The Info Session will start at 10:05

Microphones will be muted. Please write your comments and/or questions in the chat during the presentation: We'll answer them during the Q&A at the end of the presentation.

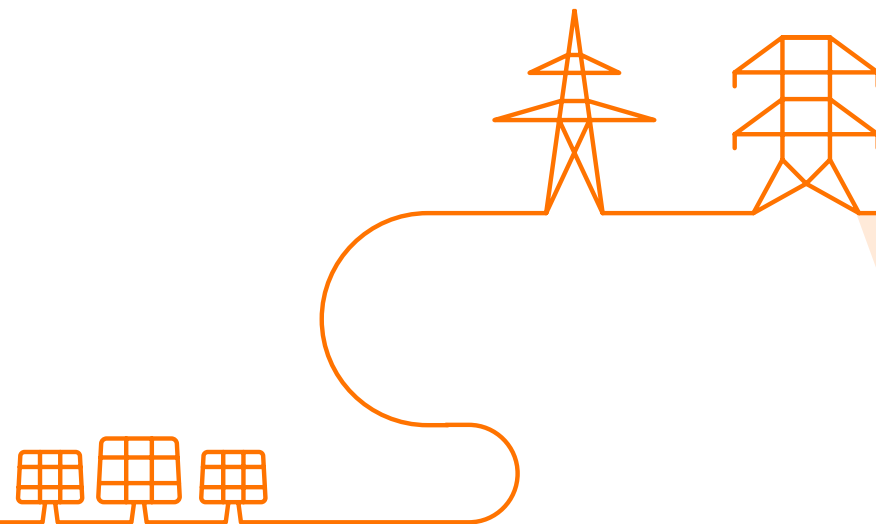This info session will be recorded and will be made available on the Elia Website.

Info session

Upcoming trial publication of the imbalance price forecast
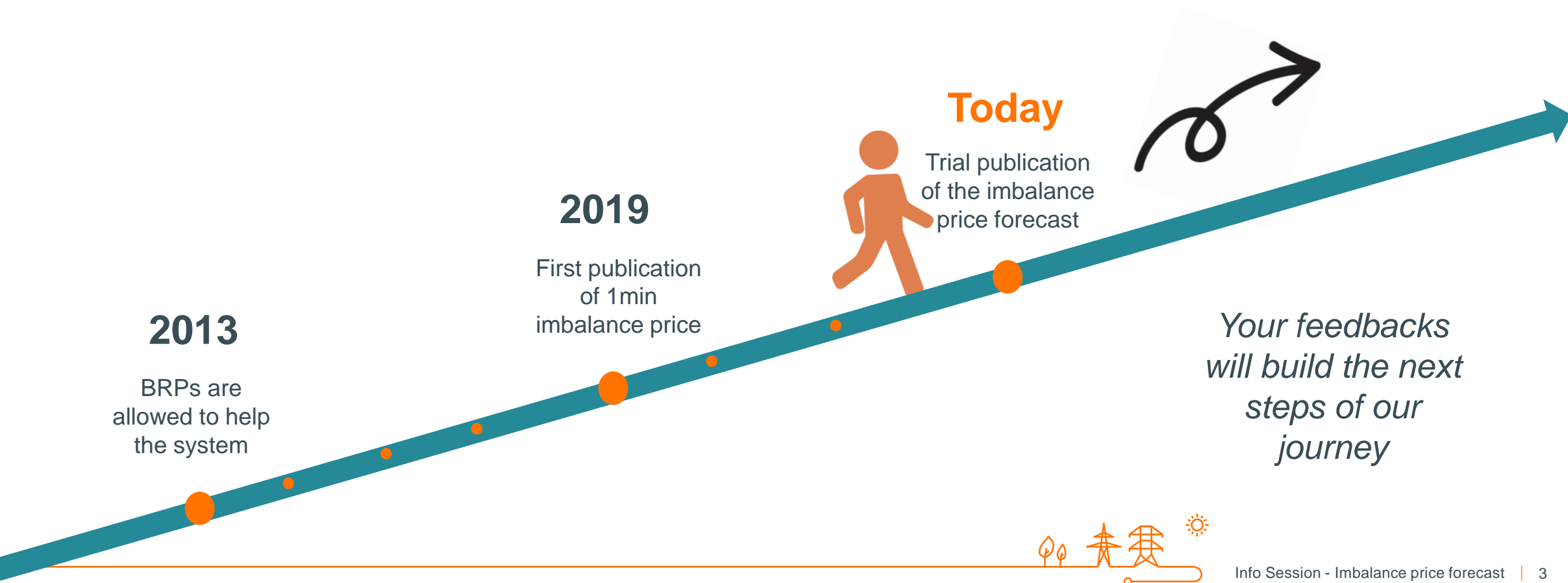
11th of September 2024

Agenda

1. Introduction

2. Methodology

3. Quality of the forecast

4. How to get access ?

5. Communication protocol

6. Q&A

Towards an efficient decentralized grid balancing model
Continuous improvement journey

2013

BRPs are allowed to help the system

2019

First publication of 1min imbalance price

Today

Trial publication of the imbalance price forecast

Your feedbacks will build the next steps of our journey

Current publication: 1min imbalance price

Today, 1minute imbalance prices are published on OpenData:

- the 1min prices give an indication, updated every minute, of the imbalance price of the quarter-hour

- it is not a forecast; it applies the data already available for the quarter-hour to the imbalance price formula

- the first 1min price is published 2-3 minutes after the beginning of the quarter-hour

	Datetime	Resolution code	Quarter hour	Quality status	ACE	System imbalance	Alpha	Alpha'	Marginal
1	4 September 2024 06:26	PT1M	4 September 2024 06:15	NV	26.376 MW	100.856 MW	0 €/MWh	0 €/MWh	109.283
2	4 September 2024 06:25	PT1M	4 September 2024 06:15	NV	27.56 MW	97.041 MW	0 €/MWh	0 €/MWh	109.283
3	4 September 2024 06:24	PT1M	4 September 2024 06:15	NV	25.125 MW	97.418 MW	0 €/MWh	0 €/MWh	109.283
4	4 September 2024 06:23	PT1M	4 September 2024 06:15	NV	21.554 MW	98.286 MW	0 €/MWh	0 €/MWh	109.333
5	4 September 2024 06:22	PT1M	4 September 2024 06:15	NV	16.941 MW	99.189 MW	0 €/MWh	0 €/MWh	109.66
6	4 September 2024 06:21	PT1M	4 September 2024 06:15	NV	22.026 MW	108.163 MW	0 €/MWh	0 €/MWh	109.743
7	4 September 2024 06:20	PT1M	4 September 2024 06:15	NV	20.512 MW	109.528 MW	0 €/MWh	0 €/MWh	109.775
8	4 September 2024 06:19	PT1M	4 September 2024 06:15	NV	15.935 MW	108.101 MW	0 €/MWh	0 €/MWh	109.751

New trial publication: imbalance price forecast

What ? Publication of an imbalance price **forecast** with a confidence indicator:

- 1 minute <u>before</u> the quarter-hour

- Confidence indicator (high, medium, low) indicates how sure Elia is about the forecast

When ? Go-live on September 18, until mid-November*

How ? Information is publicly accessible via API

*Exact date still to determine and will be communicated later

What is the expected outcome ?

1. Evaluate the impact of the publication before the quarter-hour on the reaction of market parties.

2. Put in place some use cases (theoretical and/or real-life) to assess the added-value of such a publication.

3. Get a first feedback on the format and the quality of the publication.

4. Make it transparent to market parties what ELIA can and what ELIA cannot forecast today.
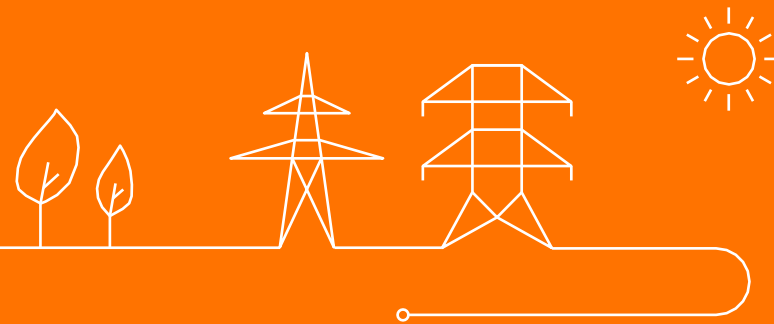
If you have any feedback or question, we'll be more than happy to discuss it with you !

Disclaimer

The publication will be done at <u>best effort as a proof of concept</u>. **We do not guarantee the availability and the quality of the forecast.**

This forecast is given as an <u>additional information</u> and should only **be used together with what is available today** (1min imbalance prices, current system imbalance, etc.). If the forecast is used for reactive balancing, please consider the other indicators made available by Elia.

Methodology

Contractual imbalance price formula (1/2)

The imbalance price is calculated based on two components:

$$imbalance\ price = main\ component \pm additional\ component$$

where,

- the main component equals the Marginal Incremental Price (MIP) if the system is short (system imbalance ≤ 0)

- the main component equals the Marginal Decremental Price (MDP) if the system is long (system imbalance > 0)

- the additional component (α) is added to the MIP if the system is short and subtracted from the MDP if the system is long

Contractual imbalance price formula (2/2)

The MIP and the MDP are calculated as follows :

- If the system imbalance is in the range [-25MW,25MW] (deadband), the MIP/MDP equals the average between the price of the first FRR Energy Bid in the upward direction (VoAA+) and the price of the first FRR Energy Bid in the downward direction (VoAA-).

- Otherwise:

MIP	MDP
Maximum between:	**Minimum between:**
• <u>aFRR price upwards</u>: weighted average of activation prices for aFRR Up	• <u>aFRR price downwards</u>: weighted average of activation prices for aFRR Down
• <u>mFRR marginal price upwards</u>: highest price of mFRR energy bids in the upward direction activated during the quarter-hour	• <u>mFRR marginal price downwards</u>: lowest price of mFRR energy bids in the downward direction activated during the quarter-hour
• <u>Floor</u>: maximum between VoAA+ and VoAA-	• <u>Cap</u>: minimum between VoAA+ and VoAA-

Imbalance price forecast formula (1/4)

The imbalance price forecast only takes the main component into account:

$$imbalance\ price\ forecast = main\ component\ forecast \pm additional\ component$$

where,

- the main component forecast equals the Marginal Incremental Price (MIP) if the system is <u>forecasted</u> short (system imbalance forecast ≤ 0MW)*

- the main component forecast equals the Marginal Decremental Price (MDP) if the system is <u>forecasted</u> long (system imbalance forecast > 0MW)*

Exception - In case mFRR is activated, it automatically sets the main component at MIP or MDP depending on the direction of the activated mFRR, whatever the sign of the forecasted SI

The system imbalance forecast is described on the Elia website and available on OpenData

Imbalance price forecast formula (2/4)

The MIP and the MDP are calculated as follows :

- If the system imbalance <u>forecast</u> is in the range [-25MW,25MW] (deadband) and <u>no mFRR is activated</u>, the MIP/MDP equals the average between the price of the first FRR Energy Bid in the upward direction (VoAA+) and the price of the first FRR Energy Bid in the downward direction (VoAA-).

- Otherwise:

MIP	MDP
Maximum between:	**Minimum between:**
• <u>aFRR price upwards</u>: calculated (see next slide)	• <u>aFRR price downwards</u>: calculated (see next slide)
• <u>mFRR marginal price upwards:</u> highest price of mFRR energy bids already activated in the upward direction at the time of the forecast	• <u>mFRR marginal price downwards:</u> lowest price of mFRR energy bids already activated in the downward direction at the time of the forecast
• <u>Floo</u>~~r~~ ✖	• <u>Cap</u> ✖

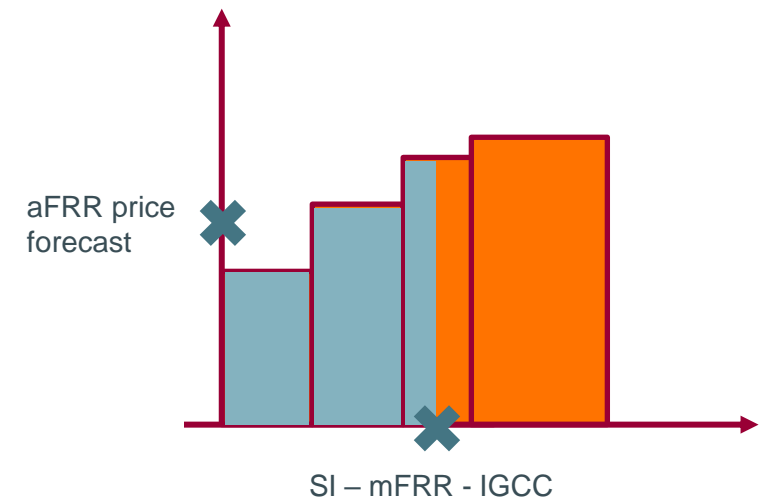# Imbalance price forecast formula (3/4)

The aFRR price upwards is calculated as follows:

1. Rank the aFRR energy bids upwards from lowest to highest price (merit-order)

2. Calculate the volume to be covered by aFRR: SI forecast – mFRR activated – IGCC

   - Estimate the IGCC volume by keeping the same repartition between the IGCC volume and the aFRR volume* as at the moment of the forecast.

$$IGCC\ volume = \frac{IGCC\ current\ QH}{IGCC\ current\ QH + aFRR\ current\ QH} \times (SI\ forecast - mFRR\ activated)$$

3. Select the aFRR energy bids and volumes by applying the volume (2) to the merit-order (1)

4. Take the weighted average of the prices of the aFRR energy bids, the weights being the selected volumes

aFRR price forecast

SI – mFRR - IGCC

$$aFRR\ price = \frac{\sum_{selected\ bids}[price \times selected\ volume]}{SI - mFRR - IGCC}$$

*the IGCC and aFRR volumes at the moment of the forecast are taken from OpenData: Balancing energy volume components per minute
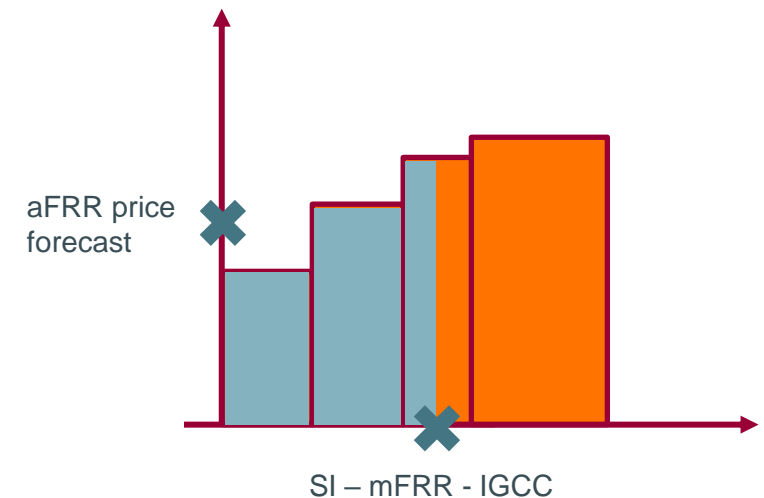
Imbalance price forecast formula (4/4)

The aFRR price downwards is calculated as follows:

1. Rank the aFRR energy bids downwards from highest to lowest price (merit-order)

2. Calculate the volume to be covered by aFRR: SI forecast – mFRR activated – IGCC

   - Estimate the IGCC volume by keeping the same repartition between the IGCC volume and the aFRR volume* as at the moment of the forecast.

$$IGCC\ volume = \frac{IGCC\ current\ QH}{IGCC\ current\ QH + aFRR\ current\ QH} \times (SI\ forecast - mFRR\ activated)$$

3. Select the aFRR energy bids and volumes by applying the volume (2) to the merit-order (1)

4. Take the weighted average of the prices of the aFRR energy bids, the weights being the selected volumes

$$aFRR\ price = \frac{\sum_{selected\ bids}[price \times selected\ volume]}{SI - mFRR - IGCC}$$

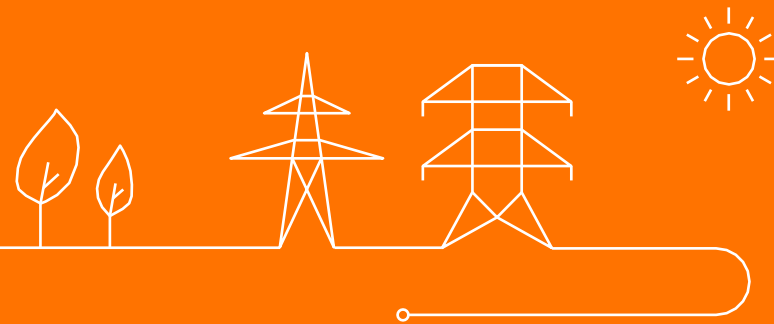aFRR price forecast

SI – mFRR - IGCC

*the IGCC and aFRR volumes at the moment of the forecast are taken from OpenData: Balancing energy volume components per minute

Confidence indicator

The confidence indicator is set according to the following criteria (based on statistical analysis):

| High	Medium	Low
Imbalance price forecast > 350€/MWh **OR** mFRR Up activated and Data availability of SI forecast >80% and IGCC forecast ≠ 0 and No deadband and No counterintuitive activation	Other cases where mFRR Up is activated **OR** mFRR Down activated and mFRR marginal price < -200€/MWh **OR** SI forecast < -25MW and No mFRR activated and Data availability of SI forecast >80%	All other cases

Forecast quality

Indicators used to assess the quality

To assess the quality of our forecast, we use the following indicators:

- **Forecast error distribution curve**: gives the % of qhs (y) for which the forecast error, in absolute value, is under x€/MWh

- **% perfect forecast**: % of quarter-hours for which error < 1€/MWh

- **% error < 50**: % of quarter-hours for which error < 50€/MWh

- **80% error**: 80% of qhs under that error

- **99% error**: 99% of qhs under that error
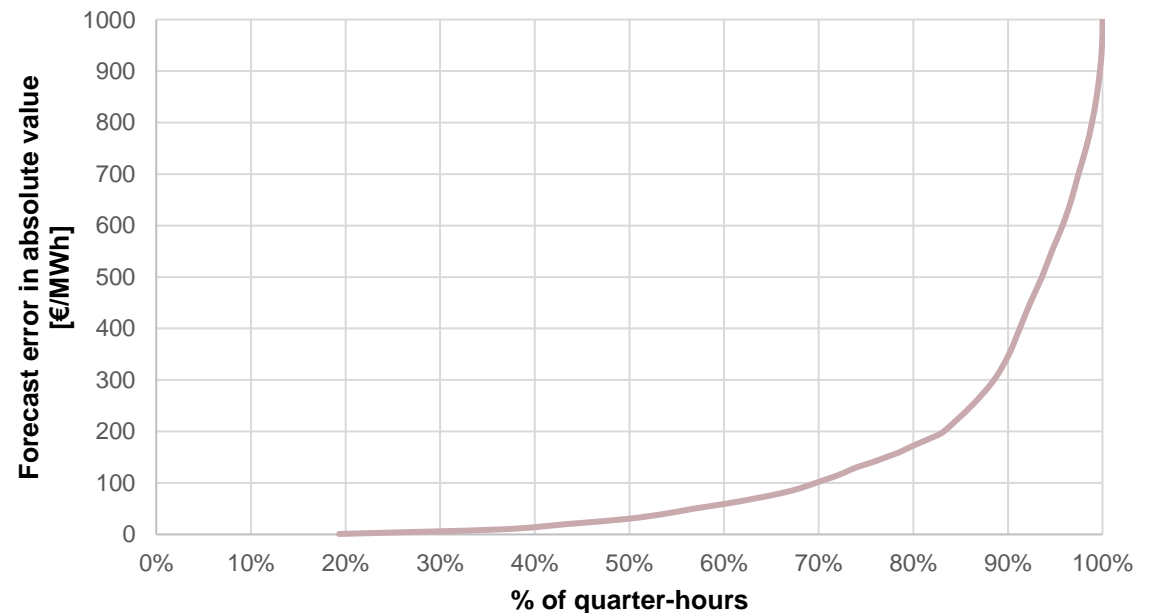
Reference - Current 1min imbalance price (July- August 2024)

The first publication of the 1min imbalance price is taken as <u>reference</u> to assess the quality of our forecast
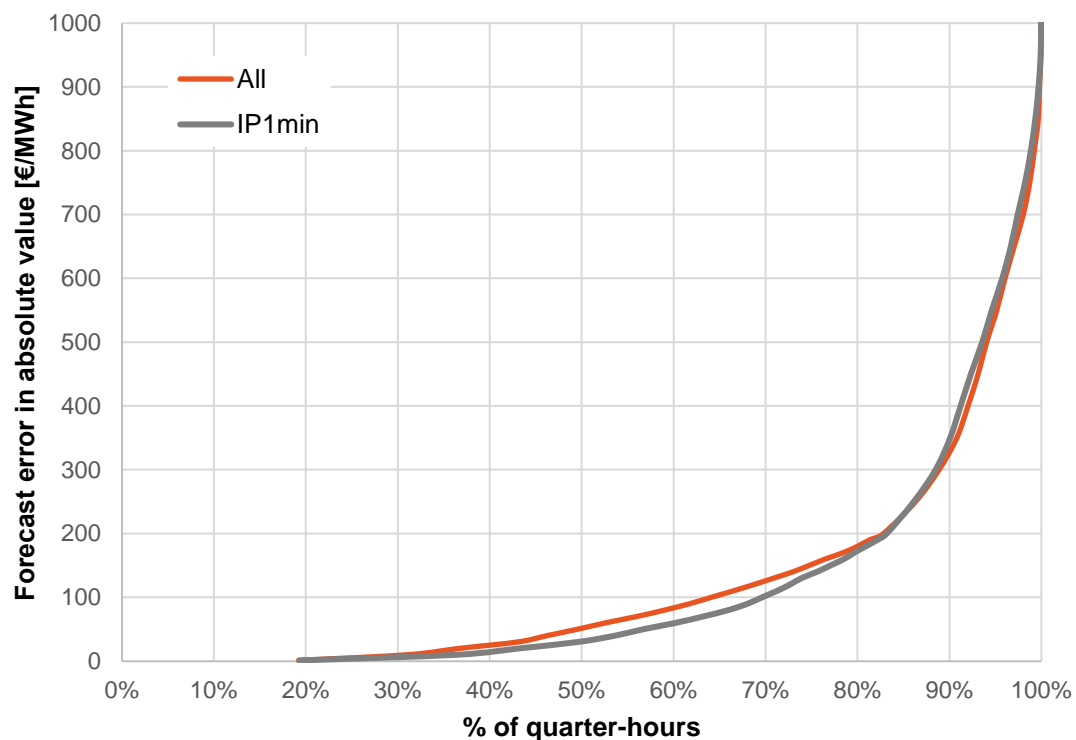
Forecast error distribution curve
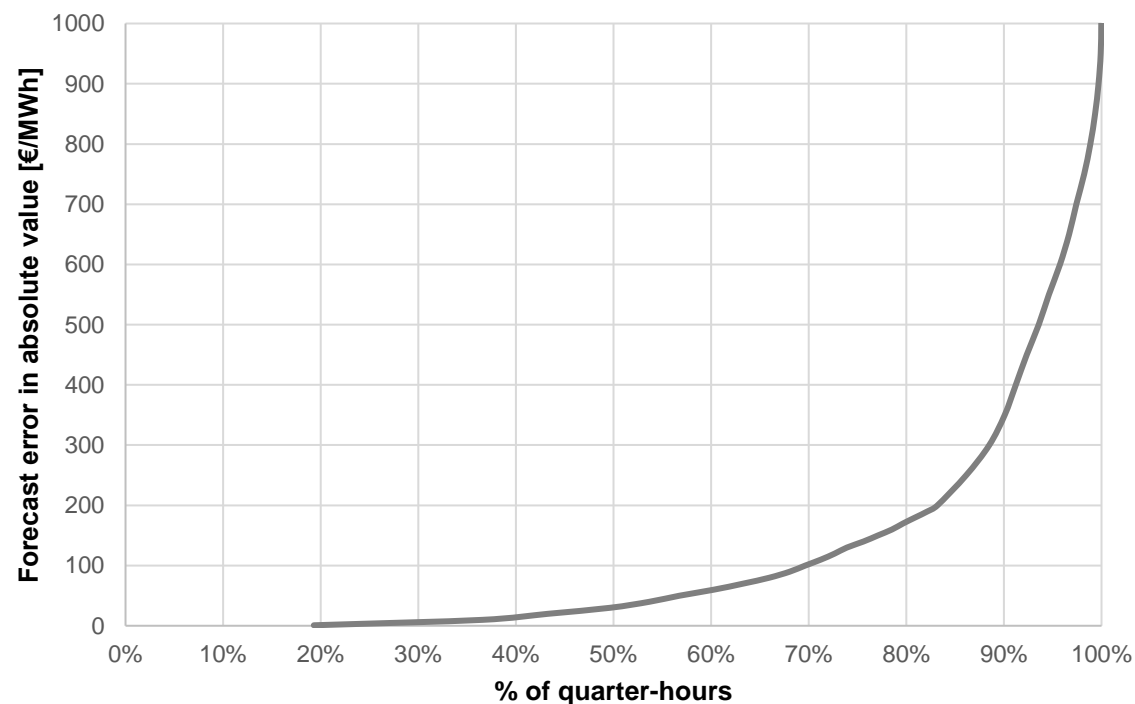
% perfect forecast	19%
% error < 50	57%
80% error	170€/MWh
99% error	800€/MWh

Quality of the forecast (July- August 2024)

The forecast has a slightly worse but similar quality than the reference

Forecast error distribution curve

	Reference *Published at QH+2'*	Forecast *Published at QH-1'*
% perfect forecast	19%	19%
% error < 50	57%	50%
80% error	170€/MWh	180€/MWh
99% error	800€/MWh	750€/MWh

Main causes of errors:
- Quality of SI forecast
- Discontinuity in the imbalance price formation (MDP → deadband → MIP)
- Low liquidity in aFRR down
- Estimated iGCC volumes

Quality of the forecast – Confidence indicator (July- August 2024)

The forecasts with a high and medium confidence indicator are more qualitative than the reference.

Forecast error distribution curve
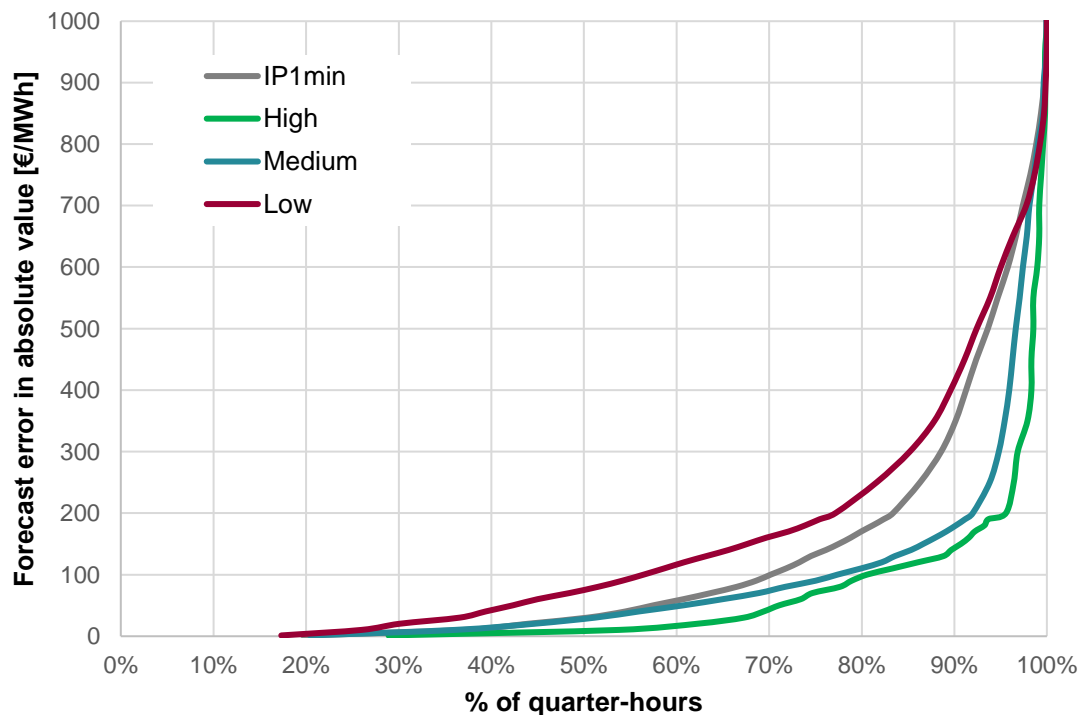
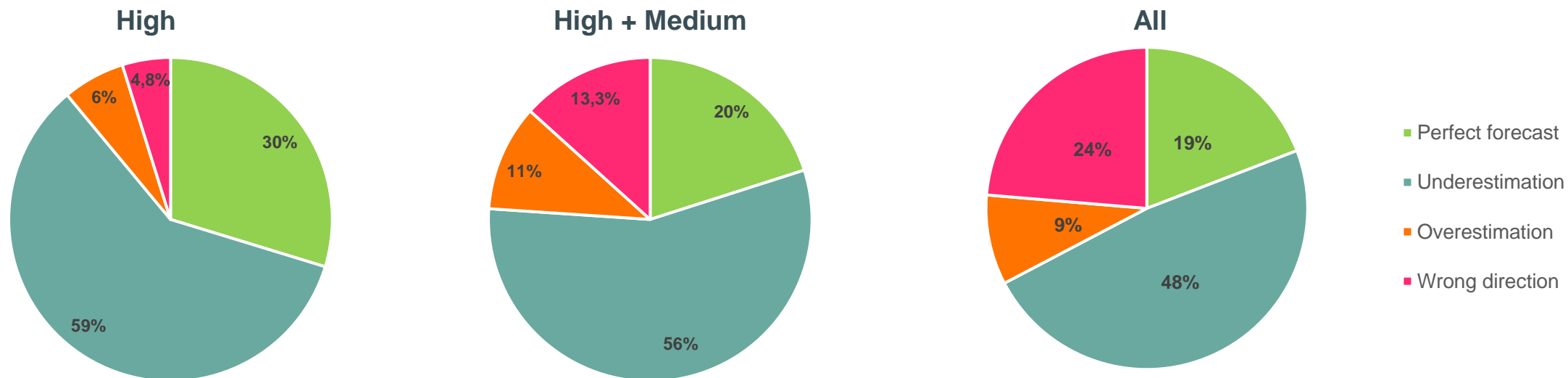|	Reference	High 9% of qhs	Medium 40% of qhs	Low 51% of qhs
% perfect forecast	19%	30%	18%	18%
% error < 50	57%	71%	60%	38%
80% error	170€/MWh	95€/MWh	115€/MWh	275€/MWh
99% error	800€/MWh	600€/MWh	750€/MWh	750€/MWh

Direction of the forecast error

- We can forecast the direction of the imbalance price (MIP/MDP) 76% of the time

- 19% of the quarter-hours have a perfect forecast

- We tend to underestimate the imbalance price (48% of the quarter-hours) → limited triggers for unnecessary reactions

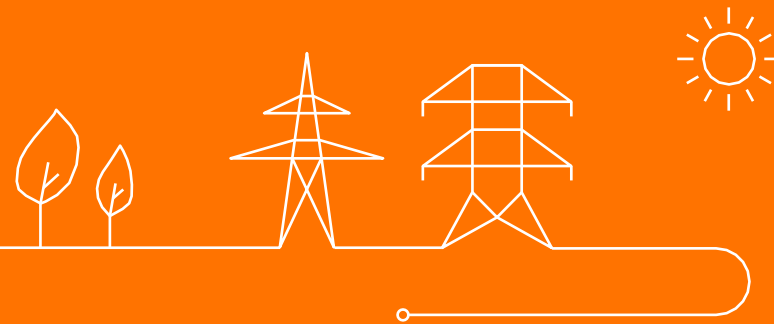→ No risk to use the publication 67% of the time

Legend:
- Perfect forecast (19%)
- Underestimation (48%)
- Overestimation (9%)
- Wrong direction (24%)
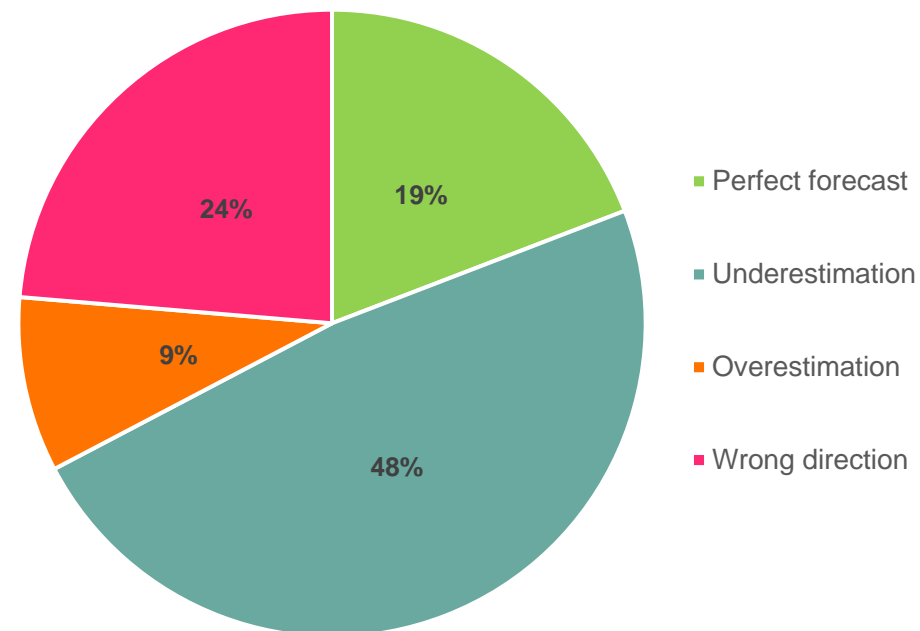
The confidence indicator allows to choose between different levels of risk

- **High confidence**: no risk to use the publication 89% of the time

- **Medium and high confidence**: no risk to use the publication 76% of the time

- **All confidence**: no risk to use the publication 67% of the time

High

- 30% Perfect forecast
- 59% Underestimation
- 6% Overestimation
- 4,8% Wrong direction

High + Medium

- 20% Perfect forecast
- 56% Underestimation
- 11% Overestimation
- 13,3% Wrong direction

All

- 19% Perfect forecast
- 48% Underestimation
- 9% Overestimation
- 24% Wrong direction

Legend:
- Perfect forecast
- Underestimation
- Overestimation
- Wrong direction

How to get access ?

Empowering developers of the energy transition

Integrate the APIs from Elia Group directly into your product offering and get the highest value out of the energy system
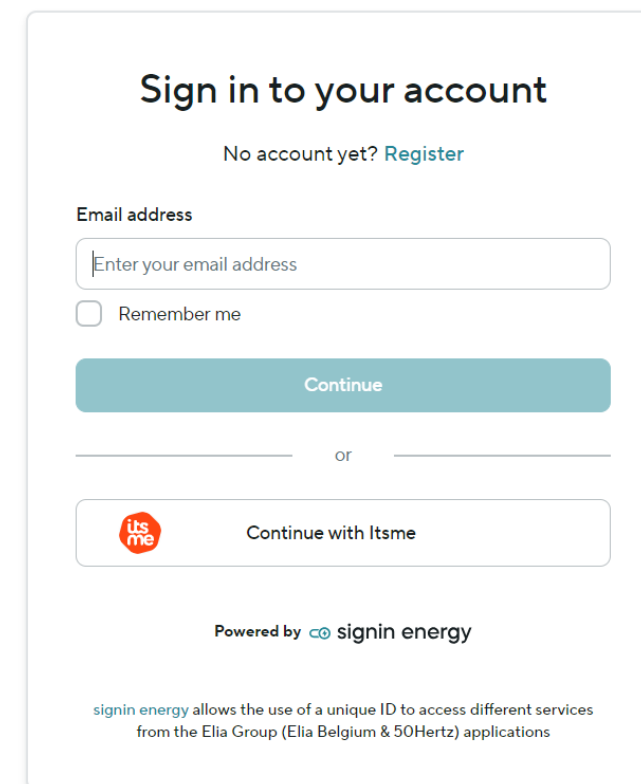
Build your own services, using APIs to Elia Group digital resources   Show all services

https://www.traxes.io/

Next steps

- **Elia** will **send** to all participants an **email to register** to "SignIn Energy", our authentication system (*ignore and do not register if you are not interested*)

- **Elia** will **send** the **credentials** for your company (ClientId & ClientSecret)

- If you need other colleagues to join, please reach out to us via email (cf. last slide of the presentation)

- You will have **access to traXes**, using your SignIn Energy credentials, and to the API as soon as published next week:

  - Linked to your company

  - Default application linked to your company

  - Using the ClientId/ClientSecret we've sent you

Communication protocol
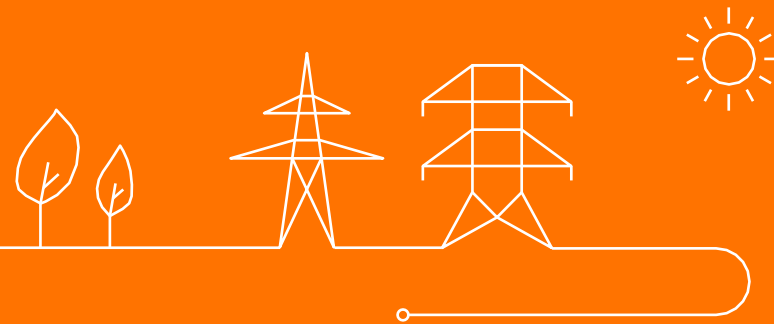
What do I do if I have questions during the trial phase (18/09 – 15/11)?

- **Step 1: I look for answers to my question(s) through the available documentation**

  - T&C BRP: How to become a BRP (elia.be) (mainly art. 30.2)

  - Slides of today

- **Step 2: I send my question(s) via e-mail**

  - I send my question(s) to rtp@elia.be with Sybille.mettens@elia.be in CC; or

  - I send an e-mail to my KAM Energy

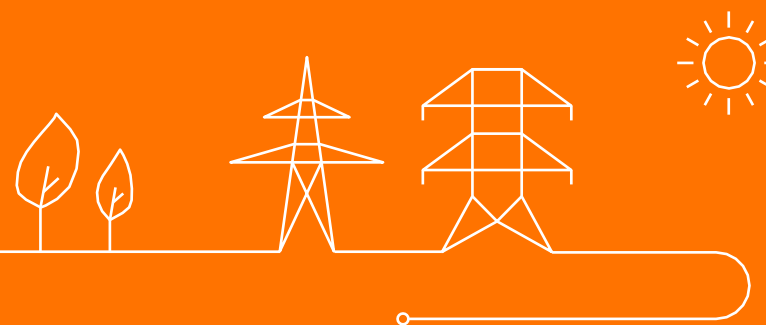- **If your question is urgent, please call +32 2 546 72 10**

Disclaimer: This e-mail address can only be used during the trial phase

ELIA will not answer outside of this testing phase & will not provide you answers if it concerns a subject not discussed during this presentation

Q&A

Thank you