# iCaros : Integrated Coordination of Assets for Redispatching and Operational Security

First fine-tuning workshop
2 April 2019
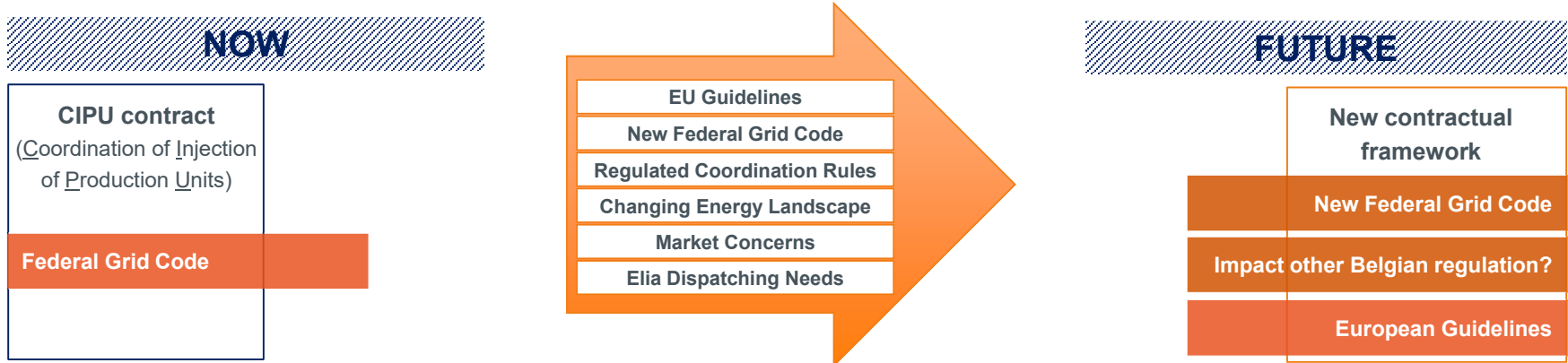
Introduction to the ICAROS project

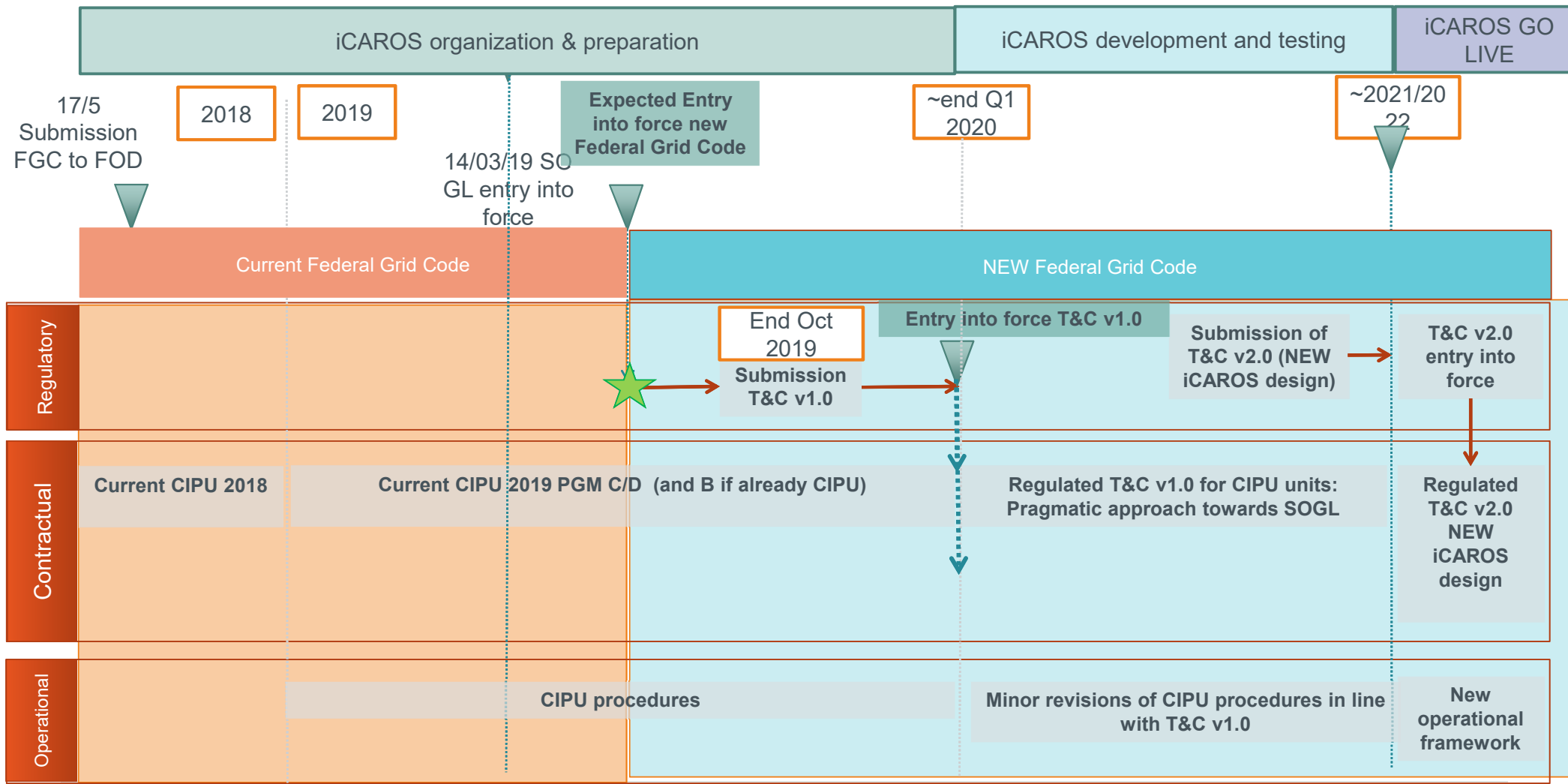# Coordination of assets & Drivers for a redesign

The **coordination of assets** serves to provide Elia with the **data and means** necessary to:

➤ avoid congestions on the grid

➤ ensure the availability of ancillary services

➤ monitor the availability of production to satisfy demand

with the aim of providing a secure grid.

**NOW**

**CIPU contract**
(Coordination of Injection
of Production Units)

**Federal Grid Code**

EU Guidelines

New Federal Grid Code

Regulated Coordination Rules

Changing Energy Landscape

Market Concerns

Elia Dispatching Needs

**FUTURE**

**New contractual framework**

**New Federal Grid Code**

**Impact other Belgian regulation?**

**European Guidelines**

# Pragmatic approach towards implementation of iCaros design

| iCAROS organization & preparation | iCAROS development and testing | iCAROS GO LIVE |
|---|---|---|

17/5 Submission FGC to FOD

2018

2019

**Expected Entry into force new Federal Grid Code**

14/03/19 SO GL entry into force

~end Q1 2020

~2021/2022

| Current Federal Grid Code | NEW Federal Grid Code |
|---|---|

**Regulatory**

End Oct 2019
**Submission T&C v1.0**

**Entry into force T&C v1.0**

**Submission of T&C v2.0 (NEW iCAROS design)**

**T&C v2.0 entry into force**

**Contractual**

**Current CIPU 2018**

**Current CIPU 2019 PGM C/D  (and B if already CIPU)**

**Regulated T&C v1.0 for CIPU units: Pragmatic approach towards SOGL**

**Regulated T&C v2.0 NEW iCAROS design**

**Operational**

**CIPU procedures**

**Minor revisions of CIPU procedures in line with T&C v1.0**

**New operational framework**

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# Project Timeline – High Level Delivery Plan until Go-Live

elia

**Dec 2017**

**Dec 2019**

**2021/ 2022**

iCaros Design

Planning and organization : translation of design into business requirements

Development iCaros platform(s)

Testing of iCaros platform(s) (UAT)

Go-Live Prepa-ration

Go-Live Window

Development@ users/ providers

Testing of Users/providers developments

Completed

On going

To be planned by Elia

To be planned by users/providers

Draft planning to be updated and reviewed as more detailed information becomes available.

# Dates

8 fine-tuning sessions (2hours)

❑ First 4 sessions pure brainstorming regarding fine-tuning topics

- 2/4
- 23/4
- 22/5
- 24/6

❑ Following 4 sessions mock-ups & brainstorming regarding fine-tuning topics

- 25/9
- 23/10
- 27/11
- 17/12

Fine-tuning session 1 :

**DESIGN NOTE FOR THE COORDINATION OF ASSETS:**

**PART II – SCHEDULING AND REDISPATCHING**

- Scheduled data exchange DA/ID for Energy storage

- Bidding of flexibility for redispatching: bid properties

# Summary Asset Obligations

- Expansion of assets included in coordination and congestion management.

  Rules on operational information exchange in SO GL:

| Connection | AS IS | | Production B Storage B | Production A Storage A | Demand facility |
|---|---|---|---|---|---|
| | Production D Storage D | Production C Storage C | | | |
| TSO / PVN-RTL / TSO-connected CDS | Outage planning | Outage planning | Outage planning | | Outage planning if cross-border relevant |
| | DA/ID Scheduling | DA/ID Scheduling | DA/ID Scheduling | | DA Scheduling |
| | Bidding for redispatching | Bidding for redispatching | Bidding for redispatching | | Bidding for redispatching |
| | GFlex | GFlex | GFlex | GFlex | |

*LEGEND:*

| | |
|---|---|
| **Mandatory** | |
| **Mandatory connection/access contract** | |
| **Voluntary** | |

- Yearly contracts replaced by contracts of longer duration (lifetime or ad hoc depending the obligations and services).

# DA/ID Scheduling: MW or ON/OFF schedules

**PGM & storage C/D ≥ 25MW**

➢ A MW schedule provides MW output per quarter-hour of day D.

| ... | 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 | ... |

➢ DA and ID scheduling obligation.
➢ Real-time metering required to follow-up the MW schedule.
➢ Flexibility activations require a modification of the MW schedule.

**PGM & storage B < 25MW (choice between MW or ON-OFF schedules)**

➢ A ON-OFF schedule provides information on the running mode (ON or OFF) per quarter-hour of day D.

| ... | 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 | ... |

➢ DA and ID scheduling obligation.
➢ Real-time metering required to follow-up the ON-OFF schedule.
➢ Flexibility activations including a start-up or shut-down require a modification of the ON-OFF schedule.

**Demand (only if RD bidding)**

➢ A MW schedule provides MW output per quarter-hour of day D.

| ... | 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 | ... |

➢ DA and ID scheduling obligation.
➢ Real-time metering required to follow-up the MW schedule.
➢ Flexibility activations require a modification of the MW schedule.

# Scheduled data exchange DA/ID for Energy storage

ELIA applies the **same principles on energy storage as on Power-Generating Modules**, the difference being that **two 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.
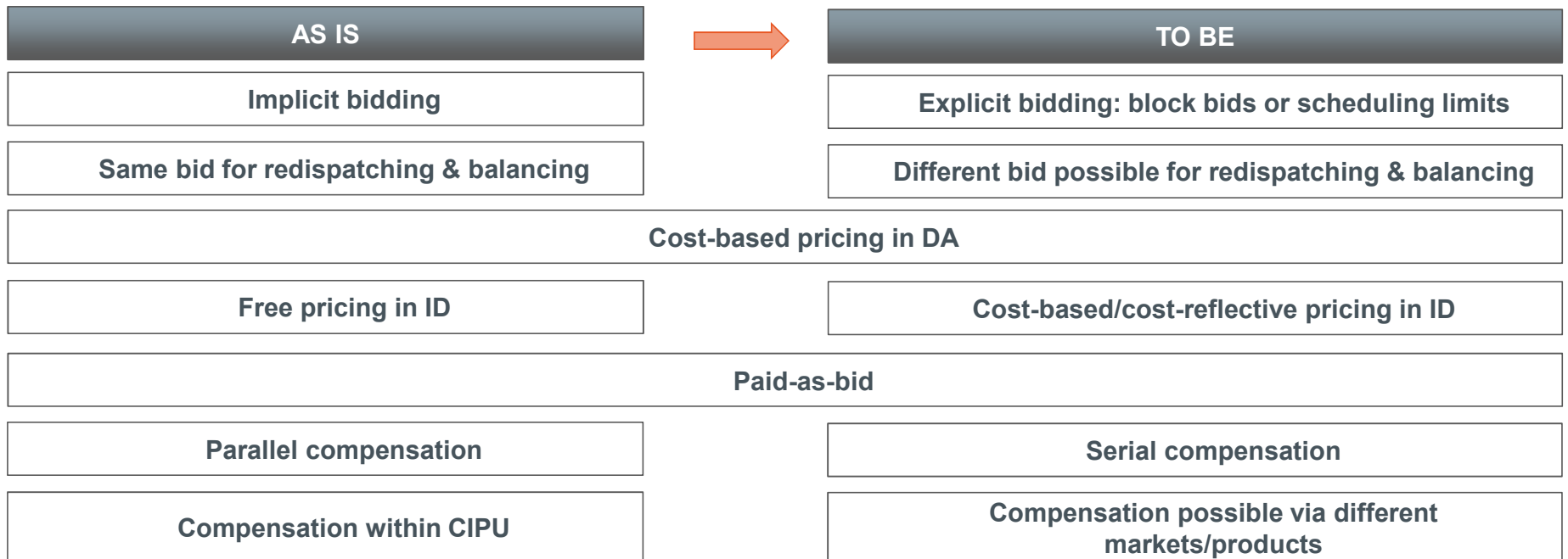
Feedback during public consultation: why not one schedule including both the loading and discharge of the energy storage device?

> Question to stakeholders: preferences? Reasons for one option (two separate schedules) or the other (one schedule)?

Topic 2 Fine-Tuning workshop :

# Bidding of flexibility for redispatching: bid properties

# Redispatching bidding: AS IS => TO BE

| AS IS | | TO BE |
|---|---|---|
| Implicit bidding | → | Explicit bidding: block bids or scheduling limits |
| Same bid for redispatching & balancing | | Different bid possible for redispatching & balancing |
| Cost-based pricing in DA | | |
| Free pricing in ID | | Cost-based/cost-reflective pricing in ID |
| Paid-as-bid | | |
| Parallel compensation | | Serial compensation |
| Compensation within CIPU | | Compensation possible via different markets/products |

# Summary – Bidding for redispatching

| Grid User | = | Scheduling Agent | OR | Grid User | → | FSP/BSP | = | Scheduling Agent |

**Signatory of contract Scheduling & Redispatching Bidding**
with Elia

**Signatory of contract Scheduling & Redispatching Bidding**
with Elia

**Mandatory bidding of available flexibility for**

- PGM & storage type D
- PGM & storage type C
- PGM & storage type B

**Voluntary bidding of available flexibility for**

- Demand facilities

**Bidding level**

'unit'-based

**Bidding**

Explicit bidding

Energy bids or scheduling limits

**Remuneration**

PGM/storage B/C/D: cost-based pricing (indicative formula)

Demand: cost-reflective pricing

(Note: PGM with flexible access (Gflex): mandatory bidding of decremental flex)

# Bidding level

**1**    **National portfolios** (with delivery points spread across entire Belgium) are only useful for international redispatching purposes, specifically **countertrading**.

**2**    Portfolios for national redispatching purposes can only include delivery points located in the same geographic area: all delivery points in the portfolio must be located in the same zone. The **zonal portfolio** is only useful in case of **congestion between zones**.

**3**    **Congestions within zones** require **location-specific** bids.

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**Portfolio bids will not be possible for redispatching in the first implementation phase of ICAROS.**
*(the need for such could be evaluated in a later phase)*

# Bidding of flexibility on PGM & storage C & D (≥ 25MW)

- Hypothesis: Continuation of current bidding obligations (Federal Grid Code, CIPU) for redispatching (taking into account whether an asset is fully coordinable, limited coordinable, or not coordinable).

- Bidding on unit-level

- Bidding format: explicit block bids (in compliance with article 2 of GL EB)

- ID MW schedule obligation: the MW schedule is used as baseline for activations

# Explicit form of bidding: Alternative 1 = Block bids

*Bid indicating the MW delta available for incremental and decremental redispatching actions*

**SCHEDULING AGENT**

**ELIA**

**Bid**

MW

**1. Incremental block bid offered**

t(qh)

**2. Elia matches the schedule and the bids.**
**Result: an operating margin for incremental activations up to a theoretical maximum per qh.**

**Schedule**

MW

**1. MW schedule or baseline**

minimum

t(qh)

**3. Activation request**

**3. Elia activates the incremental bid that can be translated into a requested value …**

**4. … and into a new schedule sent to the Scheduling Agent for the quarter-hours concerned**

**A redispatching activation**
= a new schedule commanded by Elia

**Incremental activation**
⇒ the schedule prescribes a <u>minimum</u> schedule

**Decremental activation**
=> the schedule prescribes a <u>maximum</u> schedule

# Bidding of flexibility on PGM & storage B (< 25MW)

- Bidding obligation for redispatching (taking into account whether an asset is fully coordinable, limited coordinable, or not coordinable.         Remark: possible automatisation on bidding process, e.g., set default bid to avoid daily operations

- Bidding on unit-level

- Bidding format:

  - If same bid as for balancing: explicit block bids (in compliance with article 2 of GL EB)

  - If different bid than for balancing: choice between explicit block bids and scheduling limit (see further slides)

- if MW schedule is available (not ON-OFF schedule) then the MW schedule is used as baseline for activations

# Explicit form of bidding : Alternative 2 = Scheduling Limit bids

*Bid indicating an incremental and decremental limit for redispatching actions*

**SCHEDULING AGENT**  **ELIA**

**Bid**

MW

1. **Scheduling limit (maximum) offered (could vary per quarter-hour)**

minimum

t(qh)

2. **Elia matches the limit with the received schedule.**

**Schedule**

MW

1. MW schedule or baseline

3. **Elia activates a part of the incremental bid that can be translated into a Erequested value …**

4. **… and into a new schedule sent to the Scheduling Agent for the quarter-hours concerned**

3. Activation request

t(qh)

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**A redispatching activation**
= a new schedule commanded by Elia

**Incremental activation**
⇒ the schedule prescribes a <u>minimum</u> schedule

**Decremental activation**
=> the schedule prescribes a <u>maximum</u> schedule

# Bidding of flexibility on demand

- No bidding obligation for redispatching

- In case of bidding for redispatching: Bidding on the level of the demand facility (1st implementation phase: no portfolio bids)

- Bidding format:

  - If same bid as for balancing: explicit block bids (in compliance with article 2 of GL EB)

  - If different bid than for balancing: choice between explicit block bids and scheduling limit (see further slides)

- If redispatching bidding than ID schedule obligation: the MW schedule is used as baseline for activations

# Price setting for congestion bid & Remuneration

**Grasping ID market opportunities  +  Cost-based redispatching**

The proposed design reduces the impact of congestions on the ID markets compared to CIPU:

- No more block on schedules depending on CRI level.
- When possible Elia will wait to activate flexibility for redispatching

…thereby elevating the risks of congestion management for Elia.

Cost-based pricing allows Elia to keep congestion management cost efficient while at the same time (in combination with the above) allowing market parties to maintain the financial benefits of ID market deals and therefore a reduction of opportunity costs.

| | |
|---|---|
| PGM: price determined by a cost-based formula * <br> $\Rightarrow$ different prices for congestion & balancing <br><br><br> Demand: cost-reflective price (same marginal price as for balancing if not in portfolio bid) <br> $\Rightarrow$ Monitoring by Elia to highlight non-competitive / non-reasonable price setting | Paid-as-bid: <br> $Remuneration = E_{requested} \times bid\ price$ |

\* exception: PGM - decremental bid under Gflex contract: regulated price (regional regulation)

# Bid properties - Possibilities

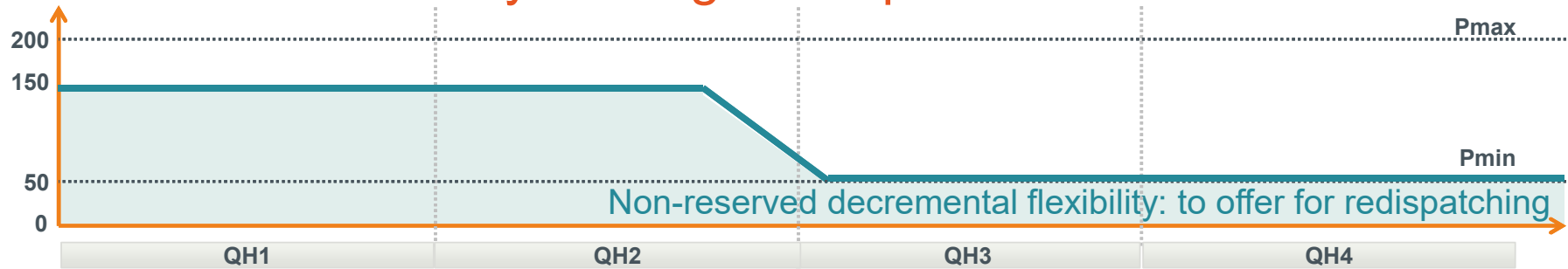| Bid property | Unit | Explanation |
|---|---|---|
| Delay | 15 Min | the deadline for an activation request before the start of the bid |
| Minimum activation time | 15 Min | minimum activation duration of a bid once it gets activated |
| Maximum activation time | 15 Min | indicating the maximum number of times (if any) that a bid can be called off during the availability period |
| Bid size (Block bid or Scheduling Limit Bid) | MW | |
| Divisibility | / | whether a bid can be partially activated or not (e.g. non-divisible in case of start-up) |
| Condition (Interaction or Exclusivity) | | - Cannot be combined with bid #… <br> - Must be preceded by bid #… (for activation with start-up) <br> - Must be activated together with bid #… |
| Fix Price (€) | € | (e.g. representing start-up costs in case of start-up or shut-down activation) |
| Activation Price (€/MWh) | €/MWh | |
| Locational information | EAN | |
| Flex direction | | |

# Explicit bids & full availability bidding: example start up/incremental
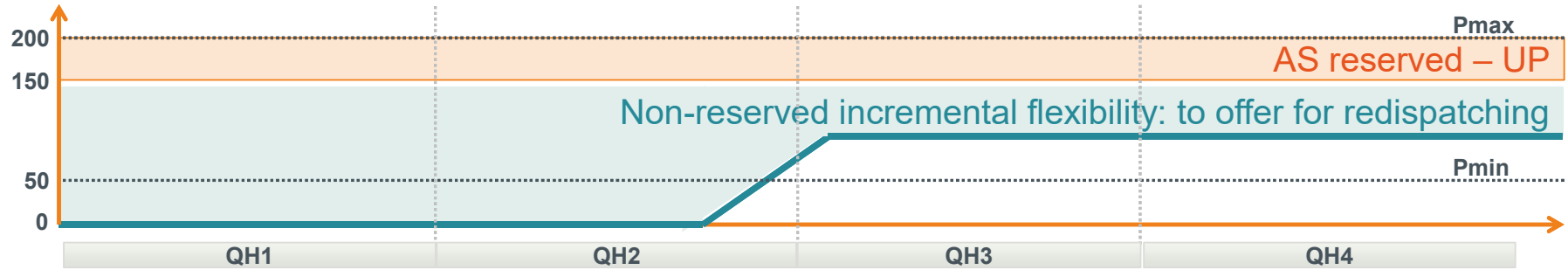


| Bid property | Unit | QH1 start up bid | QH1 incremental bid | QH2 start up bid | QH2 incremental bid | QH3 incremental bid | QH4 incremental bid |
|---|---|---|---|---|---|---|---|
| Delay | 15 Min | 0 | 0 | 0 | 0 | 0 | 0 |
| Minimum activation time | 15 Min | 1 | 1 | 1 | 1 | 1 | 1 |
| Maximum activation time | 15 Min | | | | | | |
| Bid size | MW | 50MW | 100MW | 50MW | 100MW | 50MW | 50MW |
| Divisibility | Y ; N | N | Y | N | Y | Y | Y |
| Condition (Interaction or Exclusivity) | | | To be activated with or after start-up bid | | To be activated with or after start-up bid | | |
| Fix Price (€)* | € | 1000€ (if additional start-up) | N/A | N/A (as start-up foreseen) | N/A | N/A | N/A |
| Activation Price (€/MWh) | €/MWh | 70€/MWh | 70€/MWh | 70€/MWh | 70€/MWh | 70€/MWh | 70€/MWh |
| Locational | EAN | EAN code | EAN code | EAN code | EAN code | EAN code | EAN code |
| Flex direction | I ; D | I | I | I | I | I | I |

\* Rules for payment to be specified

# Explicit bids & full availability bidding: example shut down/decremental



| Bid property | Unit | QH1 decremental bid | QH1 shut down bid | QH2 decremental bid | QH2 shut down bid | QH3 shut down bid | QH4 shut down bid |
|---|---|---|---|---|---|---|---|
| Delay | 15 Min | 0 | 0 | 0 | 0 | 0 | 0 |
| Minimum activation time | 15 Min | 1 | 1 | 1 | 1 | 1 | 1 |
| Maximum activation time | 15 Min | | | | | | |
| Bid size | MW | 100MW | 50MW | 100MW | 50MW | 50MW | 50MW |
| Divisibility | Y ; N | Y | N | Y | N | N | N |
| Condition (Interaction or Exclusivity) | | | To be activated with or after decremental bid | | To be activated with or after decremental bid | | |
| Fix Price (€)* | € | N/A | 1000€ (if additional start-up) | N/A | 1000€ (if additional start-up) | 1000€ (if additional start-up) | 1000€ (if additional start-up) |
| Activation Price (€/MWh) | €/MWh | - 70€/MWh | - 70€/MWh | - 70€/MWh | - 70€/MWh | - 70€/MWh | - 70€/MWh |
| Locational | EAN | EAN code | EAN code | EAN code | EAN code | EAN code | EAN code |
| Flex direction | I ; D | D | D | D | D | D | D |

* Rules for payment to be specified

# Annex

# For information: Thresholds for PGM A/B/C/D as specified in FTR

Thresholds for PGM A/B/C/D & required derogations on NC RfG

(towards implementation of RfG art. 5(3))

⇒ Derogations (categories Type D (requir.=A) and Type D
  (requir.=B)) only apply for connection requirements."



Legend:
- Type D (requir. = A)
- Type D (requir. = B)
- Type A
- Type B
- Type C
- Type D
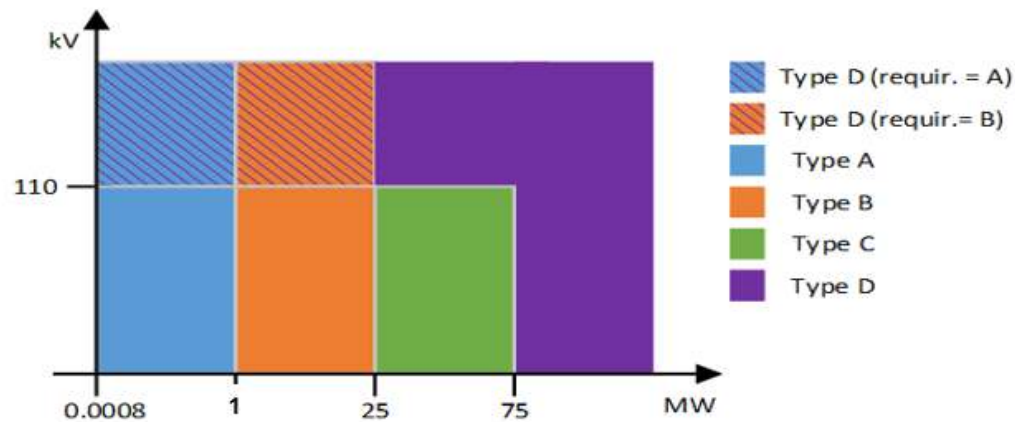
**The same classification for
<u>Storage Devices</u>
(but only based on installed capacities not on kV
connection levels)**

Graphical representation of the limits considering the adaptation of
requirements for units of type D smaller than 25MW

# Definition Coordinable – Limited Coordinable

- Coordinable or "C" : Characteristic of a CIPU Technical Unit which is technically capable of modifying its power injection on the Elia Grid upon request by ELIA, within 15 minutes;

- Limited Coordinable or "LC"' : Characteristic of a CIPU Technical Unit which is technically capable of modifying its power injection on the Elia Grid upon request by ELIA, within 15 minutes or more depending on technical and/or organizational constraints;