage planning.** For example, a reduction of the active power capability during Intraday (partial forced outage) decreases the incremental flexibility offered on a Power-Generating Module.
- **By the Balancing Service Provider: a transfer of reserve obligations (aFRR**

or mFRR) from one asset to another also entails a transfer of the non-reserved flexibility between the two assets (the flexibility offered for redispatching represents flexibility that is not contracted as a reserve).

Based on the schedule, available Pmax and available Pmin Elia may perform consistency checks in order to control the legal obligation to bid in all available flexibility for congestion purposes.

Bid amendments do not require approval by ELIA although possibly the reason for the bid amendment may be an action which does require approval (e.g., transfer of reserve obligations).

Bid updates are possible until the **same time as the scheduling deadline for the schedule** of the concerned asset (in case of schedule delivery) (see section 6.2).

Neutralization period for bid amendments = number of minutes[38]

Bid update deadline on bid Z = deadline for activation by ELIA of the congestion bid (bid property in the new bid) + Neutralization period

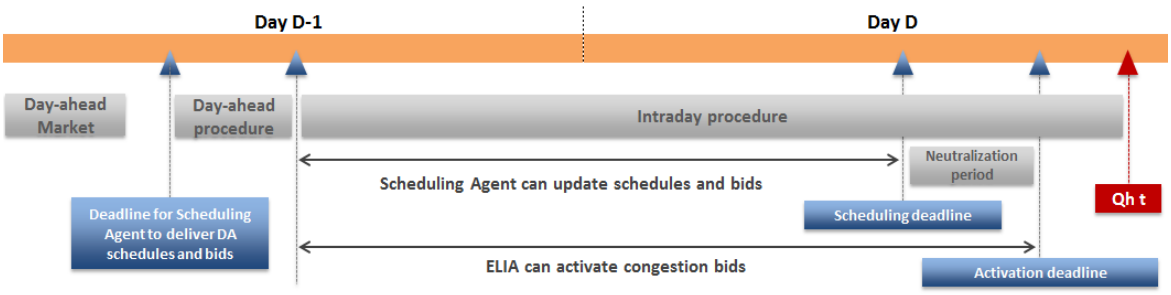


Figure 8.1. Timeline across Day-ahead and intraday procedures indicating actions and deadlines for ELIA and the Scheduling Agent

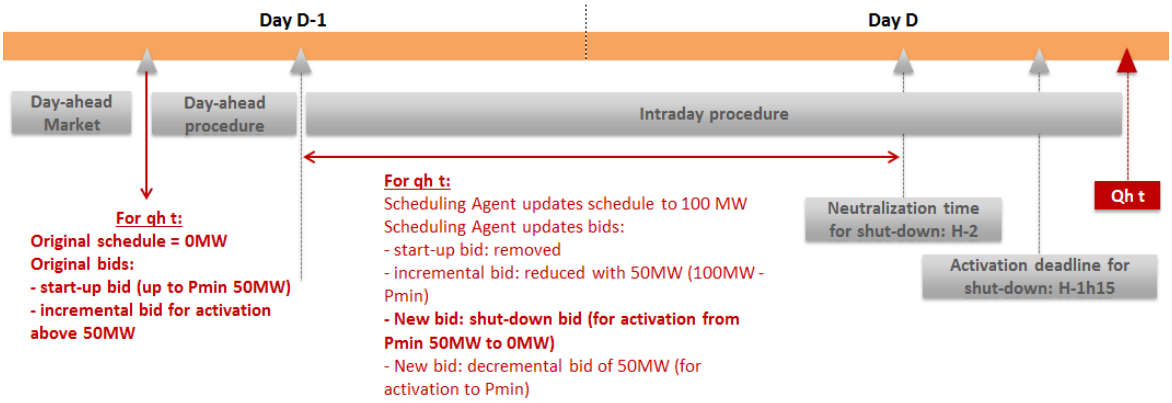
The deadline to update non-activated bids may therefore be different for each asset and even for different bids on an asset (e.g. slow start-up versus fast incremental activation), as shown in the example below.

Example for a limited-coordinable Power Generating Module:

The example below shows how the Scheduling Agent updates the schedule in Intraday to announce the start-up in quarter-hour t of a Power-Generating Module. Together with the schedule update, the Scheduling Agent must update the bids: the earlier start-up bid is replaced by a shut-down bid.

If ELIA would want to prevent the start-up, ELIA would have to activate a shut-down bid. The shut-down bid has an activation deadline of 1h15 in advance of qh t. Assuming the current neutralization period of 45', the scheduling deadline for the schedule update is 2 hours in advance. Therefore the Scheduling Agent must announce the start-up to ELIA at least 2 hours before qh t.

[38] The number of minutes is yet to be determined. Historically a period of 45 minutes has been used.



Once in running mode, the Power-Generating Module may be fully coordinable and require incremental or decremental bids to be activated one quarter-hour in advance. Therefore if the Scheduling Agent would want to increase the schedule further, and ELIA would have to redispatch by activating a decremental bid, the scheduling deadline for the schedule update would then become 1 hour (15' + 45').

8.4.2. Timeline for assets with mandatory bidding

Given the asset obligations as explained in section 7.1 this section applies to Power Generating Modules and Energy Storage devices.

This timeline is applicable to bid Z (as the deadline for updates may differ per bid):

Day-ahead procedure	
Day D-1 between the closure of the DA market and hour H[39]	The Scheduling Agent offers the redispatching bids to ELIA. The bid must be firm.
Intraday procedure	
Between day D-1 hour H and day D before the update deadline of bid Z	The Scheduling Agent can update bid Z for day D. The bid must be firm at all times. ELIA may activate the flexibility bid Z for redispatching purposes (rules see section 7.4). (If applicable) ELIA will amend the corresponding schedule for day D (rules see section 6.5.3).
Day D after the update deadline of bid Z	ELIA may activate the flexibility bid Z for redispatching purposes (rules see section 7.4) until the deadline for activation of the bid.

[39] Historically (CIPU-contract) the deadline for delivering schedules in Day-ahead is at 15:00 of day D-1.

	(If applicable) ELIA will amend the corresponding schedule for day D (rules see section 6.5.3).

8.4.3. Timeline for assets with voluntary bidding

Given the asset obligations as explained in section 7.1 this section applies to demand facilities.

This timeline is applicable to bid Z (as the deadline for updates may differ per bid):

Between the closure of the Day-ahead market on day D-1 and before the update deadline of bid Z on day D	The Scheduling Agent can offer the redispatching bids to ELIA. The Scheduling Agent can update the redispatching bids to ELIA. The bid must be firm at all times. ELIA may activate the flexibility bid Z for redispatching purposes (rules see section 7.4).
Day D after the update deadline of bid Z	ELIA may activate the flexibility bid Z for redispatching purposes.

8.4.4. Bid properties

Flexibility for redispatching must be bid in an **explicit** way by the Scheduling Agent. This implies that the Scheduling Agent must indicate **per quarter-hour** which **flexibility** is available as well as the **conditions for activation** by ELIA. These **bid properties** are listed below[40]. **The bid properties can be combined in different ways to offer different types of bids to ELIA: the Scheduling Agent can offer multiple bids on the same asset**. For example, an asset may have 2 bids: one start-up bid (up to Pmin) and one incremental bid for the activation of energy on top of Pmin [41].

Examples of properties of bids for redispatching

- Bid size (MW), i.e., the amount of flexibility offered as a block bid or as a scheduling limit (see details further in this paragraph).
- Divisibility (Yes/No), i.e., indicating whether a bid can be partially activated or not
- Flexibility direction , i.e., incremental flexibility (increasing net injection / decreasing net offtake) or decremental flexibility (decreasing net injection / increasing net offtake)
- Locational information, i.e., EAN code

[40] The bid properties may be reviewed during the implementation phase depending on the feedback of the stakeholders on how to treat specific cases. The idea is to allow the Scheduling Agent to indicate default properties of the bid for a particular asset in order to avoid a daily operational workload.

[41] Examples of bids are given in Q6 of the "Questions & Answers" section at the end of this document.

- Delay (Minutes), i.e., the deadline for ELIA to request the activation of the offered flexibility starting at quarter-hour qh
- Minimum activation time (Minutes), i.e., the minimum number of quarter-hours that the flexibility is to be activated consecutively
- Maximum activation time (Minutes), i.e., the maximum number of quarter-hours that the flexibility can be activated during day D, whether or not consecutively
- Relation with other bids, i.e., indicating whether the bid must be activated together with another bid, or before another bid, or cannot be combined with another bid.
- Fix price (€), i.e., the cost for a start-up in case of a start-up or shut-down bid
- Activation price (€/MWh), i.e., the cost in €/MWh for activating the flexibility offered in the bid

Coherent level between bids and schedules[42]

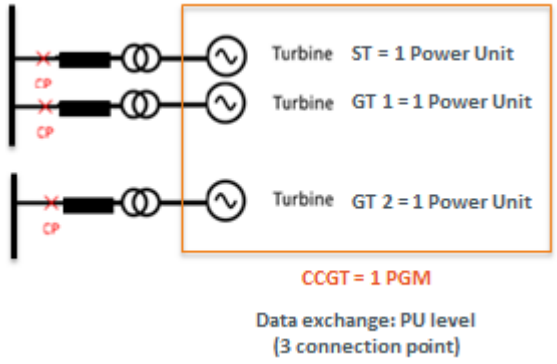
Flexibility for redispatching must be bid on the same level as the schedule (or a more detailed level if chosen by the Scheduling Agent) to allow ELIA to properly make the link and amend the schedule when activating the flexibility for redispatching. Bids on a higher level than the schedule are not acceptable because ELIA cannot be sure that it will resolve the identified congestion risk. **This also shows why ELIA cannot work with portfolio bids for congestion management as the geographic distribution of bids and the uncertain effect on specific schedules do not lead to efficient or effective congestion management.**

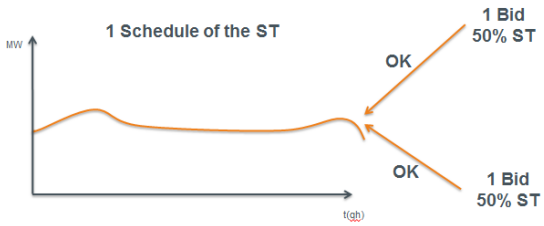
Examples explaining the need for coherence between schedules and bids

Example 1: Acceptable schedule and bid levels

- a CCGT consisting of 2 gas turbines (GT1 and GT2) and one steam turbine (ST) (which due to different connection points must provide schedules and bids per power unit and not for the CCGT as a whole)
- the flexibility on the steam turbine may be split in two: one bid for half of the capacity on the ST to be activated together with GT1 and another bid for the remaining capacity on the ST to be activated with GT2.

[42] On asset with Intraday scheduling obligation.





Example 2: Unacceptable schedule and bid levels

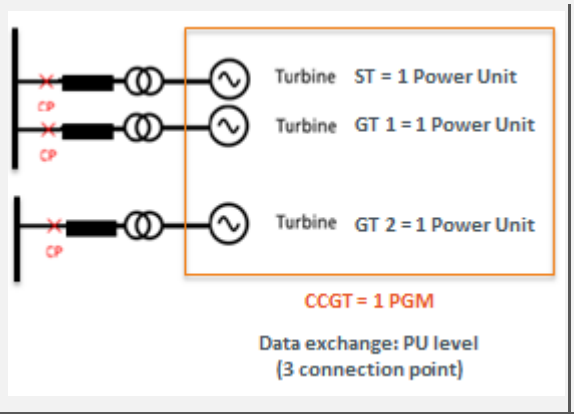
Presume in example 1 of the CCGT that all its flexibility is offered in one bid although GT1 and GT2 are not connected on the same bus bar.

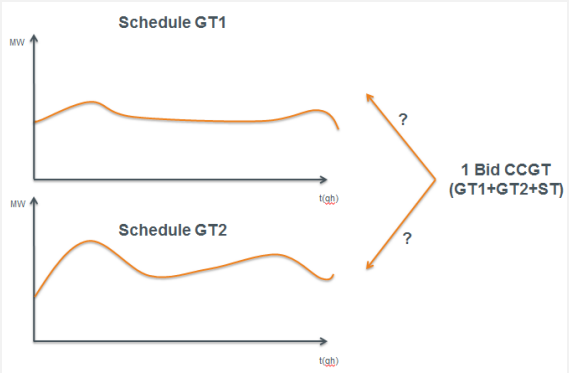
The contingency for which ELIA search a remedial action may be linked specifically to GT1. Therefore ELIA wishes to activate the flexibility on GT1 and not on GT2.

ELIA does not need an activation of the entire volume offered on the CCGT.

When partially activating the bid ELIA does not know which bus bars will be affected and which schedules are to be amended.

The partial activation of the CCGT bid does not guarantee ELIA a solution for the contingency. Therefore an aggregation of schedules to concord with the level of the bid does not provide a solution in this case.





The flexibility available to bid for redispatching is the flexibility that is not reserved for balancing services (FCR, aFRR, or mFRR), as shown in Figure 8.2. The flexibility for redispatching is a “free bid”, which can also be bid for balancing on top of the energy related to the reserved capacities.

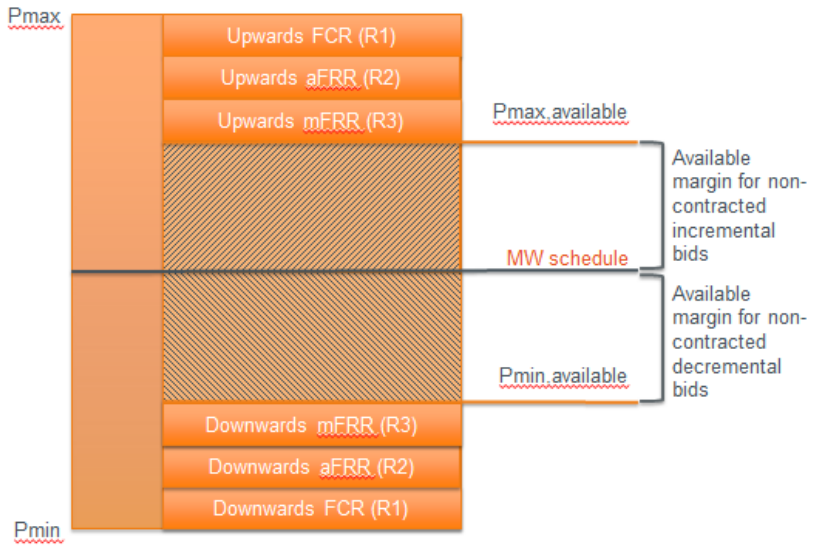


Figure 8.2. Flexibility offered for FCR, aFRR, mFRR, free flexibility

As a standard rule the Scheduling Agent will bid flexibility for redispatching explicitly to ELIA in the form of **energy block bids**. For flexibility on Power-Generating Modules and energy storage devices type B as well as for demand flexibility, the Scheduling Agent may choose alternatively to bid in the form of a **scheduling limit** (see Figures 8.3-4).

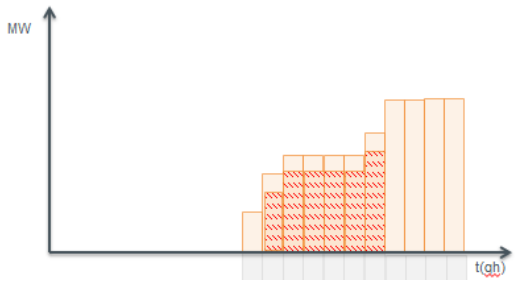


Figure 8.3.Incremental block bids

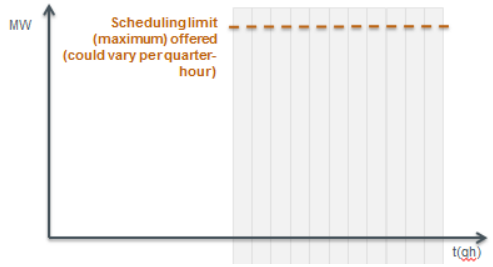


Figure 8.4. Incremental scheduling limit

Bid size option 1: Block bids

Block bids indicate **the energy available for activation per quarter-hour**, either incrementally or decrementally. The bid therefore gives information on **how much** energy can be activated. Based on the baseline and the bid, ELIA calculates the range of possible new setpoints that ELIA may request on the asset. In need of an activation ELIA may activate any new setpoint within this range (if the bid is divisible), as shown in the example in Figure 8.5. Based on the baseline and the new requested setpoint, ELIA calculates the requested energy, which is used for settlement and for the compensation of the Belgian imbalance position.

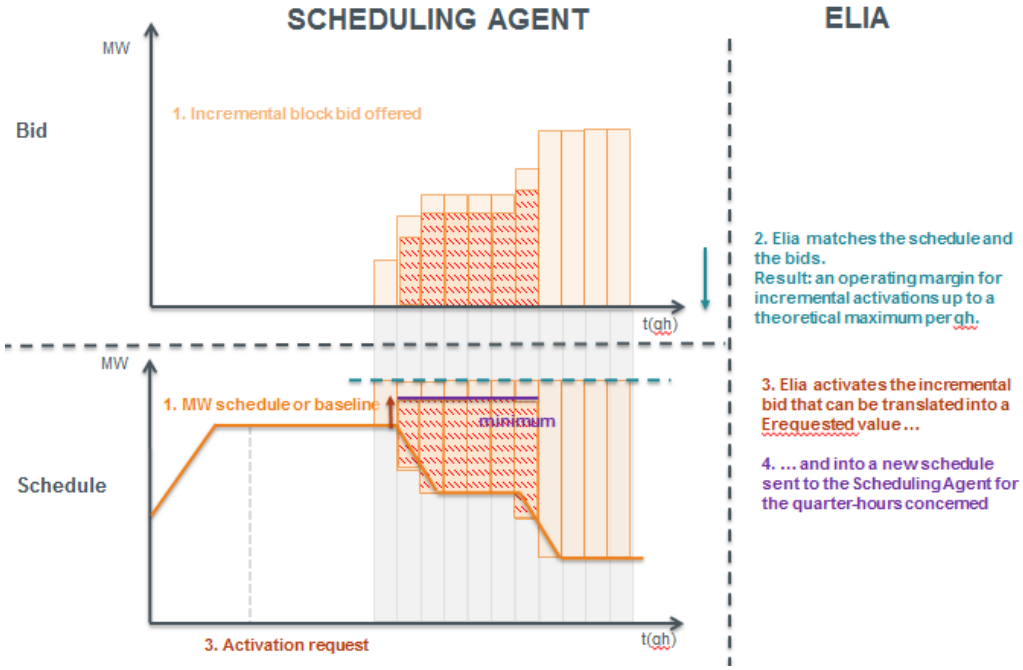


Figure 8.5. Incremental redispatching activation in case of block bids

Bid size option 2: Scheduling limits

The flexibility may also be bid in a format that provides ELIA the range of possible new setpoints: a scheduling limit. The Scheduling Agent informs ELIA of the maximum or minimum schedule that may be requested for each quarter-hour. In need of an activation ELIA may activate any new schedule within this range (if the bid is divisible), as shown in the example in Figure 8.6. Based on the baseline and the new requested schedule, ELIA calculates the requested energy, which is used for settlement and for the compensation ofthe BRP perimeter and the Belgian imbalance position.

Working with a scheduling limit may be particularly useful for flexibility which is offered on assets without a MW schedule (i.e., demand facilities and PGM or storage type B with ON/OFF schedules). Block bids imply knowledge of a MW schedule or a fixed baseline. A scheduling limit requires no such information and does not need an update when the schedule or baseline changes. Moreover scheduling limit enables the scheduling agent to send standing offers which are valid for a long period. Therefore the workload for the Scheduling Agent is lower.

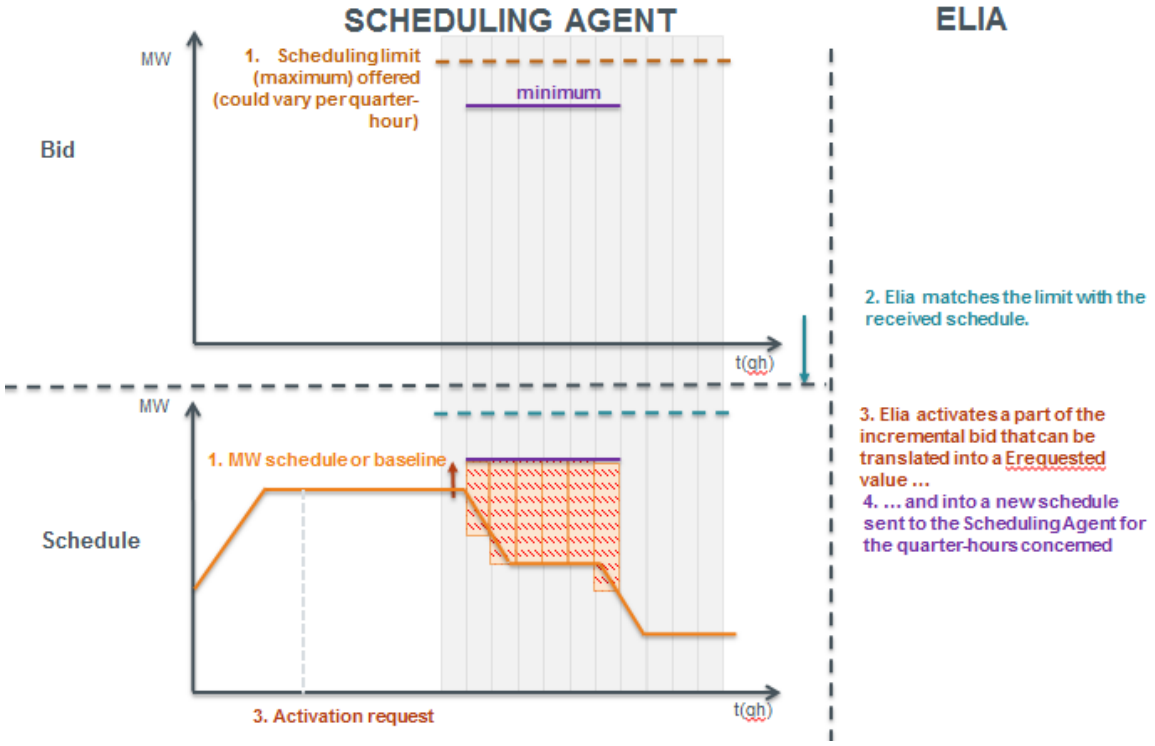


Figure 8.6. Incremental redispatching activation in case of scheduling limits

Note that the Scheduling Agent has to provide bids that are coherent with the outage planning information received from the Outage Planning Agent.

In case of status 'available', a bid is to be delivered with value smaller than the structural installed capacity or than the restriction on active power capability.

In case of status 'unavailable': No bids allowed.

In case of status 'testing': No bids allowed.

ELIA will restrict the delivery of congestion bids and notify the Scheduling Agent if a restriction is applicable. The Scheduling Agent should contact the Grid User in order to detect the reason for this.

Verification of offered volume

As the Scheduling Agent is responsible for both scheduling and congestion bidding, coherency between both is guaranteed. The MW schedule is used as the baseline for congestion activations, therefore the schedule by definition determines the volume that can be bid.

- The bid size must be coherent with the difference between the schedule on the one hand and on the other the Pmax (for incremental activation) or 0 MW (for decremental activation).

- ON/OFF schedules at least indicate whether start-up bids and shut-down bids are possible.

Must-Run and May-Not-Run schedules can be amended by ELIA in Day-ahead or Intraday if ELIA needs the flexibility for redispatching. The flexibility must therefore be bid (as explained in chapter 7).

8.5. Remuneration for congestion activation

8.5.1. Cost-reflective: Reasonable, directly related, demonstrable bid price

One of the properties of a congestion bid relates to price. The price should reflect the costs for activating the flexibility and therefore be reasonable, directly related to the activation, and demonstrable.

Reasonable remuneration: The bid price concerns an additional cost or loss of revenue that cannot be recovered elsewhere, based on certain information available at the moment of bidding the flexibility for redispatching.

Directly related to the activation: The bid price must be for a cost directly linked to the activation. Therefore, it concerns a cost that would not be incurred if the flexibility would not be activated.

Demonstrable: The Scheduling Agent must be able to support the bid price by documents (invoice, price offer of a contractor, a reliable source of, for example, reference prices) justifying the amount at the moment of the price offer. The Scheduling Agent must be able to present this documentation when requested by ELIA or by the regulating authority.

Examples of cost-reflective prices for incremental bids (more net injection)

An incremental activation implies an increase in net injection resulting from:

- **Increased production on a Power-Generating Module**

  The bid price can reflect the cost of production, such as the cost of the fuel.

- **Decreased consumption of a demand facility**

  The bid price can reflect an opportunity cost, such as the cost of reduced business output and consequently a potential reduction in revenues.

- **Increased discharge of an Energy Storage unit (e.g., increased injection of the turbine of a Pump-Storage Unit)**

  The bid price can reflect the cost of the production of the energy that was previously stored.

- **Decreased loading of an Energy Storage unit (e.g., decreased pumping of a Pump-Storage Unit)**

  The bid price can reflect the additional cost for future loading to compensate for the load stop during the activation request.

Examples of cost-reflective prices for decremental bids (less net injection)

A decremental activation implies a decrease in net injection resulting from:

- **Decreased production on a Power-Generating Module**

  The bid price can reflect the costs saved by not producing, such as the cost of the fuel. The energy was sold on the Day-ahead or Intraday market at a price above the cost price. As the energy must not be produced on the concerned Power-Generating Module (but ELIA redispatches it physically to be produced on another unit), the producer does not bear the costs but ELIA does.

  A known exception is in the form of Green Certificates: as the producer due to the decreased production gains less revenues from the Guarantees of Origin, this is an additional cost for the producer. In such case the bid price for a decremental activation will be negative and therefore paid by ELIA to the Scheduling Agent.

- **Increased consumption of a demand facility**

  The bid price reflects the price for offtake of electricity.

- **Decreased discharge of an Energy Storage unit (e.g., decreased injection of the turbine of a Pump-Storage Unit)**

  In general there are no costs associated with decreased discharge of storage.

- **Increased loading of an Energy Storage unit (e.g., increased pumping of a Pump-Storage Unit)**

  The bid price can reflect the cost of producing the energy stored.

For the bid price on **Power Generating Modules or Energy storage** devices these characteristics can be translated into a cost formula including components such as the fuel price or the value of Green Certificates[43].

For the bid price of **demand flexibility** offered for redispatching a generalized price formula is not feasible as the bid price depends on the specific character of the demand. However, via the contract the Scheduling Agent could explain which components are most critical in the determination of a reasonable price.

Cost-reflective prices allow ELIA to keep congestion management cost efficient. As market parties are allowed to update schedules (that are not defined by a previous activation or agreement) and therefore make deals on the Intraday market regardless of the congestion risks in the zone, a cost-reflective activation of flexibility allows the Scheduling Agent to maintain the financial benefits of the Intraday market deals.

A system for the detection of non-cost-reflective prices may be created to allow price monitoring by the relevant regulating authority.

The price component in the design is valid in case there is no regulatory framework imposing a specific price. At the moment of writing this design note, this latter is the case for **power units connected with a flexible access ("Gflex")**[44]. The regulatory framework describes a remuneration mechanism for the activation of Gflex, i.e., the activation of

[43] i.e., Groenestroomcertificaten, Certificats Verts

[44] "GFlex" is described in regional regulation n Flanders and Wallonia. As the scope of this design note is limited to assets connected to the ELIA grid, the relevance of the section on Gflex is limited to power units connected to ELIA's local transmission grids.

decremental flexibility on power units with a flexible access as formalized in the connection and access contracts. In such cases the **regulated price** will serve as basis for the remuneration.

The bid price for redispatching is not the same as the bid price for balancing. For balancing the flexibility will in the future be bid in a marginal pricing system: pricing is free yet with the philosophy of reflecting marginal costs.

8.5.2. Remuneration for a congestion bid

The remuneration for a congestion activation will be based on the bid price:

$$Remuneration = E requested \; x \; bid \; price$$

The requested energy equals the difference between the baseline and the new setpoint or MW schedule requested in the activation.

There are different financial flows for incremental than for decremental activations:

Incremental activations are paid by ELIA to the Scheduling Agent (provided a positive bid price).

Decremental activations are paid by the Scheduling Agent to ELIA (provided a positive bid price).

8.6. Activation control & Liability

8.6.1. Activation control

Congestion activations (incl. Return-to-Schedule Activations) are verified by ELIA ex post. For the entire period of the activation the metered values are compared with the last valid schedule amended with the value of the activation (for assets with MW schedules and Intraday scheduling obligation, i.e., Power-Generating Units and Energy Storage devices) or with the schedule requested in the activation (i.e., demand flexibility).

Activation control on injection of Power Generating Modules and Energy Storage:

An incremental congestion activation enforces a new minimum schedule or setpoint to be reached: the activation control verifies whether the metered values are equal or higher than the requested values.

A decremental congestion activation enforces a new maximum schedule or setpoint to be reached: the activation control verifies whether the metered values are equal or lower than the requested values. See Figure 8.7 for an example.

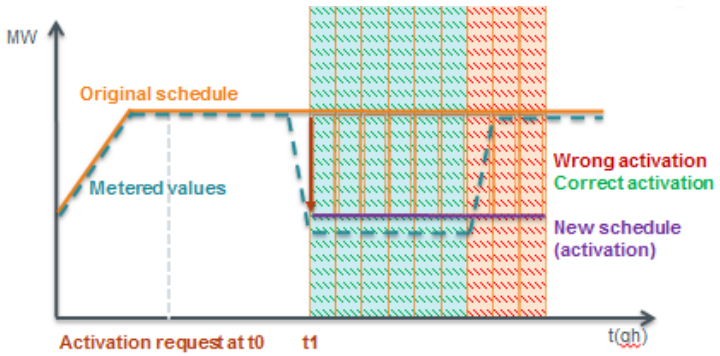


Figure 8.7. Example of control of a decremental activation

Note that the activation control on demand flexibility and Energy Storage offtake mode is in the other direction:

A incremental congestion activation enforces a new maximum schedule or setpoint to be reached: the activation control verifies whether the metered values are equal or lower than the requested values.

An decremental congestion activation enforces a new minimum schedule or setpoint to be reached: the activation control verifies whether the metered values are equal or higher than the requested values.

8.6.2. Penalty for incorrect activation

In case of insufficient activation (Edelivered < Erequested) ELIA will apply a dissuasive penalty regime. Considering the fact that imposing a schedule is done for grid security reasons, strong penalities need to be applied in case of large deviations as such behavior is unacceptable and even dangerous for the security of supply.

Underdelivery will be regarded as unacceptable when the difference between Erequested and Edelivered is larger than a certain percentage of Erequested. The penalty price will be equal to a fixed rate per MWh or, if higher, a multitude of the imbalance price at the concerned quarter-hour.

The penalty does not relieve the Scheduling Agent from its general liability. If ELIA incurs costs that can be clearly accounted to an incorrect activation response of the Scheduling Agent, ELIA will charge the costs to the Scheduling Agent.

8.7. Compensation of congestion bids on the imbalance position

ELIA aims to minimize the effect of congestion management on the imbalance in the control zone via a compensation mechanism.

In this respect **ELIA foresees to neutralize the net impact of activated congestion flexibility on the control zone imbalance position before the balancing timeframe** via a compensation mechanism. However Elia doesn't exclude that – in the framework of regional integration of balancing market and associated harmonization – this principle might be changed in the future.

In this compensation mechanism ELIA intends to activate the least costly flexibility available for activation. **ELIA intends to be able to procure this compensation flexibility via several markets:**

- (Cross-border) Day-ahead or Intraday markets
- Cross-border balancing market (once available)
- Non-contracted balancing bids (coordinable flexibility bids)
- Limited coordinable flexibility bid for redispatching (if time allows its activation)

Rather than compensate each congestion activation separately each time a congestion bid is activated, ELIA will at a certain moment take a decision on how the compensation of the net impact of congestion bids will be performed. ELIA may activate flexibility for the net estimated value that needs to be compensated for the concerned quarter-hour at a certain moment. Although this compensation action will normally happen after the congestion activation in the "Intraday" or close to real time timeframe, ELIA will also study the possibility, to take some compensation actions already in the Day-ahead market. The underlying idea is that in the event that a congestion is very predictable (i.e., minimized

volume risk) pro-active compensation activation may turn out to be cheaper than to await the Intraday or close to real-time timeframe.

ELIA therefore does not activate the congestion and compensation bids at the same time ("parallel") but independently from each other ("serial"), if time permitting.

Example of the compensation mechanism

- For quarter-hour 13:30-13:45 the total amount of congestion bids (absolute value of both incremental and decremental) accounts for 300MW. The net impact to compensate is lower at 200MW as there were two congestion bids that compensated each other.
- For quarter-hour 14:30-14:45 there are two congestion activations in two different zones tackling two different contingencies. As the congestion activations are in opposite direction, they largely compensate each other and only a residual 10MW remains to be compensated via a compensation bid.

Activation time	Zone	...	13:15	13:30	13:45	14:00	14:15	14:30	14:45	...
D-1 19:30	LA-W		-70 MW	-70 MW	-70 MW	-70 MW	-70 MW	-70 MW	-70 MW	
D 11:00	LA-W		-130 MW	-130 MW	-130 MW	-100 MW	-80 MW			
D 11:30	HA-W		+ 50 MW	+ 50 MW	+ 50 MW	+ 50 MW				
D 11:30	HA-W		- 50 MW	- 50 MW	- 50 MW	- 50 MW				
D 14:15	SC							+80 MW	+80 MW	
Net impact			**-200 MW**	**-200 MW**	**-200 MW**	**-170 MW**	**-150 MW**	**+10 MW**	**+10 MW**	

Figure 8.8. Example of congestion activations for day D

Compensation bids to activate		...	200 MW	200 MW	200 MW	170 MW	150 MW	-10 MW	-10 MW	...

Figure 8.9 . Example of the needed compensation bids for the same quarter-hours

For quarter-hour 13:30-13:45: ELIA has the following information at H-1,5

- 100MW is available on the ID market at 60€/MWh
- Slow units are available for 220 MW but at a cost of 75€/MWh
- ELIA estimates that 100 MW of mFRR bids will be certainly available on top of the bids needed to cover the reserve requirement of ELIA and that the cost of these balancing bids will be lower than 75€/MWh.
- At H-1,5 Elia decides to activate: 100 MW via the ID market

Because ELIA forecasts to have sufficient balancing means available, after Balancing Gate Closure Time ELIA will activate the remaining flexibility to compensate via non-reserved mFRR bids: 100 MW with a flag that they cannot set the imbalance price.

The time of activation of the compensation bid may vary. If ELIA foresees a shortage in available compensation bids closer to real-time, the activation of slow flexibility earlier on may be preferred. Reversely there may be situations where ELIA has to wait until close to real-time to activate the flexibility on contracted reserves which was not activated for balancing purpose (if ranked in the balancing merit order above the clearing price), in which case the balancing bid price will be paid without affecting the imbalance price.

8.8. Summary

Flexibility on Power-Generating Modules and Energy Storage Devices types B/C/D must be bid to ELIA in Day-ahead with updates in Intraday; demand flexibility can be bid voluntarily. The bidding level must be coherent with the level on which the schedule is provided for assets with Intraday scheduling obligation as ELIA modifies the schedule when activating flexibility. The MW schedule on an asset with Intraday scheduling obligation is also used as a baseline for activations. For assets with ON/OFF schedules an "X of Y" baseline must be determined.

The bidding requirements of Power-Generating Modules and Energy Storage devices will take into account the coordinability level of the asset, which can be set differently per direction (incremental/decremental), depending on operational mode (running or shut-down), and also for a specific period. Fully coordinable assets respond quickly and typically also bid for balancing. Limited coordinable assets have flexibility to offer but with slower response times. Non-coordinable assets have no flexibility that can be utilized in normal conditions.

Flexibility must be offered for each quarter-hour of day D in an explicit way. The different bid properties can be used to offer flexibility depending on the operational mode or configuration of the asset at the time: start-up bids on not running assets, incremental/decremental/shut-down bids on running assets, bids per power unit which together represent the flexibility of the power plant as it is configured at that moment,... The standard format for bid size is a block bid, showing the available energy per quarter-hour. ELIA foresees an alternative for Power-Generating Modules and Energy Storage Devices type B and for Demand Facilities, which can bid the flexibility in the form of a scheduling limit, which represents the maximum or minimum schedule that can be requested by ELIA.

Congestion bids are remunerated based on the requested energy at a cost-reflective price. Activations (including return-to-schedule requests) are ex post verified. Large underdelivery (meaning that the delivered energy is much smaller than the requested energy) will be penalized.

The perimeter of the Grid User's BRP[45] will be corrected with the congestion bid based on the delivered energy. ELIA will also correct for the net impact of the congestion bids on the Belgian imbalance, using the least costly flexibility that ELIA expects to be available. ELIA may activate compensation bids on limited coordinable assets, non-reserved balancing flexibility, or use the flexibility on the cross-border markets.

[45] There is no Transfer of Energy applicable on congestion bids.

9. Impact on Federal Grid Code

Impact on the draft proposal for the new Federal Grid Code

This section lists the aspects of the design which ELIA will propose to embed in the Federal Grid Code. The specific text proposal will be sent to the concerned stakeholder in preparation of the *Federal Grid Code Workshop* at ELIA headquarters on February 7th, 2018. The list is a first proposal based on the current analysis and can evolve until the workshop in February 2018 as well as until the final proposal for the grid code submitted for formal public consultation in March 2018. The evolutions will depend on conclusions of further analyses and/or comments received by the stakeholders.

Principles proposed to include in the new Federal Grid Code

- Access to the grid can be denied if the Scheduling responsibility is not correctly executed.

- The Grid User can in the connection contract appoint a third party to act as Scheduling Agent on the Grid User's behalf. The third party must be the Flexibility Service Provider/Balancing Service Provider.

- If the Grid User appoints third parties as Outage Planning Agent and Scheduling Agent, the Grid User must assure a correct coordination between them.

- ELIA can restrict the delivery of information if not coherent with the information received within another procedure.

- The Scheduling Agent is also responsible for bidding flexibility for redispatching to ELIA.

- If the asset's flexibility is offered for balancing by a Balancing Service Provider, then the Flexibility Service Provider acting as Scheduling Agent must be the same party as the Balancing Service Provider.

- Although the obligation to deliver schedules is on the level of the Power Generating Module, ELIA can request the schedules and bids to be delivered on a more detailed level relevant for operational needs.

- ELIA exempts the demand facilities connected to its grid from delivering schedules in Day-ahead and in Intraday if the demand facility does not offer flexibility for ancillary services.

- Energy Storage devices are subject to the same requirements for scheduling and bidding of flexibility for redispatching, with the exception of exemptions or alternative modalities described in Terms and Conditions for the Scheduling Agent.

- Power Generating Modules type B, C, D are obliged to offer their full available flexibility for redispatching to ELIA, taking into consideration the level of coordinability of the Power Generating Module and flexibility that is contracted as a reserve for balancing.

- The modalities on exchange of schedules in Day-ahead and Intraday and on bidding of flexibility for redispatching will be described in Terms and Conditions for the Scheduling Agent, to be submitted by ELIA for approval to the relevant regulating authority.

- The Terms and Conditions of the Scheduling Agent will at least include principles on:

(a) minimum operational requirements

(b) calendars for data exchange

(c) granularity of exchanged data

(d) remuneration and penalty mechanisms

(e) verification and liabilities

(f) exempting assets from the exchange of schedules and bidding

- The settlement modalities laid down in the Terms & Conditions should be based on cost-based principles.

Note that the following key principles are imposed in the European Guideline on Electricity Transmission System Operation[1] and therefore do not require repetition in the Federal Grid Code:

- TSO-connected Power Generating Modules type B, C, and D are obliged to deliver schedules in Day-ahead and Intraday (no exemption possible through national regulation).

- CDSO-connected Power Generating Modules type B, C, and D are obliged to deliver schedules in Day-ahead and Intraday (may be exempted through national regulation).

- TSO-connected Demand Facilities are obliged to deliver schedules in Day-ahead (may be exempted through national regulation).

- Each grid user obliged to deliver schedules, must take on the role of Scheduling Agent or appoint a third party.

Note that the following key principles are described in the draft version of KORRR [2] and (under the assumption that the principles will remain in the final version) therefore do not require repetition in the Federal Grid Code:

- The Grid User "shall remain responsible for ensuring compliance with the obligations" from the European Guidelines on Transmission System Operation, even if the Grid User delegates the task of Scheduling Agent to a third party. (article 3.8)

- The Grid User remains responsible for the quality of the delivered schedules, even if the Grid User delegates the task of Scheduling Agent to a third party. (article 3.1)

- The requirements to exchange schedules are defined by the TSO. (article 17.2)

- Each Power Generating Module and demand facility must comply with the requirements set by the TSO. (article 17.2)

REFERENCES

[1] European Commission (2017). "COMMISSION REGULATION (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation," Official Journal of the European Union, http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32017R1485&from=EN (consulted 19/10/2017)

[2] European Network of Transmission System Operators for Electricity (ENTSO-e) (2017). "All TSOs' proposal for the Key Organisational Requirements, Roles and Responsibilities (KORRR) relating to Data Exchange in accordance with Article 40(6) of the Commission Regulation (EU) 2017/1485 of 02 August 2017 establishing a Guideline on Transmission System Operation, " 2/10/2017 (draft proposal published for consultation)

[3] European Commission (2016). "COMMISSION REGULATION (EU) 2016/1388 of 17 August 2016 establishing a Network Code on Demand Connection," Official Journal of the European Union, http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016R1388&from=EN (consulted 9/11/2017)

[4] European Commission (2016). "COMMISSION REGULATION (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators," Official Journal of the European Union, http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016R0631&from=EN (consulted 27/10/2017)

[5] Economische Zaken (1999). "29 APRIL 1999. - Wet betreffende de organisatie van de elektriciteitsmarkt," 15/05/1999, n° 1999011160, p. 16264, http://www.ejustice.just.fgov.be/cgi_loi/change_lg.pl?language=nl&la=N&cn=1999042942&table_name=wet (consulted 27/10/2017)

[6] European Network of Transmission System Operators for Electricity (ENTSO-e) (2009). "Continental Europe Operation Handbook. Policy 3: Operational Security," Final Version approved by SC on 19/03/2009 https://www.entsoe.eu/fileadmin/user_upload/_library/publications/entsoe/Operation_Handbook/Policy_3_final.pdf (consulted 21/10/2017)

QUESTIONS & ANSWERS

Q1. What changes in the future design for units subject to a CIPU contract today?

- The first procedure in which schedules and flexibility is to be delivered is in Day-ahead. The CIPU contract contained procedures for data exchange in Week-ahead and in Month-ahead.
- The CIPU contract does not allow the modification of schedules in zones with congestion risks. The new design allows for schedule updates; ELIA will respond via redispatching as a remedial action against congestion.
- Coordinability levels can be managed on a more detailed level (e.g. per direction).
- Flexibility is to be bid explicitly. In CIPU ELIA calculated the available flexibility in an implicit way based on schedules, ramp-up rates, Pmax, Pmin, ...
- The remuneration for congestion bids is cost-based in both Day-ahead and Intraday. In CIPU the remuneration was based on a free price in Intraday as the same price was used for balancing bids.

Q2. What changes in the future design for units not subject to a CIPU contract today?

Non-CIPU units are not subject to scheduling and bidding obligation today. If the unit has such obligations according to the new requirements, the entire procedures are new and must be implemented.

Q3. What are examples of a Demand Facility? What are examples of a Demand Unit?

Example of a Demand Facility:

- a commercial building (e.g., shopping mall)
- a factory
- each of the factories on an industrial site (if a connection point per factory)

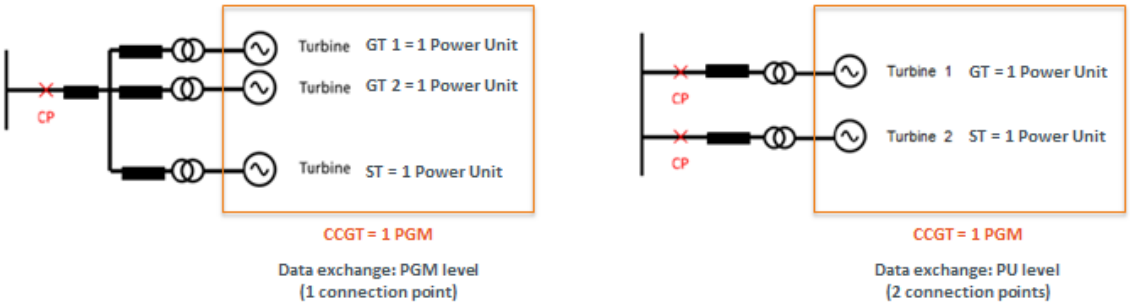
Example of a Demand Unit:

- a motor on an industrial site
- an air conditioning system or refrigerator
- a charging station for electric vehicles

Q4. What are examples of a Power Unit? What are examples of a Power-Generating Module?

Example 1: In a Power-Generating Module that represents a CCGT there are 3 Power Units, namely the 2 gas turbines and the steam turbine.

Example 2: In a Power-Generating Module that represents an OCGT there are 2 Power Units, namely the 2 gas turbines.



Q5. Which schedules are exchanged for demand facilities with scheduling obligation and with locally connected production units or storage?

Presuming the following situation:

- A demand facility connected to the ELIA grid with no demand side response
- A PGM of 150MW (type D) connected on the site of the demand facility
- A storage unit of 10MW (type B) connected on the site of the demand facility
- A set of smaller PGM of 0.2MW each (type A) connected on the site of the demand facility
- The Grid User for the demand facility is the same as for the production or storage units connected to it

The Scheduling Agent should provide the following information on scheduled active power output:

- For the demand facility: /
- For the PGM of 150MW (type D): a **MW** schedule of its **generation**
- For the storage unit of 10MW (type B):
    - a **MW or ON/OFF** schedule of its **generation (discharging mode)**
    - a **MW or ON/OFF** schedule of its **consumption (charging mode)**

For the smaller PGM of 0.2MW each (type A): **no** schedule obligation

Q6. Which schedules are exchanged for assets in ELIA-connected CDS?

The CDS itself falls under the same requirements as ELIA-connected Demand Facilities: by default no schedule obligation. In case a CDS grid user would offer flexibility for redispatching then a scheduling obligation would be applicable on the delivery point.

Regarding Power-Generating Modules and Energy Storage Devices there are no different requirements if they are connected to a CDS rather than directly to the ELIA grid or via an ELIA-connected demand facility.

Q7. How can the Scheduling Agent use the bid properties to differentiate between different type of flexibility?

Bid properties: see section 8.4

Examples of bids:

- Start-up bid: non-divisible / bid size = Pmin of the power unit / possibly with a longer delay in case of a power unit with limited coordinability / to be activated before the incremental bid offered on the same power unit / fix price
- Incremental bid on a power unit, i.e., the power unit is already in running mode: divisible / delay depending on the ramp-up rate / activation price per MWh
- Shut-down bid: non-divisible / bid size = Pmin of the power unit / possibly with a longer delay in case of a power unit with limited coordinability / to be activated after the decremental bid offered on the same power unit / fix price in case the activation leads to an additional start-up at a later time
- Decremental bid on a power unit, i.e., not including a shut-down: divisible / delay depending on the ramp-down rate / activation price per MWh
- Power plant configuration: each bid on power unit level may have as a condition for activation that another bid must be activated simultaneously.
  For example, in a CCGT consisting of 2 gas turbines and one steam turbine (which due to different connection points must provide schedules and bids per power unit and not for the CCGT as a whole), the bid on the steam turbine would indicate that a simultaneous activation of the bid on at least one of the gas turbines is needed. The bids on the gas turbines may or may not have the same condition for activation.
- Bids of flexibility on assets with limited energy may use the maximum activation times to indicate the energy limitation

ANNEX

Annex 1. Overview of relevant articles in the European Guideline for Electricity Transmission System Operation

PART II OPERATIONAL SECURITY

TITLE 1 OPERATIONAL SECURITY REQUIREMENTS

CHAPTER 1 System states, remedial actions and operational security limits

Article 22 Categories of remedial actions

- List of remedial actions, among which the use of flexibility on TSO-connected or (C)DSO-connected assets for the purpose of redispatching.
- See this document: chapter 8

TITLE 2 DATA EXCHANGE

CHAPTER 4 Data exchange between TSOs, owners of interconnectors or other lines and power generating modules connected to the transmission system

Article 46 Scheduled data exchange

- Obligation for TSO-connected PGM type B/C/D to deliver active power schedules in Day-ahead and Intraday.
- See this document: chapter 6

CHAPTER 5 Data exchange between TSOs, DSOs and distribution-connected power generating modules

Article 49 Scheduled data exchange

- Obligation for (C)DSO-connected PGM type B/C/D to deliver active power schedules in Day-ahead and Intraday.
- See this document: chapter 6

CHAPTER 6 Data exchange between TSOs and demand facilities

Article 52 Data exchange between TSOs and transmission-connected demand facilities

- Obligation for TSO-connected demand facilities to deliver deliver active power schedules in Day-ahead and Intraday.
- See this document: chapter 6

TITLE 3 COMPLIANCE

CHAPTER 1 Roles and responsibilities

Article 54 Responsibilities of the SGUs

- The "Significant Grid User" (SGU) should notify the TSO or DSO of any limitations in technical capabilities which may affects its ability to abide by the operational requirements. The guideline applies to existing and new assets. For new assets the operational requirements in the guideline are coherent with the technical capabilities required by the Network Code on Requirements for Grid Connection of Generators (see reference [4]). However, for existing assets this implies that the SGU can be exempted from the delivery of certain structural, schedules, or real-time information if such information delivery requires a technical capability that was not imposed in the connection requirements to which the SGU is subject.
- See this document: chapter 6

PART III OPERATIONAL PLANNING

TITLE 6 SCHEDULING

CHAPTER 1 Outage coordination regions, relevant assets

Article 110 Establishment of scheduling processes

- Description of the role of scheduling agent, as assigned to the Grid User or to a third party.
- See this document: chapter 4

Annex 2. KORRR

European Guideline on Transmission System Operation

Article 6 Approval of terms and conditions or methodologies of TSOs

1. Each regulatory authority shall approve the terms and conditions or methodologies developed by TSOs under paragraphs 2 and 3. The entity designated by the Member State shall approve the terms and conditions or methodologies developed by TSOs under paragraph 4. The designated entity shall be the regulatory authority unless otherwise provided by the Member State.

2. The proposals for the following terms and conditions or methodologies shall be subject to approval by all regulatory authorities of the Union, on which a Member State may provide an opinion to the concerned regulatory authority: (a) key organizational requirements, roles and responsibilities in relation to data exchange related to operational security in accordance with Article 40(6);

[...]

Article 40 Organisation, roles, responsibilities and quality of data exchange

[...] 6. By 6 months after entry into force of this Regulation, all TSOs shall jointly agree on key organisational requirements, roles and responsibilities in relation to data exchange. Those organisational requirements, roles and responsibilities shall take into account and complement where necessary the operational conditions of the generation and load data methodology developed in accordance with Article 16 of Regulation (EU) 2015/1222. They shall apply to all data exchange provisions in this Title and shall include organisational requirements, roles and responsibilities for the following elements:

(a) obligations for TSOs to communicate without delay to all neighbouring TSOs any changes in the protection settings, thermal limits and technical capacities at the interconnectors between their control areas;

(b) obligations for DSOs directly connected to the transmission system to inform the TSOs they are connected to, within the agreed timescales, of any changes in the data and information pursuant to this Title;

(c) obligations for the adjacent DSOs and/or between the downstream DSO and upstream DSO to inform each other within agreed timescales of any changes in the data and information pursuant to this Title;

(d) obligations for SGUs to inform their TSO or DSO, within agreed timescales, about any relevant changes in the data and information established pursuant to this Title;

(e) detailed contents of the data and information established pursuant to this Title, including main principles, type of data, communication means, format and standards to be applied, timing and responsibilities;

(f) the time stamping and frequency of delivery of the data and information to be provided by DSOs and SGUs, to be used by TSOs in the different timescales. The frequency of information exchanges for real-time data, scheduled data and update of structural data shall be defined; and

(g) the format for the reporting of the data and information established pursuant to this

Title. The organisational requirements, roles and responsibilities shall be published by ENTSO for Electricity.

[...]

Here is a summary of KORRR as given on the web page for the public consultation (31/10-1/12/2017) (source: https://consultations.entsoe.eu/system-operations/korrr/)

"[A]ll TSOs' proposal for key organisational requirements, roles and responsibilities in relation to data exchange (KORRR proposal) developed in accordance with article 40(6) of Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (SO GL).

SOGL requires all TSOs to jointly agree, by 6 months after entry into force of SOGL, on key organisational requirements, roles and responsibilities in relation to data exchange. Those organisational requirements, roles and responsibilities shall take into account and complement where necessary the operational conditions of the generation and load data methodology developed in accordance with Article 16 of Regulation (EU) 2015/1222. They shall apply to all data exchange provisions in data exchange Title in SO GL and shall include organisational requirements, roles and responsibilities for the following elements:

(a) obligations for TSOs to communicate without delay to all neighbouring TSOs any changes in the protection settings, thermal limits and technical capacities at the interconnectors between their control areas;

(b) obligations for DSOs directly connected to the transmission system to inform the TSOs they are connected to, within the agreed timescales, of any changes in the data and information pursuant to data exchange Title in SO GL;

(c) obligations for the adjacent DSOs and/or between the downstream DSO and upstream DSO to inform each other within agreed timescales of any changes in the data and information pursuant to data exchange Title in SO GL;

(d) obligations for [Significant Grid Users] SGUs to inform their TSO or DSO, within agreed timescales, about any relevant changes in the data and information established pursuant to data exchange Title in SO GL;

(e) detailed contents of the data and information established pursuant to data exchange Title in SO GL, including main principles, type of data, communication means, format and standards to be applied, timing and responsibilities;

(f) the time stamping and frequency of delivery of the data and information to be provided by DSOs and SGUs, to be used by TSOs in the different timescales. The frequency of information exchanges for real-time data, scheduled data and update of structural data shall be defined; and

(g) the format for the reporting of the data and information established pursuant to data exchange Title in SO GL."

The version of KORRR that is submitted to the National Regulating Authorities for approval can be found on https://electricity.network-codes.eu/network_codes/sys-ops/methodologies/

Annex 3. Redispatching by ELIA

Timing of activation requests

When a security analysis identifies a contingency that may cause congestion, ELIA operators evaluate the potential remedial actions. Depending on the factors causing the congestion risk and the remedial actions at disposal, **ELIA decides either to take immediate action or to wait to see how the situation evolves.** Consequently, flexibility can be **activated** for redispatching purposes on day D after the **Day-ahead** procedure, in **Intraday**, as well as in **Real-time** (in case significant unforeseen events occur).

Remedial actions can be taken **preventatively** (meaning that ELIA takes action before the contingency actually occurs) or **curatively** (meaning that ELIA takes action after a contingency occurs) [46]. As curative actions require fully coordinable flexibility to respond within 15 minutes, they automatically reduce the availability of flexibility for balancing. To avoid a substantial impact of congestion management on the availability of (reserved or non-reserved) balancing energy, remedial actions are typically taken preventively in the following cases:

- If there is a substantial risk that the remedial action will not be available if not activated preventively: for example, if waiting until real-time results in the use of balancing flexibility (which may be expected to be insufficiently available) a better option would be to activate slow flexibility ahead of real-time and leave mFRR flexibility available for balancing.
- or, if there is a substantial risk that the remedial action cannot be activated within 15 minutes as a curative measure: for example, the action requires a decremental bid (maybe even with shut-down) on a power unit with a ramp down slower than 15 minutes
- or, if the identified constraint is expected to last more than 15 minutes.
- or, if there is a clear economic rationale .

When possible, the ELIA operator will wait to activate flexibility until there is more certainty on the need for redispatching and most redispatching activations can be expected to be requested up to one to two hours before real-time.

Duration of redispatching activations

Congestion risks are often caused by (a combination of) factors over a longer period of time (more than one quarter-hour). For example:

- Once started up it is more efficient to keep producing electricity with a particular power unit. Therefore the production level in the zone may remain high for several hours.

- Wind speeds may fluctuate quickly but the order of magnitude can be quite stable giving high production levels in the zone during the entire day.

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[46] See UCTE OH – Policy 3: Operational Security – Final Version P2:

A4-D1.1. Preventive remedial action. *Preventive remedial actions are those launched to anticipate a need that may occur, due to the lack of certainty to cope efficiently and in due time with the resulting constraints once they have occurred.*

A4-D1.2. Curative remedial action. *Curative remedial actions are those needed to cope with and to relieve rapidly constraints with an implementation delay of time for full effectiveness compatible with the Temporary Admissible Transmission Loading. They are implemented after the occurrence of the contingencies.*

As a result, redispatching to respond to such circumstances is often needed for **a duration of multiple quarter-hours** as well.[47] The flexibility may **immediately be activated** for such a long period or the activation can be **prolonged** via consecutive requests.

Selection of flexibility for redispatching

When there is a congestion risk in a zone, ELIA may have multiple **remedial actions available in Day-ahead or Intraday** to elevate the congestion risk, such as:

i. Cancelling maintenance works on the grid (which create an N-1 contingency)

ii. Topological measures

iii. Return-to-Schedule activations (see section 6.6.3)

iv. Redispatching: activation of a congestion bid and a compensation bid

In general ELIA will use **options (i) to (iii) before performing redispatching** to avoid a too high impact on the electricity market. However, when ELIA has to activate flexibility for redispatching, there may several alternatives to choose from.

Presuming there is more than one asset in the zone on which ELIA can activate flexibility to reduce the congestion risk, ELIA will search for the **best redispatching solution from a technical and economical perspective:**

(1) The **needs** for congestion activation are determined:

- **Location** bound: Determination of the zone
- **Time** bound: Determination of the duration of activation

(2) The **means** are assessed and ranked taking the following into consideration:

- **Bid properties** (see section 7.5) indicating that the bid can be activated taking the location and time bound needs into account. For example, at H-1 flexibility that requires an activation to be requested 2 hours in advance cannot be selected.
- The **cost of activating flexibility for the entire duration** needed. Not the bid with the lowest bid price per quarter-hour is ranked highest, but the solution for the entire duration.

  For example, for a congestion activation needed for a period of 3 hours, the choice may be between the start-up of one power unit or incremental bids on several running power units. When choosing the least expensive flexibility per quarter-hour, the start-up bid will never be chosen; instead it is possible that flexibility on one running power unit is activated for the first hour, and flexibility on another running power unit for the last 2 hours. However, when looking at the entire duration of 3 hours, activating the start-up may be more beneficial.
- **Priority of dispatch**

  Currently regulations on national and European level refer to a “priority of dispatch”. As a rule the generation of ‘green’ active power has priority to the generation of

[47] Experience has shown that the need for redispatching activations on average last about 2 to 4 hours, with extreme cases ranging to half or complete days.

'grey' active power[48]. So incremental activations would preferably be activated on green assets while decremental activations would preferably be activated on grey assets. ELIA will comply with regulations in terms of this "priority of dispatch" valid at the time of the activation.

Redispatching via 2 congestion bids or 1 congestion bid & 1 compensation bid

A remedial action to solve a congestion risk may include both activations. For example, if a line is congested with too high load flowing from point A to point B (see Figure A1) then reducing the injection on the side of point A and augmenting the injection on the side of point B will result in a diminution of the congestion risk. In this case the two congestion activations compensate one another in terms of impact on the imbalance, and ELIA needs to take no further actions.

A remedial action may, however, also be available at only one side of the flow. ELIA will activate the congestion bid and will search for flexibility in an entirely different zone in Belgium to compensate the effect on the imbalance. The latter is called a "compensation bid" (see Figure A2).

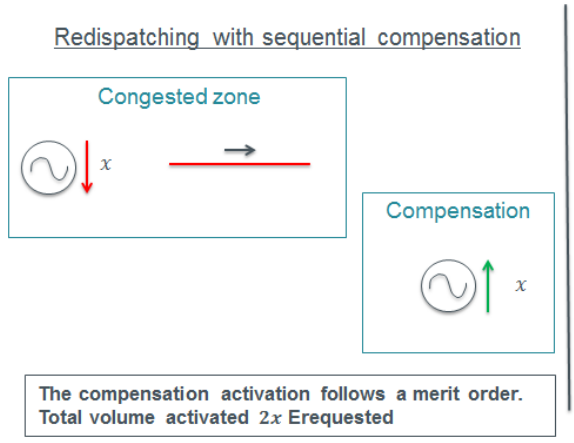


Figure A1

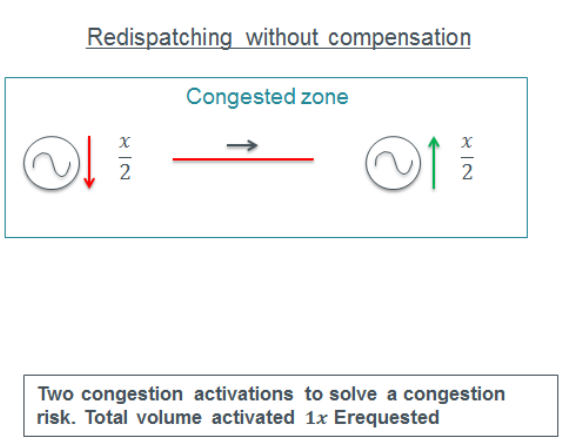
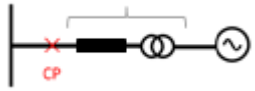
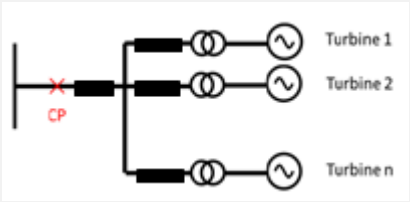
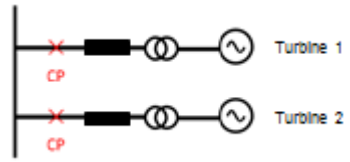
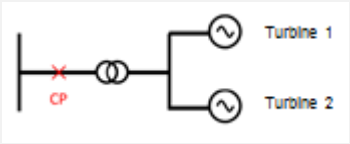
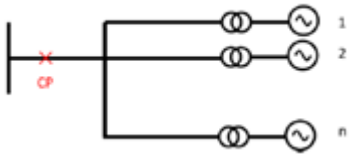
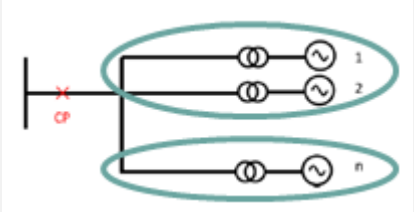


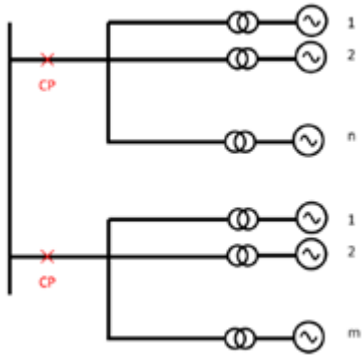
Figure A2

Figures on congestion bids with or without a need for compensation

[48] Green production is based on renew able energy sources and qualitative cogeneration (w ind, solar, biomass, r un-of-river). Grey production is based on other energy sources, in particular, nuclear, gas, coal, pumped-storage, and oil. (Source: art. 2.3bis and 2.4 of the Electricity Law of 29 April 1999 , see reference [5]).

Annex 4. Examples of data level for coordination

Configuration	Minimum requirements by ELIA for data delivery
	**1 Power Generating Module (PGM type SPGM)** 1 Power Unit 1 Connection point Min. requirement data delivery: **PGM level**
	**1 Power Generating Module (PGM type SPGM: e.g., CCGT: GT1 + GT2 + ST)** n Power Units 1 Connection point Min. requirement data delivery: **PGM level**
	**1 Power Generating Module (PGM type SPGM: e.g., CCGT: GT + ST)** 2 Power Units 2 Connection points Min. requirement data delivery: **PU level** (~CP)
	**2 Power Generating Module (PGM type SPGM)** 2 Power Units 1 Connection point Min. requirement data delivery: **PGM level**
	**1 Power Generating Module (PGM type PPM: e.g., wind farm operated as one combined unit)** n Power Units 1 Connection point Min. requirement data delivery: **PGM level**
	**2 Power Generating Module (PGM type PPM: e.g., 2 PPM in a wind farm operated separately but with a shared connection)** n Power Units 1 Connection point Min. requirement data delivery: **PGM level** (~CP)

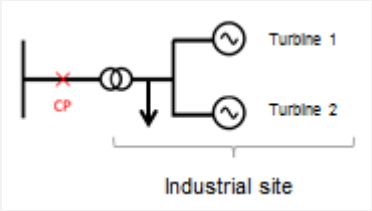


2 Power Generating Module (PGM type PPM: e.g., PPM in a wind farm operated separately in a combined manner)

n Power Units

2 Connection points

Min. requirement data delivery: **PGM level** (~CP)



2 Power Generating Module (PGM type SPGM)

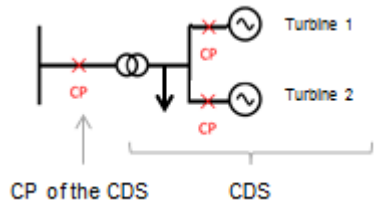
2 Power Units

1 Connection point

Min. requirement data delivery: **PGM level**

1 Demand facility

Min. requirement data delivery: **facility level**



2 Power Generating Module (PGM type SPGM)

2 Power Units

2 Connection points

Min. requirement data delivery: **PGM level**

1 Demand facility behind CDS connection point

Min. requirement data delivery: **facility level**