BGM Partner Meeting 2025

Zurich Airport and Online Meeting, 11 November 2025

swissgrid

Agenda

09:30	Welcome address	Bastian Schwark
09:45	The electricity agreement between the Swiss Confederation and the EU – outlook and challenges	Matthias Haller, Counsellor, Mission of Switzerland to the European Union, FDFA
10:15	Updates on PV integration in the Swiss power system	Marc Rüede
10:30	Go Live of new imbalance price mechanism in Switzerland	Thomas Hauri / Lukas Loser
11:00	Power break	
11:15	Swiss balance group management and operational incidents	Quirin Egli
11:35	EPEX Spot market developments: latest updates	Chiara Henle, EPEX Spot
11:55	Important updates on cross border capacity allocation	Benito Barberio
12:15	Lunch break	
13:15	Breakout Sessions: • Active balancing under the new imbalance price model: A deep dive into opportunities and actions • Publication of data at Swissgrid: Opportunities and stakeholder requirements • Implementation of electricity agreement: Key challenges and stakeholder perspectives	 Lukas Loser / Marc Rüede Roman Uhl / Edi Cortesi Julius Schwachheim / Thomas Hauri
14:15	Optimizer under Stress: Challenges of the Balancing Energy Autopilot	Jennifer Abou-Najm / Jacob Tran
14:35	PV for Balancing: an opportunity for the future	Dona Mountouri
14:55	Feedback and questions	Bastian Schwark

Your contact persons for balance group management at Swissgrid

Bastian Schwark
Head of Market Operations

Marc Rüede
Head of Balance Group &
Sched. Services

Julius Schwachheim
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Thomas Hauri
Responsible for
BGM Partner Meeting

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Balance group registration

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The electricity agreement between the Swiss Confederation and the EU – outlook and challenges

Matthias Haller
Counsellor, Mission of Switzerland to the European Union
Federal Department of Foreign Affairs FDFA

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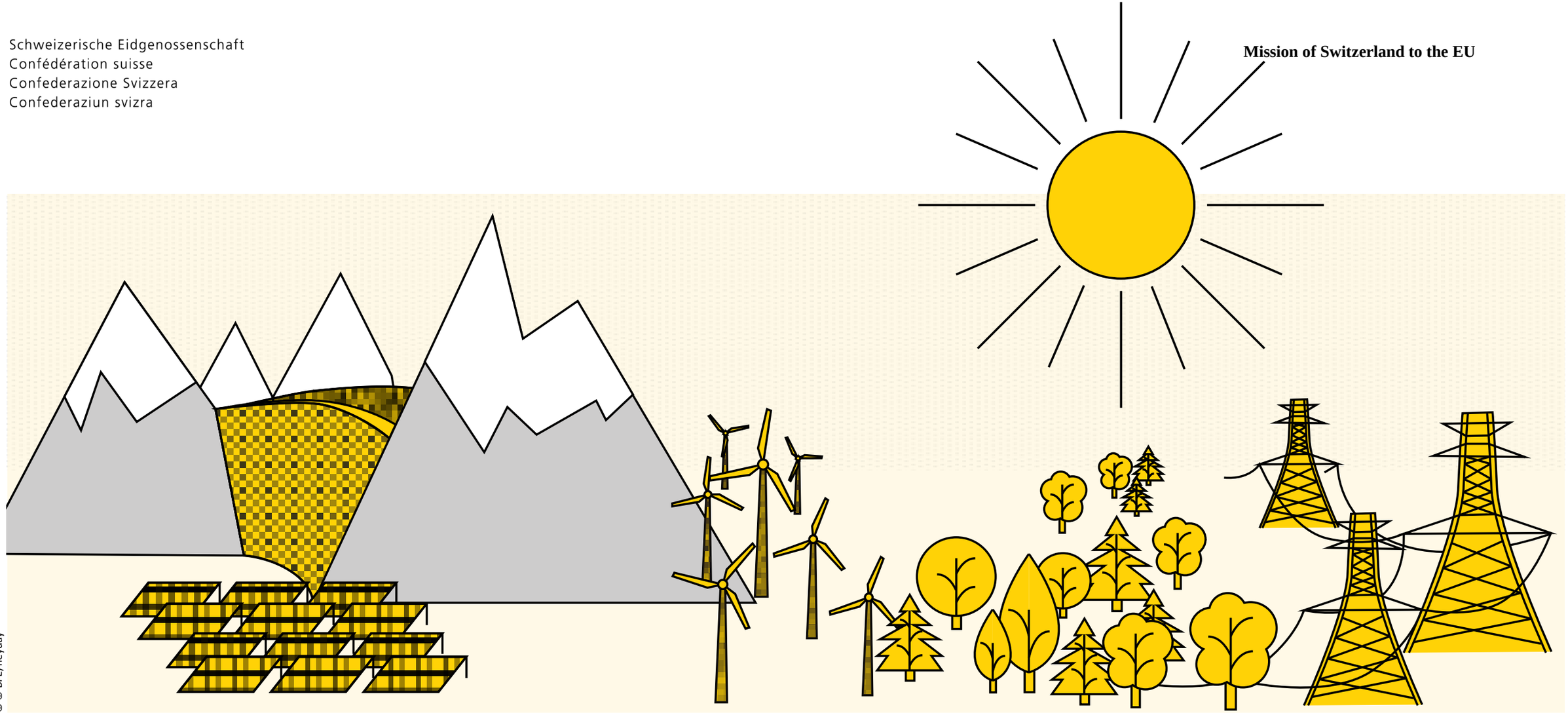
Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Mission of Switzerland to the EU



AGREEMENT BETWEEN THE SWISS CONFEDERATION AND THE EUROPEAN UNION ON ELECTRICITY

CH-EU Agreement on Electricity

Bilanzgruppen Partner Meeting - Matthias Haller - 11.11.2025

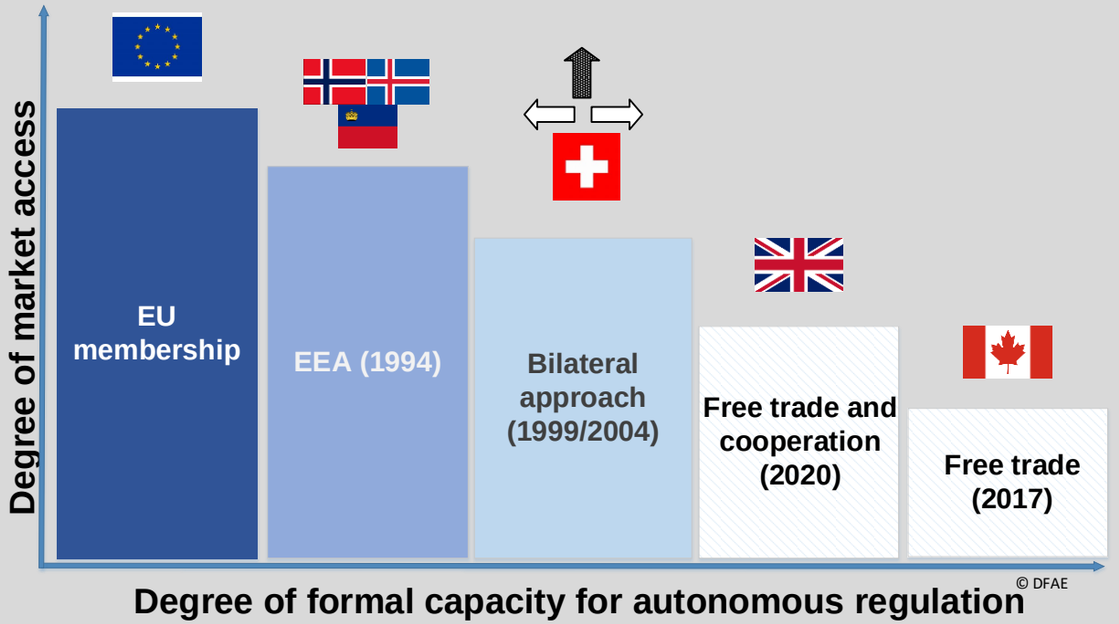
The Bilateral Approach

The bilateral path has proven its worth:

- Balanced relationship between political room for manoeuvre and sectoral, tailor-made participation in the EU single market
- Basis for a **mutually beneficial CH-EU partnership**
- **Status quo is not an option**: EU law is evolving and Switzerland has interests that go beyond what already exists

The Federal Council is committed to **stabilising** the bilateral path and **further developing** it where it is in Switzerland's interest.

Different ways of being in a relationship with the EU EU membership, EEA, bilateral approach, FTAs



The Package

Normalisation

Transitional regulation («*modus vivendi*»)

Stabilisation

MRA

Free movement of persons
Immigration
Wage protection

Land transport

Swiss contribution

Civil aviation

EU programmes
u.a Horizon Erasmus+

Agriculture

Space

Further development

Health

Electricity

Food safety

Dialogues and cooperation

Parliamentary cooperation

High-level dialogue

Existing single market agreements

Other agreements and areas of interest

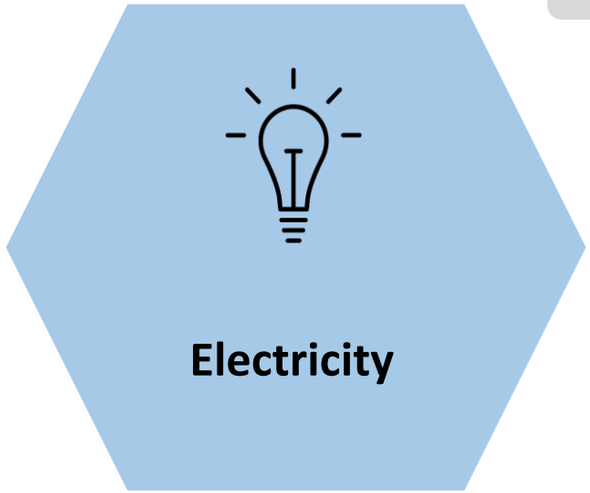
New single market agreements

Institutional elements
Dynamic alignment, dispute settlement

State aid

EU-Switzerland agreement on electricity

The Electricity Agreement – Key Aspects



Swiss actors will be able to participate in the **EU internal electricity market** on an equal footing and without barriers. Enables more efficient electricity flows and reduces the costs of electricity supply.

Security of supply and **grid stability** will be strengthened

- ✓ **Electricity market liberalisation** with regulated universal service and accompanying measures.
- ✓ Switzerland has the right to **create** necessary **electricity reserves**.
- ✓ **Long Term Capacity Reservations** will be replaced with **financial compensation (**max 7 years)
- ✓ **Cross-border interconnectors shall remain open**, also in times of an electricity crisis
- ✓ Cooperation between Switzerland and the EU for **expansion** of **renewable energy**
- ✓ **Switzerland** retains the right to **independently determine** the **conditions** for the use of its energy resources, including hydropower and its energy mix.
- ✓ **No requirements** regarding the granting of **concessions**, water rates or ownership structures. Current practice can be maintained.
- ✓ **No new requirements** in **environmental law**: Switzerland is not obliged to apply EU environmental law under the electricity agreement.

The Acquis of the Electricity Agreement

Electricity

Institutional Provisions (Dispute Settlement, Dynamic Alignment of Law)

State Aid Rules

Risk Preparedness Regulation (2019/941)

Electricity Market Directive (2019/944)

Renewables Energies Directive (2018/2001)

ACER Regulation (2019/942)

REMIT Regulation (1227/2011)

Environmental Directives
- Environmental impact assessment
- Industry emissions
- Sulphur reduction fuels
- Wild bird protection
- Environmental liability

Electricity Market Regulation (2019/943)

Incl. Network Codes
- CACM
- FCA
- Balancing
- Emergency and Restoration
- Demand Conection
- Grid Connection of HVDC
- Transmission System Operation
- Cybersecurity

Fully integrated (with necessary general and technical adaptions)
Partly integrated
Equivalence

Legal texts as of the end of 2024

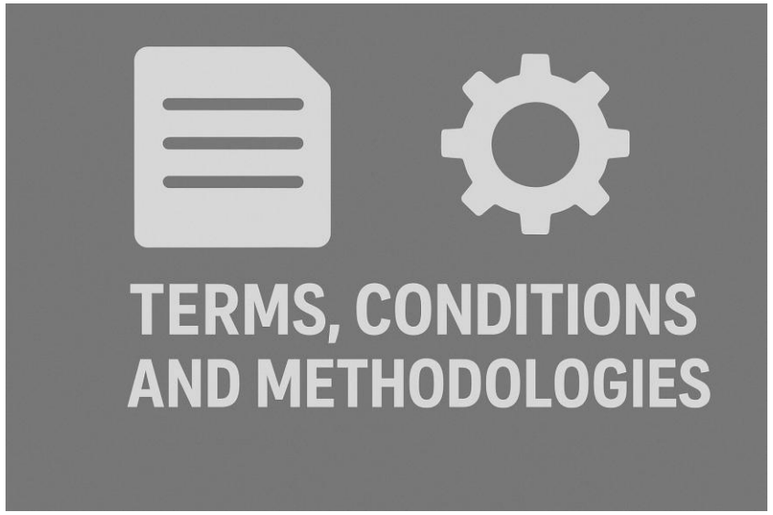
Market Coupling

Electricity

- The guideline on capacity allocation and congestion management **CACM** is the **technical key** for **market coupling**
- The **Swiss TSO** and **market operators** shall participate in **single day-ahead** and **single intraday coupling** under the same conditions as TSOs and market operators from the European Union
- All actors involved shall swiftly take the necessary steps to **allow for Switzerland joining the market coupling within 9 months** of the entry into force of the Electricity Agreement

Terms, Conditions and Methodologies TCMs

Electricity



- TCMs are **technical** and **operational rules** for the **functioning** of the **electricity market**
- Swiss TSO, DSO, NEMO and NRA **participate in the elaboration** of any new or amended TCMs
- **Relevant existing TCMs** will **be applicable** as of **entry** into **force** of the Agreement
- New or amended TCMs shall be **integrated within one month** into the Swiss regulatory order by the Swiss NRA
- The **TCMs shall be provisionally applicable** in Switzerland as from the date of their application in the European Union
- CH will have **similar voting rights** as EU Member States

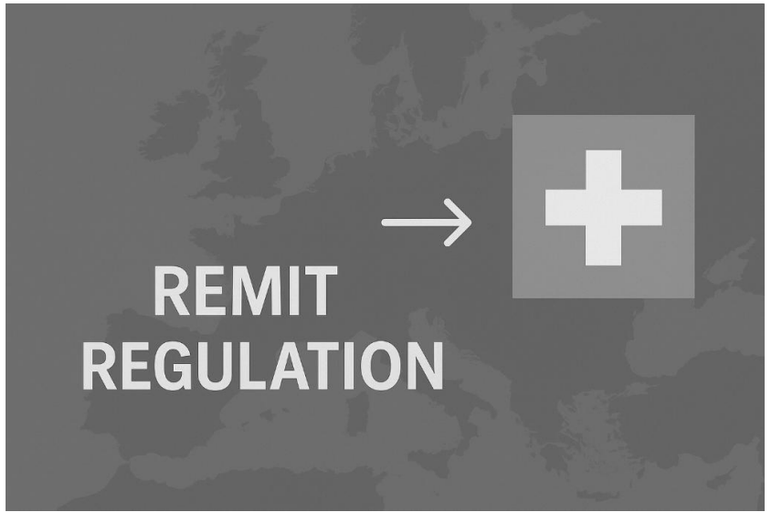
ACER

Electricity

- Swiss NRA (ElCom) **will participate** in the Agency for the Cooperation of Energy Regulators (ACER)
- If a **competence is not assigned** in the electricity agreement, the **Swiss authorities are responsible**
- **Several competences** are **assigned** to **ACER**: Highly technical matters (mainly TCMs), and where there is no suitable alternative decision-making body
- **Special solutions** in cases where **Swiss sovereignty is affected** (CCR, Bidding zone assignment, Powers of ACER under REMIT).

REMIT

Electricity



- **REMIT** only for **electricity**
- **Federal Law on Supervision and Transparency in Energy Wholesale Markets** (BATE, 21. March 2025) – already compatible with REMIT
- **Swiss NRA** (ElCom) will be **responsible** for ensuring compliance with and enforcement of **REMIT**
- **ElCom** will carry out **investigative measures** under REMIT (to ensure Swiss sovereignty)

Process in and after 2025

domestic / foreign policy

21. May 2025	**Initialing of the agreement texts**, on the Swiss side by the chief negotiators and the lead negotiator(s) of the respective negotiation track(s)
13. June 2025	**Start of public consultation** and **approval of the agreements** by the Federal Council
13. June – 31. Okt. 2025	**Public consultation**
1. November 2025 - 1. Quarter 2026	**Evaluation of the consultation results and finalisation of the message**
10. November 2025	**Signing** of the agreement on **EU programmes**
1. Quarter 2026 *tbc*	**Signing of the agreements**
	Adoption of the legislative project by the Federal Council and **submission** to **Parliament**
Next steps	**Parliamentary deliberation**
	Facultative Referendum

Modus Vivendi – Joint Declaration 25 June 2025

In the field of electricity, **Switzerland and the European Union should take all necessary steps to preserve operational security** also in the absence of an agreement on electricity. For this purpose, appropriate **arrangements** should be found between **Swiss and European Union grid operators** and regulators **at technical level**, where appropriate with the support of ENTSO-E, notably in the field of **capacity calculation and balancing cooperation**, and ElCom should be able to take part for that purpose in relevant meetings of Regulators within ACER's framework, on an *ad hoc* basis. Switzerland should continue to be able to participate in the Electricity Coordination Group on an *ad hoc* basis, where appropriate.

Challenges

- Integration of EU energy market are progessing
- Divergence in legal developments is continuing
- The electricity system is changing - electrification and the expansion of renewables are progressing
- At present, cooperation between Switzerland and the EU is not secured under international law
- Despite the high probability of a referendum, preparatory work must be undertaken to ensure rapid access to the internal EU energy market

Thank you for your attention!

Matthias Haller, Counsellor for Energy, Galileo

Updates on PV integration in the Swiss power system

Marc Rüede
Head of Balance Group & Sched. Services

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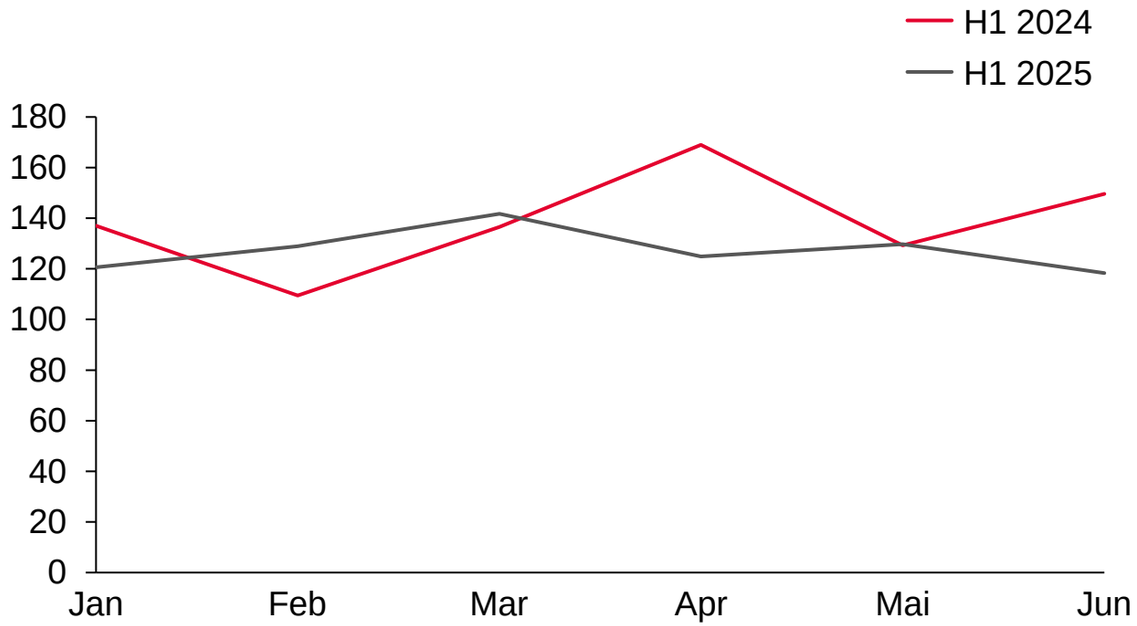
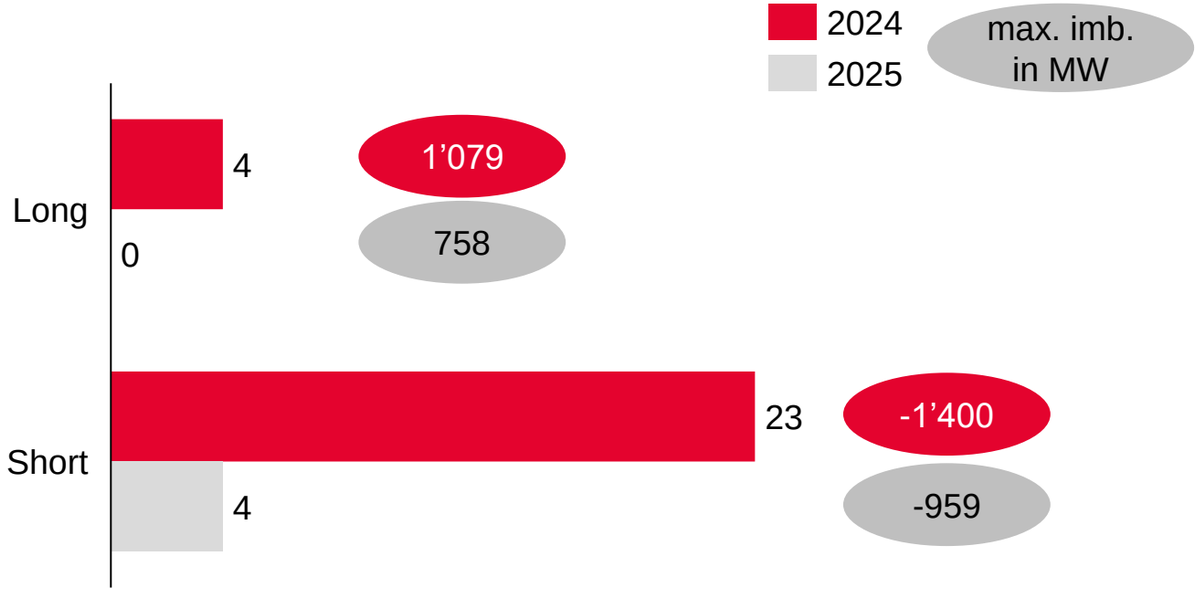
Comparison of the 1st half of 2024 vs. 2025 shows similar absolute imbalance, but fewer extremes

Average imbalance of Swiss control area
in MW

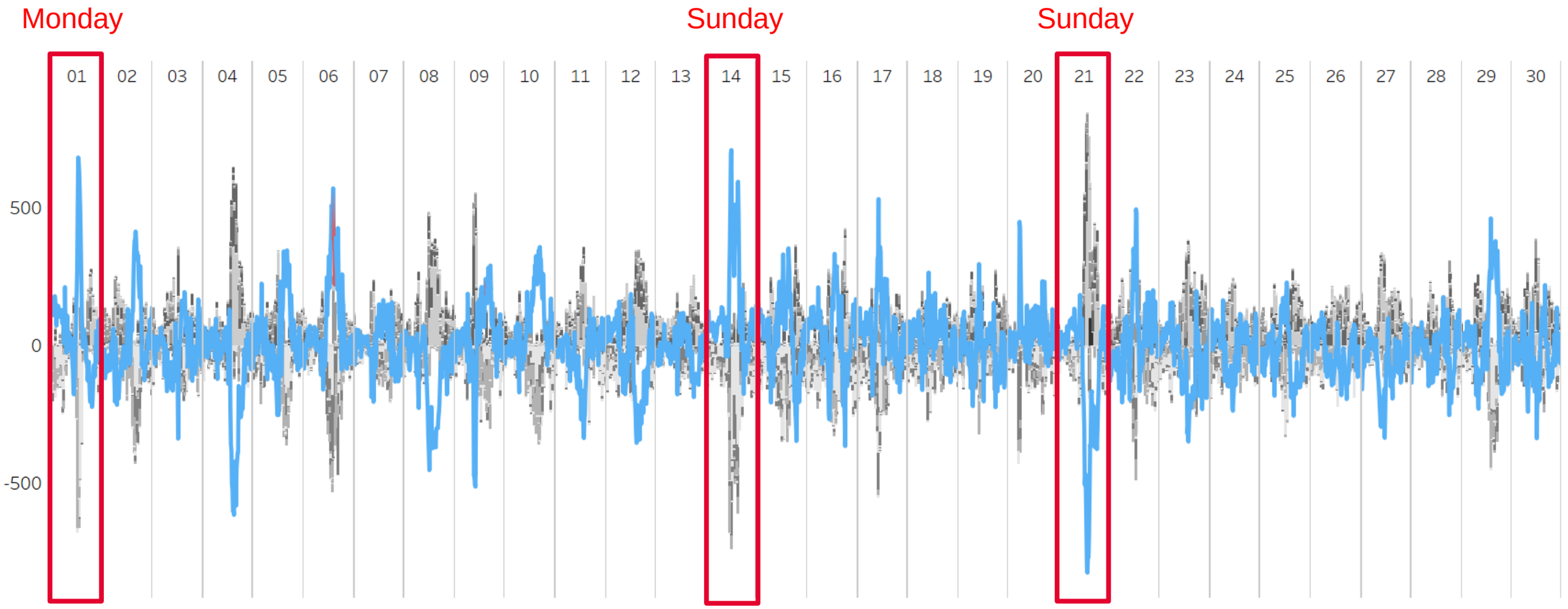


Largest imbalance and 1/4h events >800 MW
in number of events



- Even though the number of extreme events and the maximum imbalance of the Swiss control area has decreased from the 1st half of 2024 to 2025, the average imbalance of the Swiss control area remains at a high level.
- Further efforts are therefore needed by the balance groups to reduce the imbalances and thus the costs of imbalance energy.

Significant imbalances still occur on public holidays, weekends and Mondays



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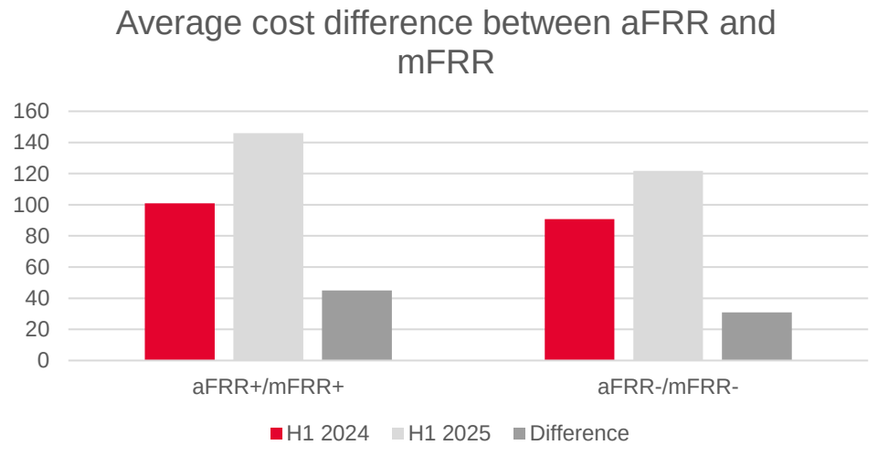
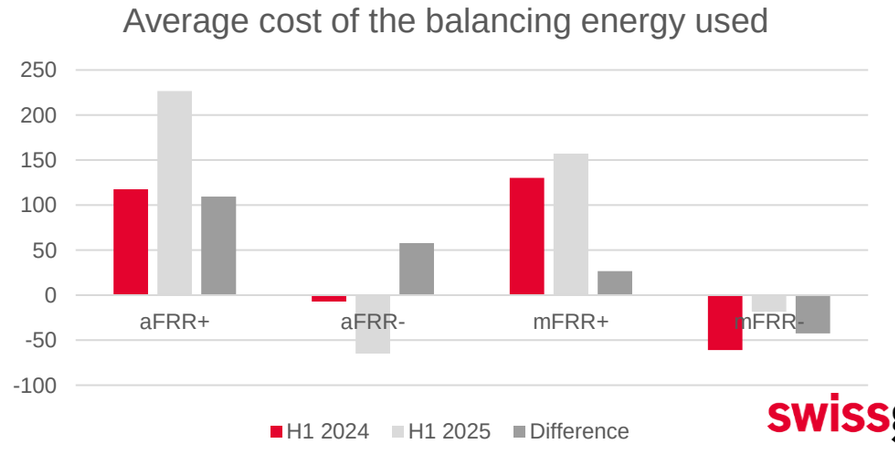
Why does the revenue increase in the imbalance energy with constant balancing energy costs?

- The current imbalance energy price mechanism penalises the balance groups in several ways
- One penalty in pricing is that the maximum or minimum price of the aFRR and mFRR average costs is used
- This always leads to additional revenue for Swissgrid if aFRR and mFRR are activated in the same direction in a 1/4 hour.
- The higher the difference between aFRR and mFRR average costs, the more remains with Swissgrid
- The **average cost difference** between aFRR+ and mFRR+ **increased** by approx. **45 EUR/MWh** from the first half of 2024 to the first half of 2025 and by over **30 EUR/MWh** from aFRR- to mFRR-
- In particular, the **average cost of aFRR increased sharply** from the first half of 2024 to the first half of 2025: approx. **+109 EUR/MWh for aFRR+** and approx. **+58 EUR/MWh for aFRR-**

Balance group	short (deficit)	BGV pays $(A + P_1) * \alpha_1$	$A = \max (P_{spot}; P_{sek+}; P_{ter+})$
	long (surplus)	BGV receives $(B - P_1) * \alpha_2$	$B = \min (P_{spot}; P_{sek-}; P_{ter-})$

With alpha factors as following:	α_1	1.1
	α_2	0.9
With base price as following:	P_1	0.5 ct/kWh





Go Live of new imbalance price mechanism in Switzerland

Thomas Hauri
Principal Market Operations

Lukas Loser
Specialist Balance Group & Sched. Services

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We update the imbalance price mechanism to create an incentive for a control area-supporting behavior of all balance groups

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Short recap of proposed new imbalance price mechanism

	Balance group short	Balance group long	Price formula
Under-covered control area (short)	Balance group pays: A	Balance group receives: A	A = max (P_{sec+}; P_{ter+})
Over-covered control area (long)	Balance group pays: B	Balance group receives: B	B = min (P_{sec-}; P_{ter-})

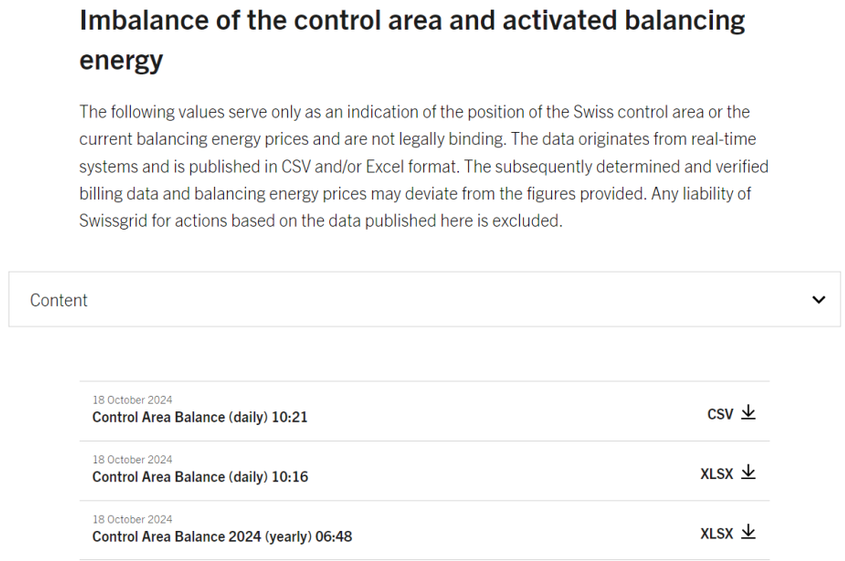
P_{sec} = defined as weighted average price of secondary control energy (aFRR) activations, only activations in the relevant direction are used for the calculation

P_{ter} = defined as weighted average price of tertiary control energy (mFRR) activations, only activations in the relevant direction are used for the calculation

Note: If A or B results in a negative price, the direction of the payment type changes from pays to receives specific numerical examples will be shown in the dedicated breakout session

Short recap of proposed new imbalance price mechanism

- Balance groups with metering points may take open positions in the amount **of their maximum production**
- Trading balance groups may take **open positions up to 50 MW** depending on the collateral deposited
- A **scarcity component** has been introduced; actual values can be found on Swissgrid wesite: Energy statistic Switzerland
- Swissgrid publishes today on its website **total system imbalance** and an **indicative imbalance price** with a delay of approx. 15 minutes
- Goal is to publish soon only total system imbalance with a delay of approx. 7 minutes and all other values inclusive indicative imbalance price (as today) with a delay of approx. 15 minutes -> we`ll keep you informed



- **Balancing energy price 2026 [€ct/kWh]**

  Average costs of the balancing energy activated for this quarter of an hour. According to the one-price model calculation logic, which comes into force on 01.01.2026. Scarcity component: Long 1000 MW, Short 1200 MW

Date Time	Total System Imbalance (Positiv = long / Negativ = short)
05.11.2025 09:00	-64.73385222
05.11.2025 09:15	25.33323111
05.11.2025 09:30	91.98679
05.11.2025 09:45	163.5528522

Swissgrid is ready to introduce new imbalance price mechanism by 1. January 2026

- All Balance Groups have signed the updated Balance Group contract in time 👏
- All adjustments and preparations has been completed in a timely manner
- Swissgrid has held meetings with individual balance groups to understand how their strategies are regarding active balancing
- Swissgrid has carried out some analyses to understand, when active balancing makes sense
- The most important findings are shown on the following slides

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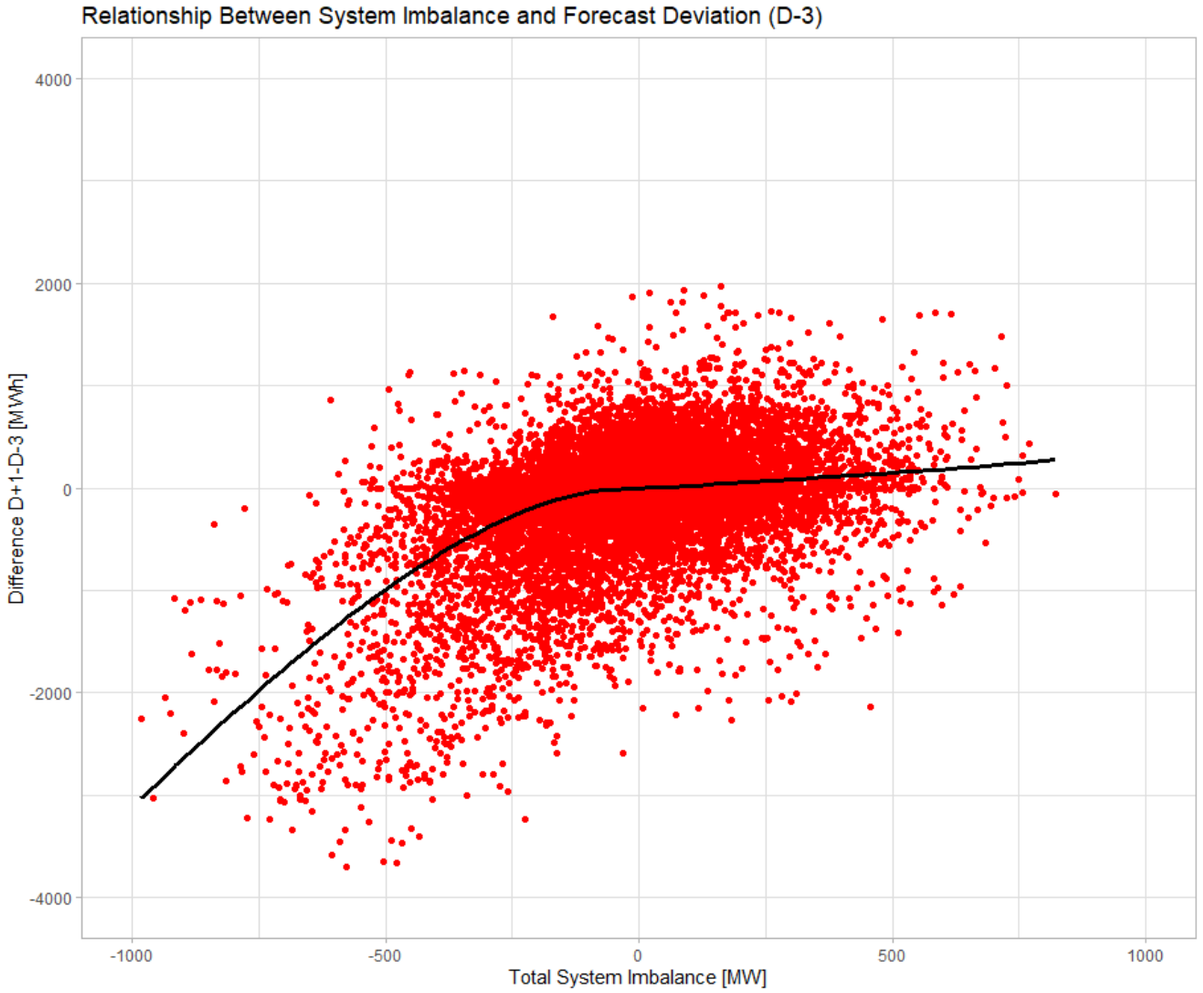
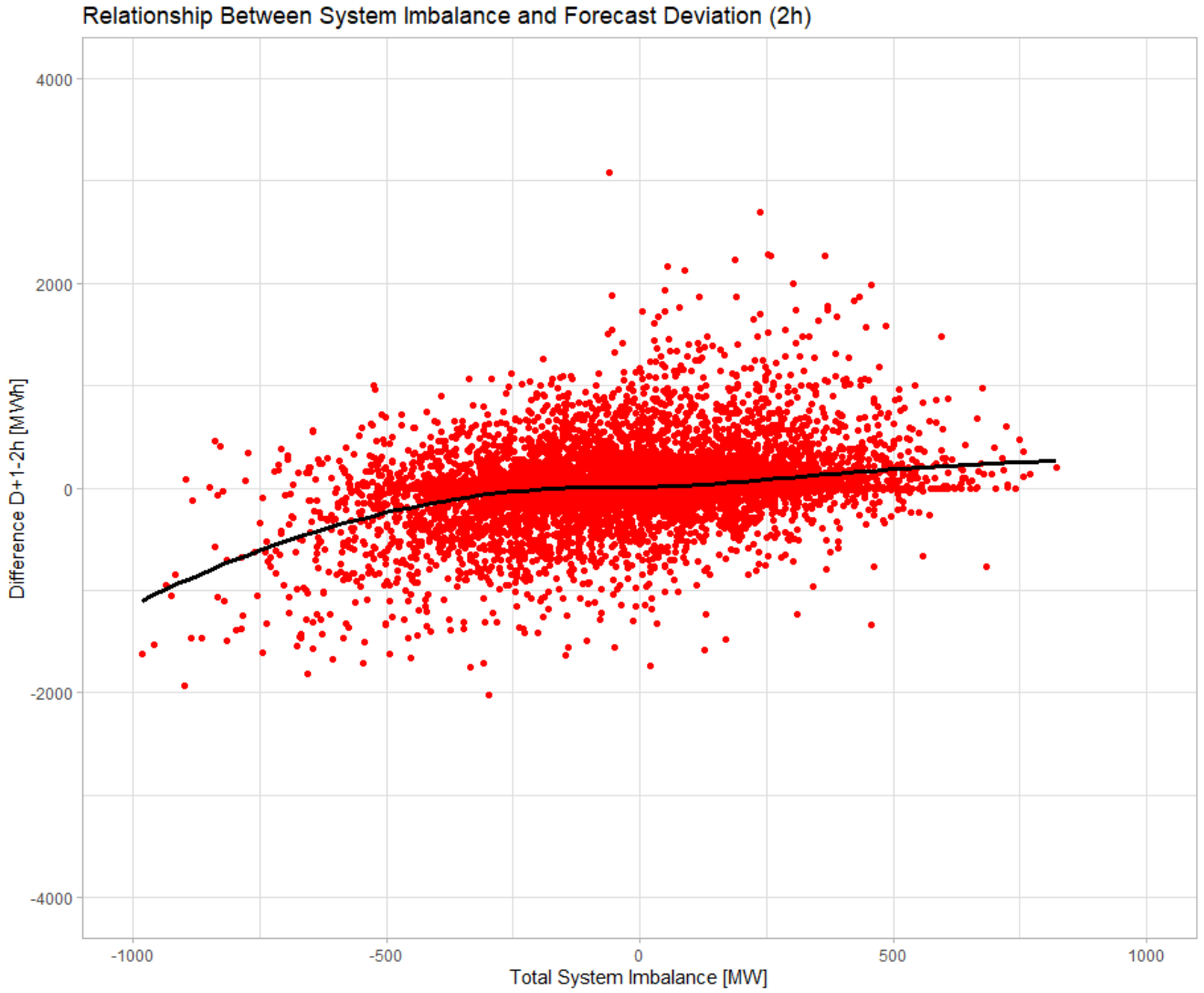
Most important findings

- High imbalance values are most likely to occur on Sundays, offering better opportunities for active balancing
- On Saturday, Sunday and Monday the control area tends to remain long or short for extended periods, increasing predictability
- A critical driver of imbalance is the PV Forecast deviation (D-3, D-2 and D-1)
- Short-Term actions are essential to be successful
- Flexibility is key
- Fractional increases and decreases in active balancing to prevent oscillations in the control area
- Many balance groups plan to start slow in 2026 and observe the market in the beginning
- Balance groups wish for more Intraday liquidity and hope the new imbalance price improves it

PV Forecast Deviation





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OnePager

Swissgrid will distribute a one-pager summarizing the findings from recent analyses on active balancing.

Purpose of the One-Pager

- To share key insights from evaluations of active balancing
- To support Balance Groups in identifying optimal moments to participate in balancing actions

What the One-Pager will Include

- Patterns and trends observed
- Recommendations on when active balancing may be favourable

Why This Matters

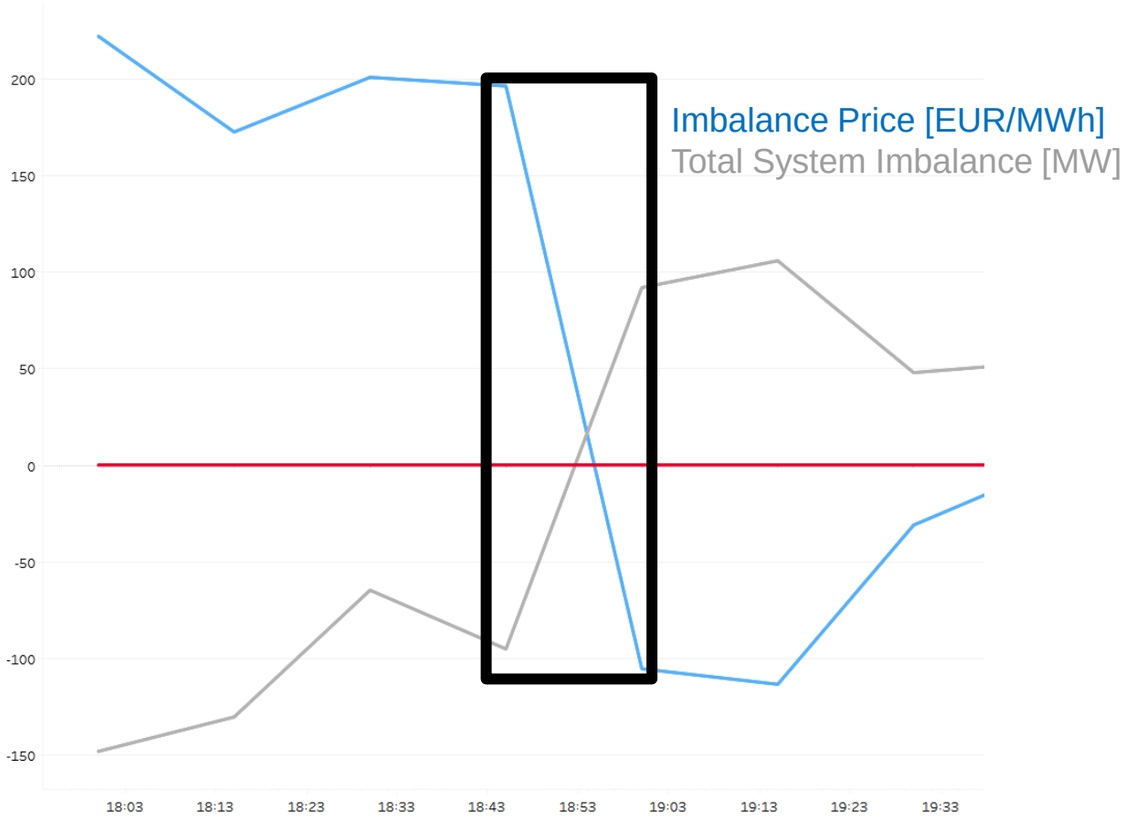
- Helps Balance Groups make informed decisions
- Contributes to cost efficiency and system stability
- Strengthens collaboration between Swissgrid and market participants

Potential price jumps due to changes in System Imbalance (+/-)

Does the crossing of zero by the total system imbalance influence prices, and does it lead to extreme prices?

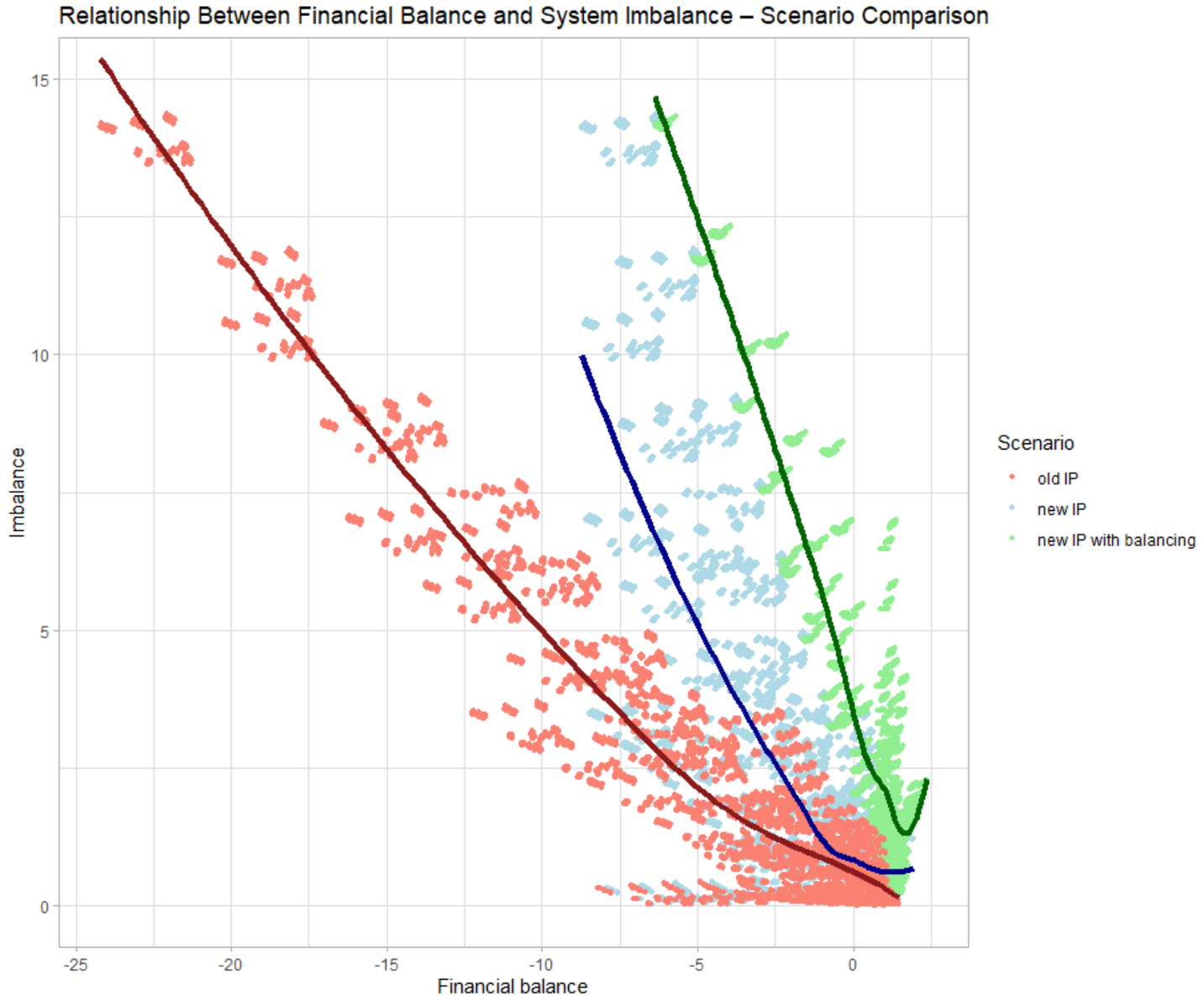
- No, in Switzerland this is not the case.
- This issue may become more significant next year.
- Further analyses will be conducted next year.

The table shows the imbalance price values [EUR/MWh] for all time intervals, filtered by whether zero was crossed or not.



TSI crossing zero	1 Quartile	Mean	Median	3 Quartile	98% - Percentile	99% - Percentile
Yes	50.5	159.1	121.8	210.2	586.7	732.3
No	73.5	218.2	143.7	234.6	987.8	1568.6

Simulation – Balance group of the future



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Swiss balance group management and operational incidents

Quirin Egli
Specialist Balance Group & Sched. Services

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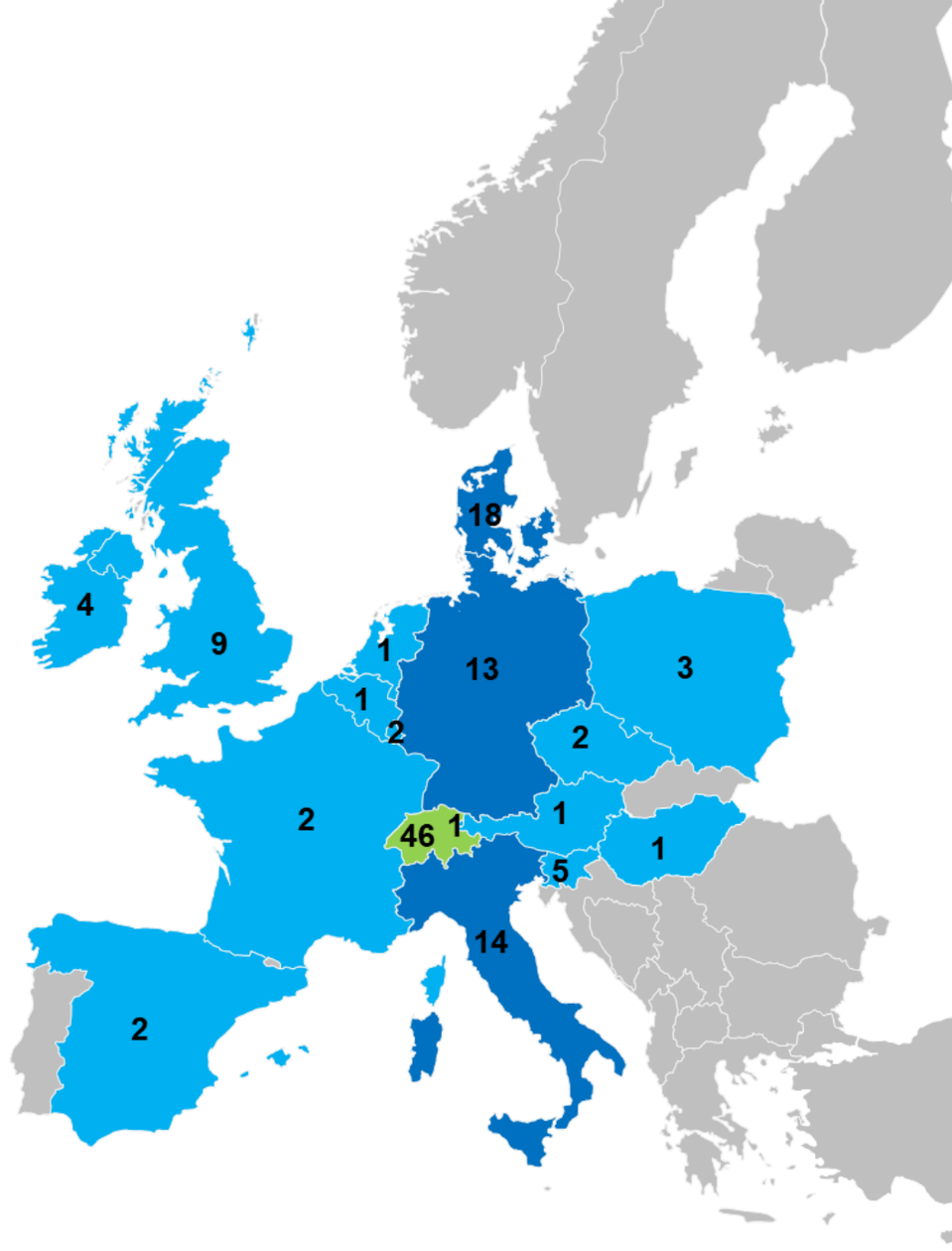
Few new registrations this year

	BGs	↓	↑	Mutations
2021	104	3	1	88
2022	107	2	5	122
2023	111	3	7	143
2024	116	7	12	169
2025	127	3	14	225

USA
1

UAE
1



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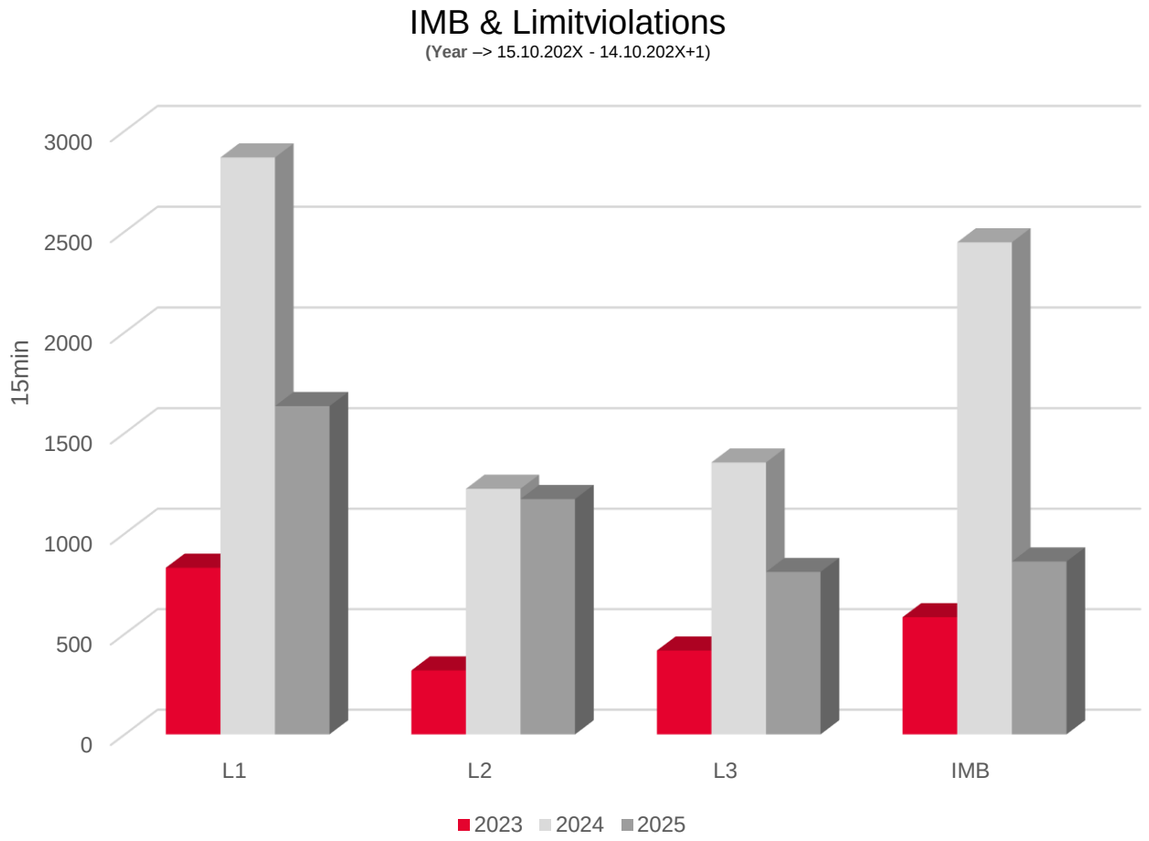
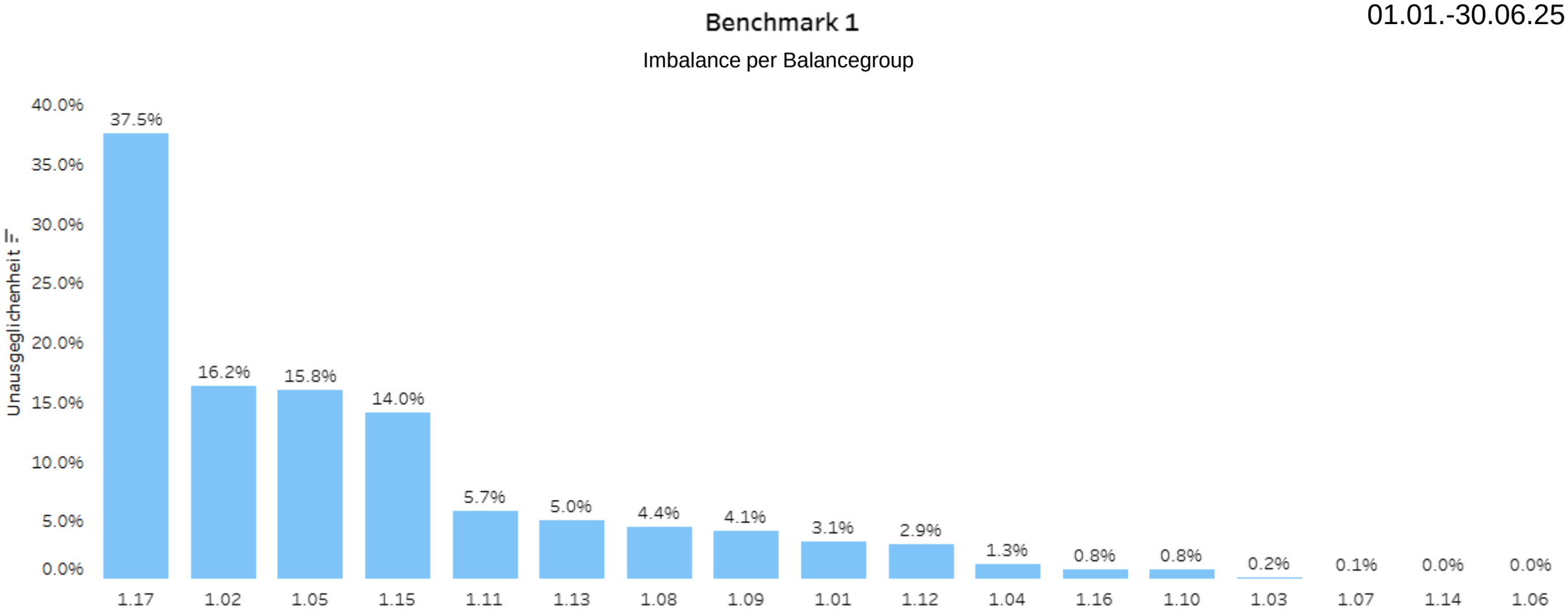
Fewer limit violations but with higher costs



	2024	2025
Intraday suspension	0	1
written statement	10	7
Meeting with Swissgrid	5	5
Penalties (L3 violations)	7	4
	€ 165’826.49	€ 293’218.97

Benchmark balance group with metering points

01.01.-30.06.25



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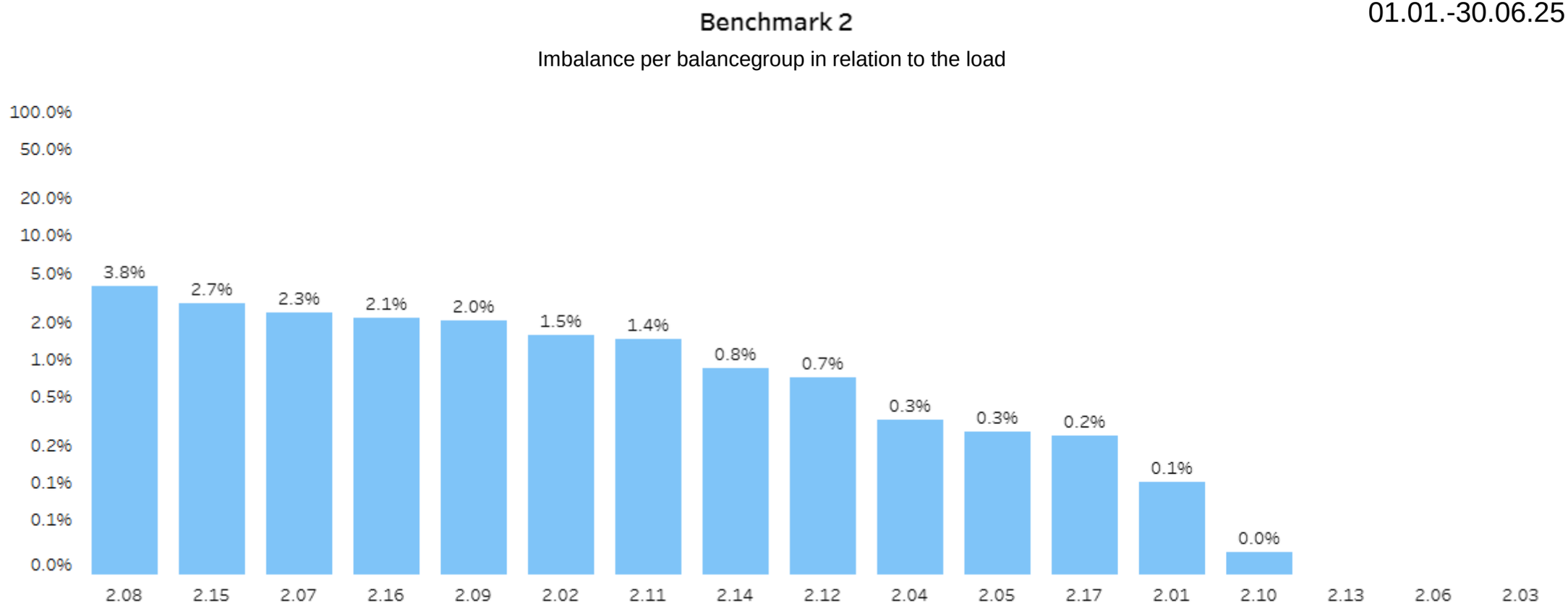
Benchmark balance group with metering points

01.01.-30.06.25



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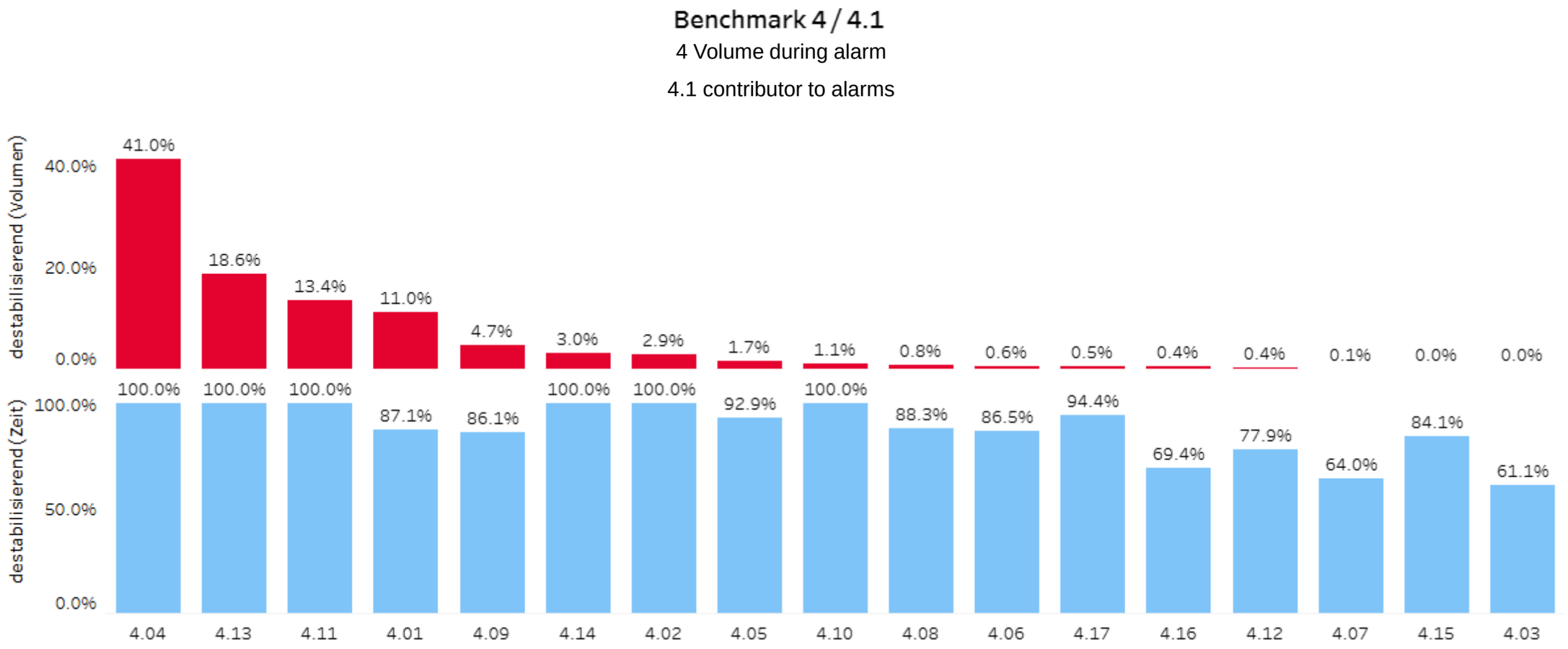
Benchmark balance group with metering points

24

01.01.-30.06.25



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BG Monitoring Alerts by Mail

Email subject:

BG Monitoring: TPS Position Check of BG ‘XXXX_S (EIC: XYZ)' in TPS version '10’ is violated.

Email body:

Dear Madam/Sir,

the Scheduling Management System (SMS) is sending you a notification. Please pay attention to this alert:

TPS Position Check of BG ‘XXXX_S (EIC: XYZ)' in TPS version '10’ is violated.

Business day: 13.10.2025

Date and time: 13.10.2025, 08:00:06

Best regards

Day Ahead / Intraday Schedule Management

Swissgrid AG

This message has been automatically generated by the SMS system run by company Swissgrid AG based on the rules defined by the system administrator. Please, do not respond to this message.

BG Monitoring Alerts by Mail

Adjustments via the BG customer portal

3.2 Contact office for operational queries

E-Mail	
E-Mail 2 (optional)	
Fixed line phone Dayahead	
Fixed line phone Intraday	

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Main adjustments in Appendixes of Balance Group Contract per 1.1.2026

Appendix 1: General Balance Group Regulations

- In addition to a non-personal e-mail address, time series for the imbalance energy quantity can also be transmitted via an FTPS interface. *[1.3]*
- Clarifications on the content and of updating of time series for consumption, production and pump forecast *[2.1.1.2]*
- Clarifications on relevant deadlines and possibility for temporarily set thresholds in all limit sets and in all limits to 10 MW. *[2.2.2]*
- Clarifications on penalization, to now create clear basis that increases transparency and ensures traceability for all parties *[2.3.1]*
- Add exception for balance groups without metering point that provide tertiary balancing energy as part of their participation in balancing energy market for these, calculation of ramps is used. *[7.2]*

Appendix 2: Technical Balance Group Regulations

- Update nomination process of capacity rights, add resolution and possibility of nominating different values within an hour *[Chapter 8]*

Appendix 5: Power Reserves

- Delete directives of the ElCom which are not longer valid *[Chapter 1]*

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epexspot

part of eex group

Swissgrid BGM Partner Meeting 2025

Market Developments – EPEX SPOT

Chiara Henle,
Key Account Manager

11th November 2025

01 Spot Power Market Update

02 15 min MTU Project SDAC – Analysis

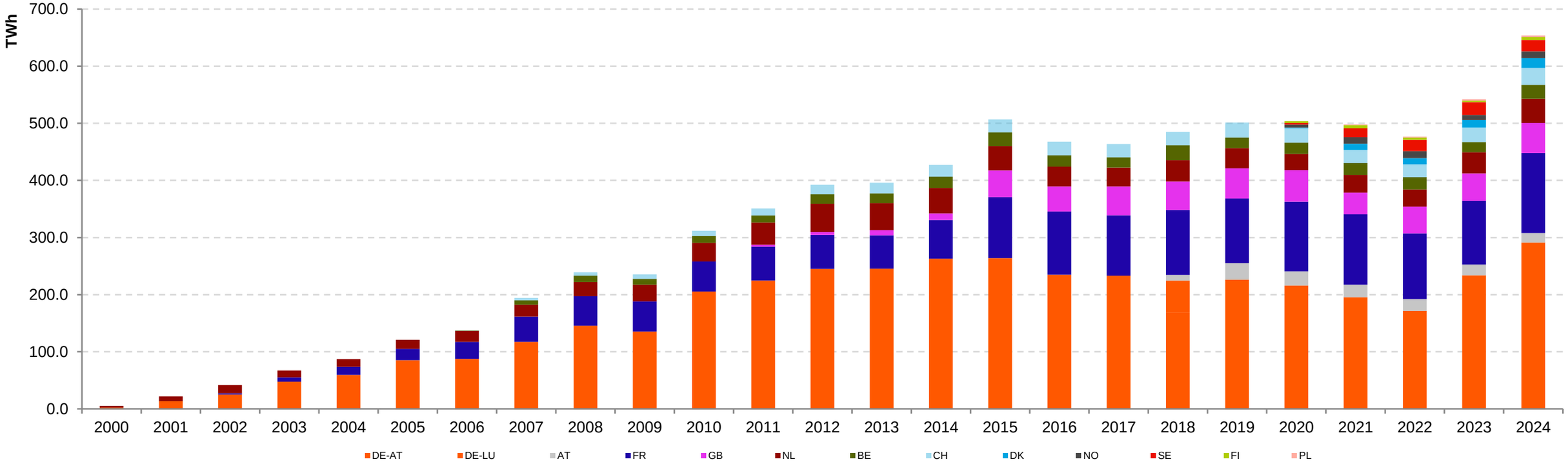
03 15 min MTU Project CH – Outlook

04 Q&A

Spot Power Market Update

01

Day-Ahead markets: + 21% traded volumes in 2024

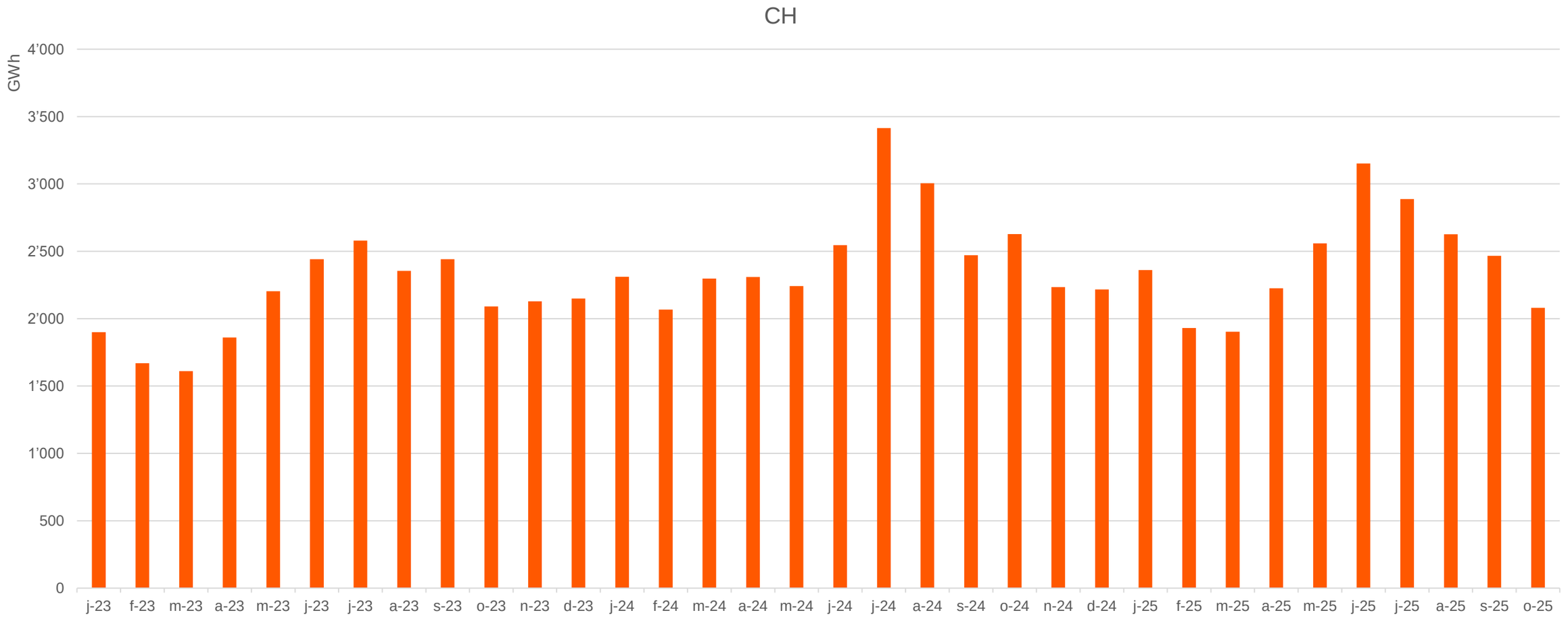


Day-Ahead markets are interconnected via Single Day-Ahead Coupling (except for CH and GB)

A rapid growth leading up to 2015 and a record in 2024

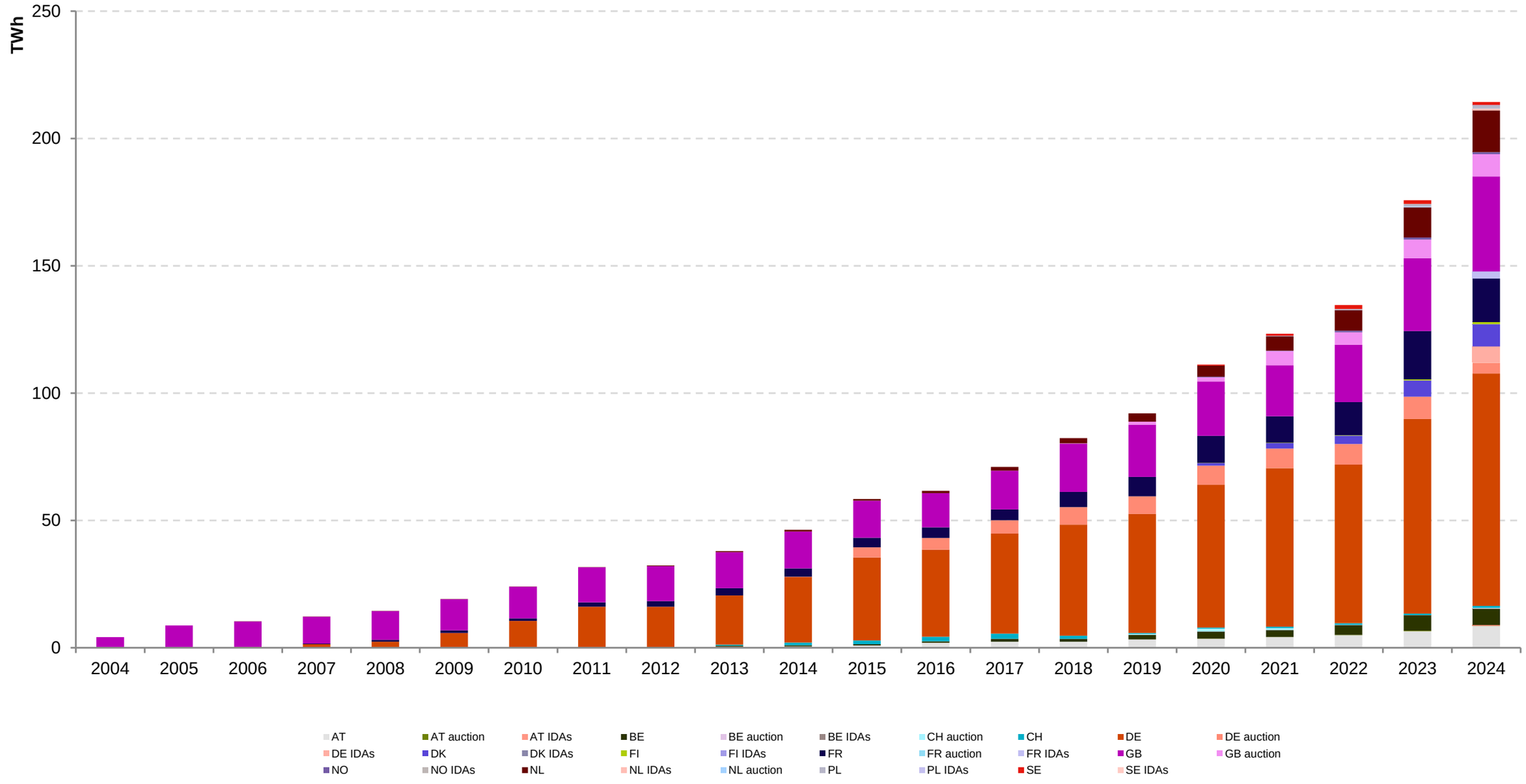
- +21% traded volumes in 2024 vs 2023
- Record volumes for BE, CH, DE, DK, FR and PL

Swiss Day Ahead Auction Volumes



- **90+ Members are active** in the CH Day-Ahead Auction
- **24.1+ TWh traded on DAM CH** since January 2025

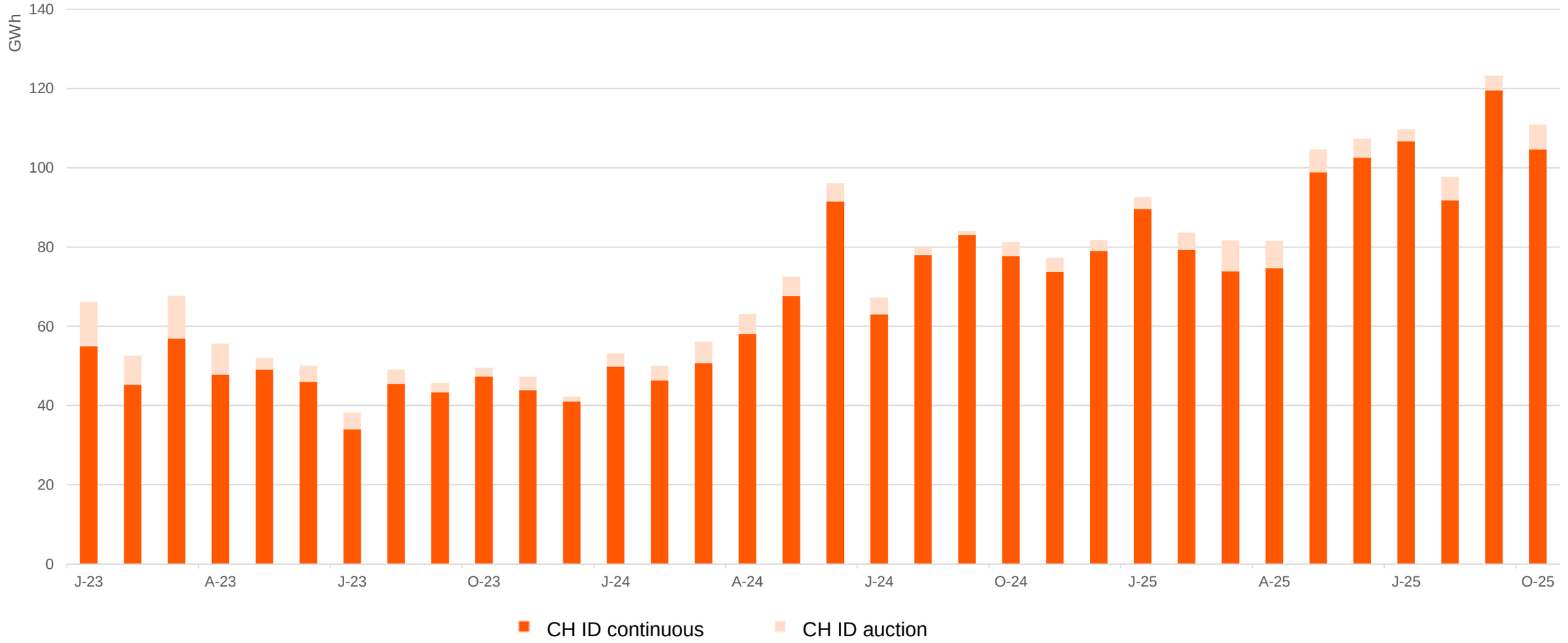
Intraday liquidity : 214 TWh traded in 2024



The markets are interconnected via Single Intraday Coupling (except for CH and GB)

Swiss Intraday volumes

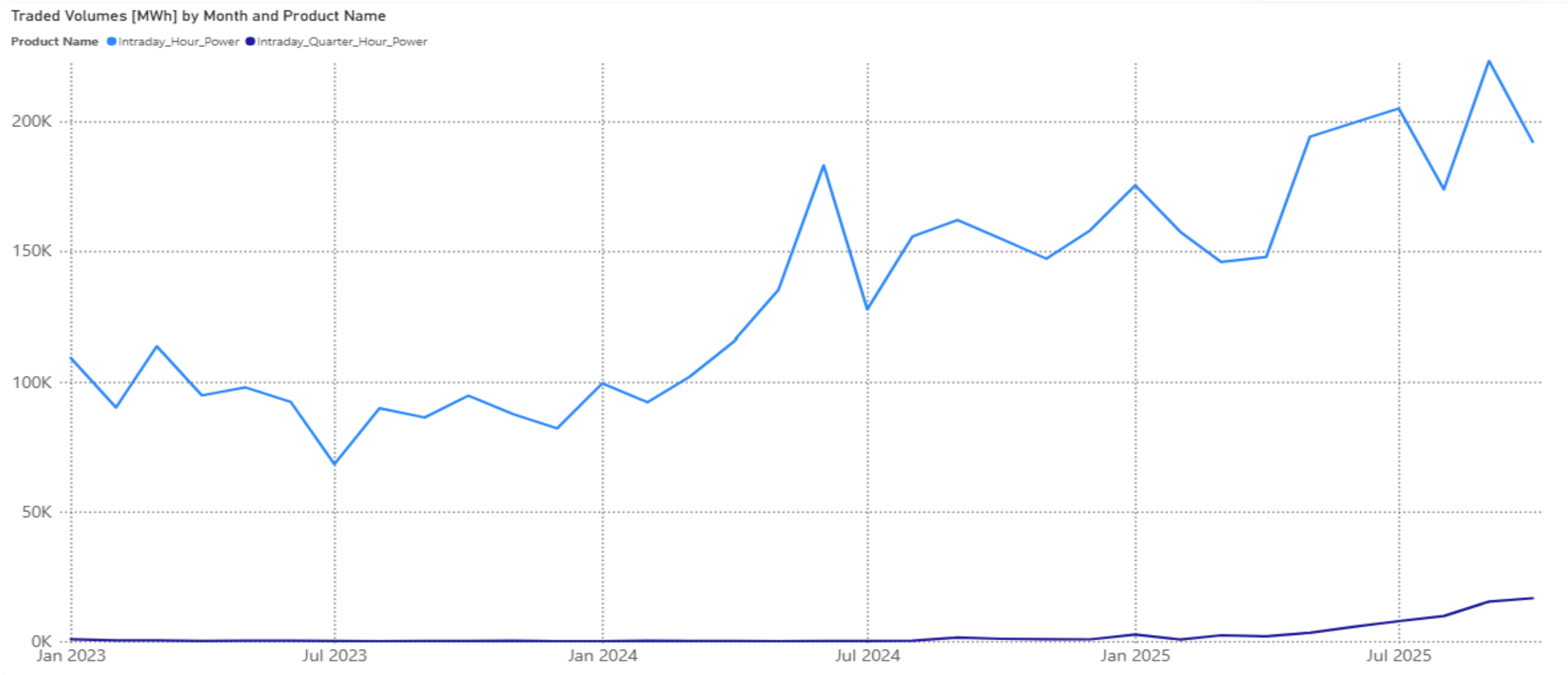
Intraday Continuous + Intraday Auctions



- On IDC Market, 3GWh are traded on a daily average, while the **overall traded volume in YTD 2025 increased by +41% vs YoY 2024.**
- Already **90 members** on the Intraday Continous market, with a lot of interest & a promise of further strong growth
- On IDAs market, 51+ GWh traded YTD 2025, + 37% vs YoY 2024

Swiss Intraday Continuous – 15 min contracts trading is increasing

Monthly traded volumes split per contract duration



- In October 2025, 15 min contracts accounted for **8% of overall traded volumes** (+2.7% vs. August 2025)

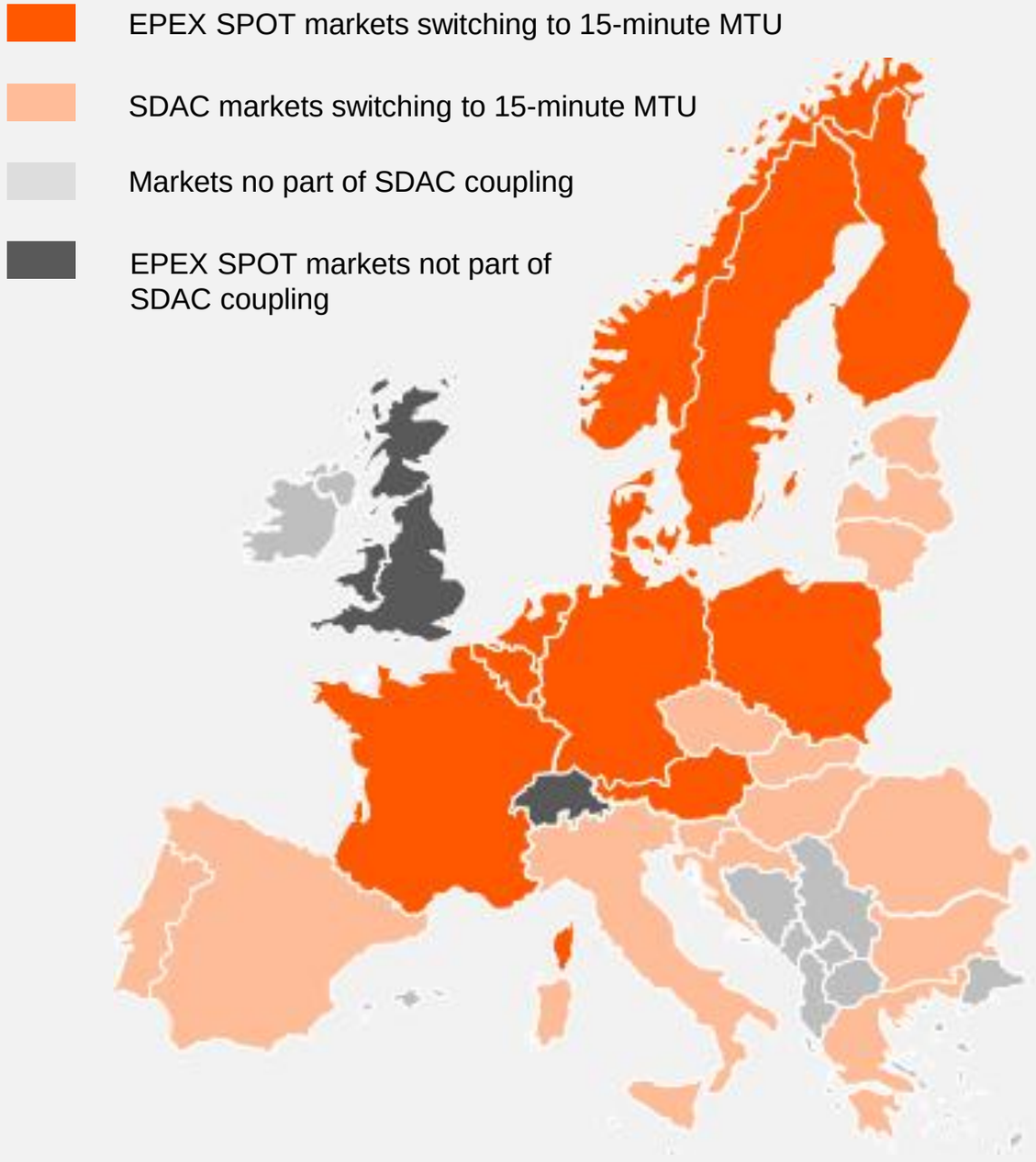
15 min MTU Project SDAC – Analysis

03

SDAC 15-minute MTU succesfully launched

Switch from 60-minute MTU to 15-minute MTU in SDAC was implemented across all European bidding zones and bidding zone borders on trading day 30 September 2025 for delivery day 1 October 2025:

- **Rollback Monitoring Period** successfully ended on 06 October 2025.
- Project Parties are closely **monitoring the stability and robustness** of system performance over the coming weeks of operations.

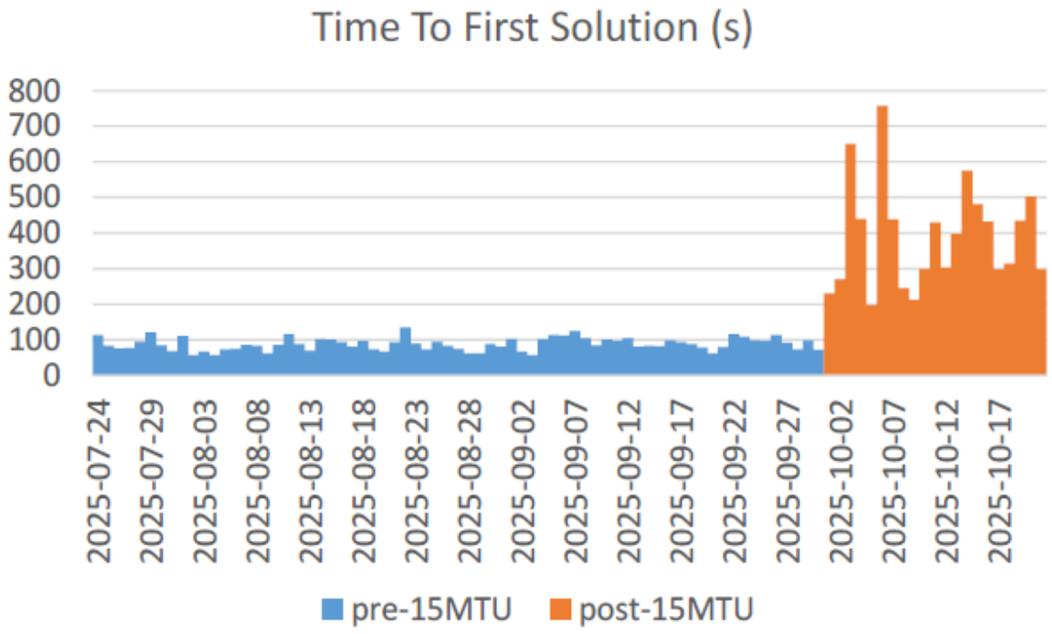


SDAC 15-minute MTU

Statistics on Algorithm & Block Usage

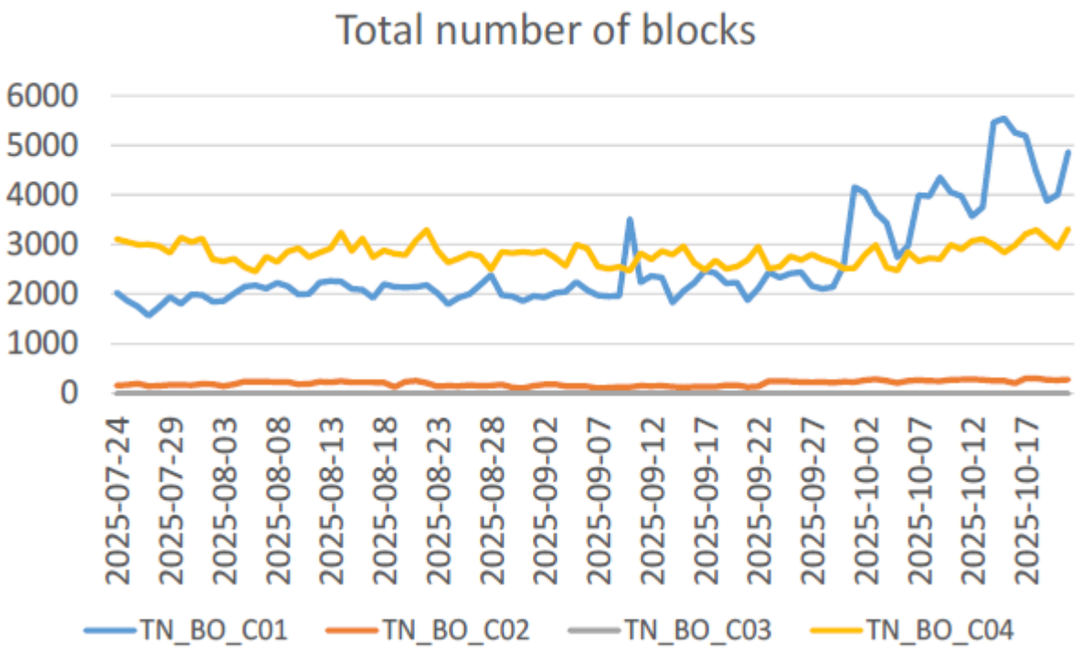
Operational calculation time of the SDAC algorithm :

- Before 30.09.2025 incl.: 17mins = 1020s
- After 01.10.2025 incl. : 30 mins = 1800s



Increase of usage of Standard (C01) Blocks :

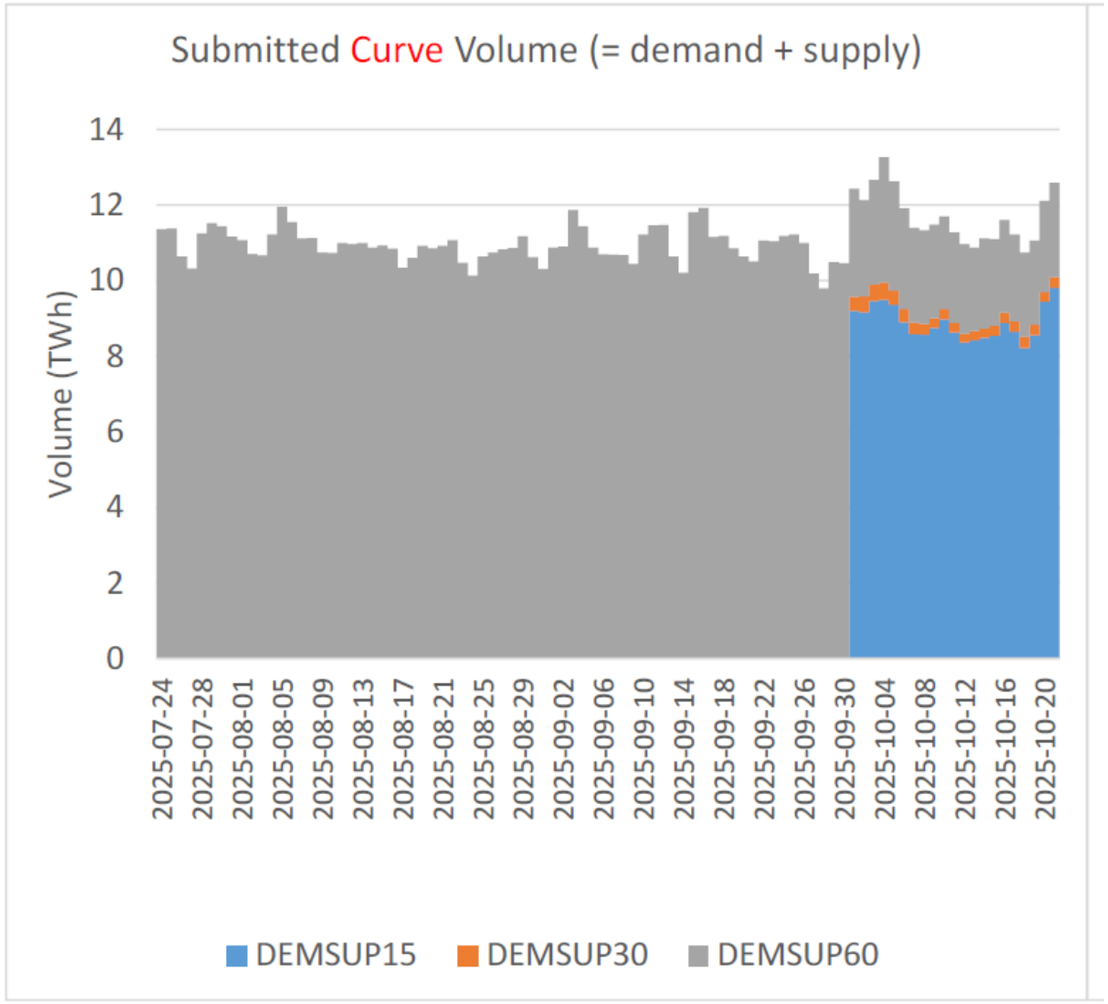
- Before 30.09.2025 incl.: ~ 2000 C01
- After 01.10.2025 incl. : Increase to over 5000 C01

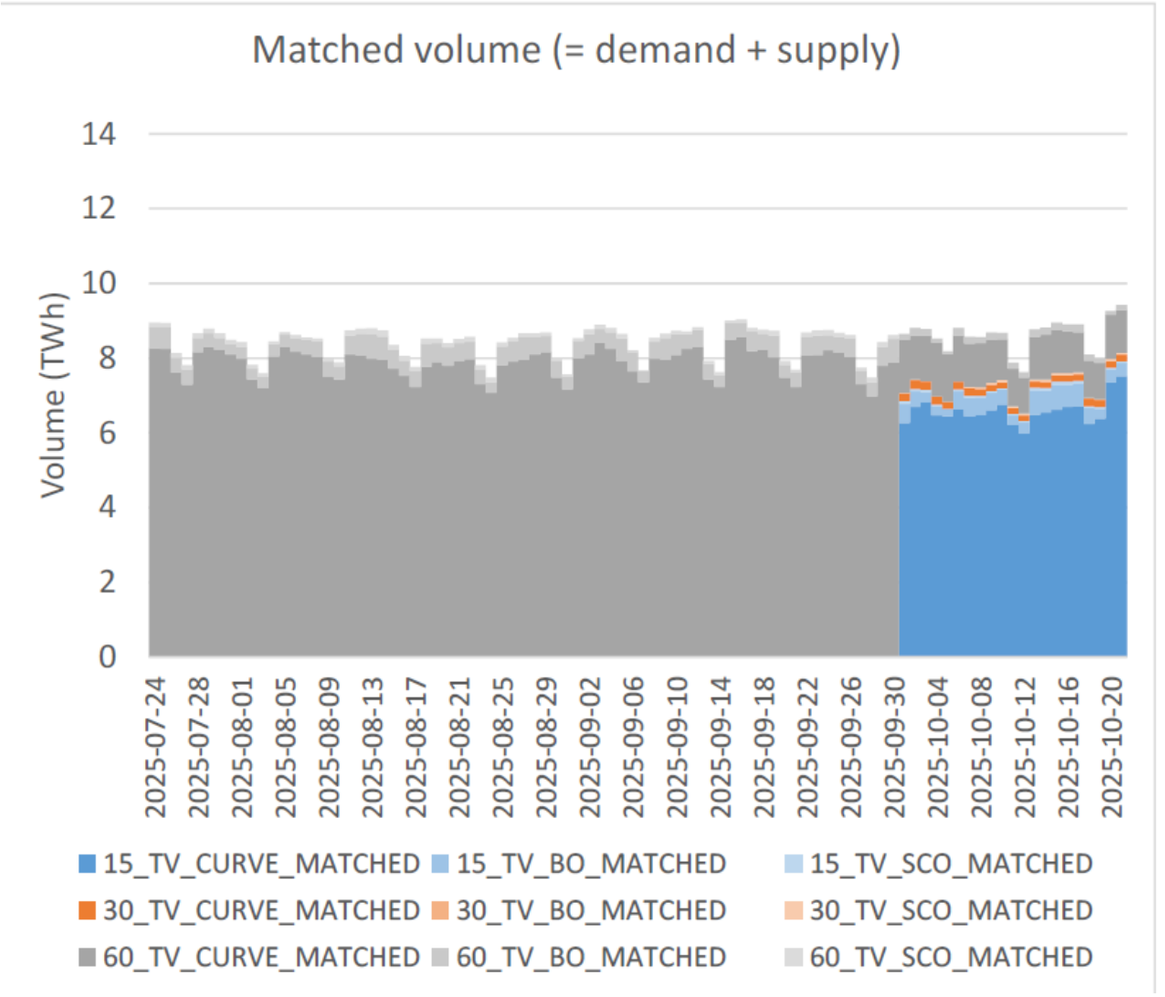


Source: MCSC

SDAC 15MTU

Statistics on Algorithm the last 90 days: volumes





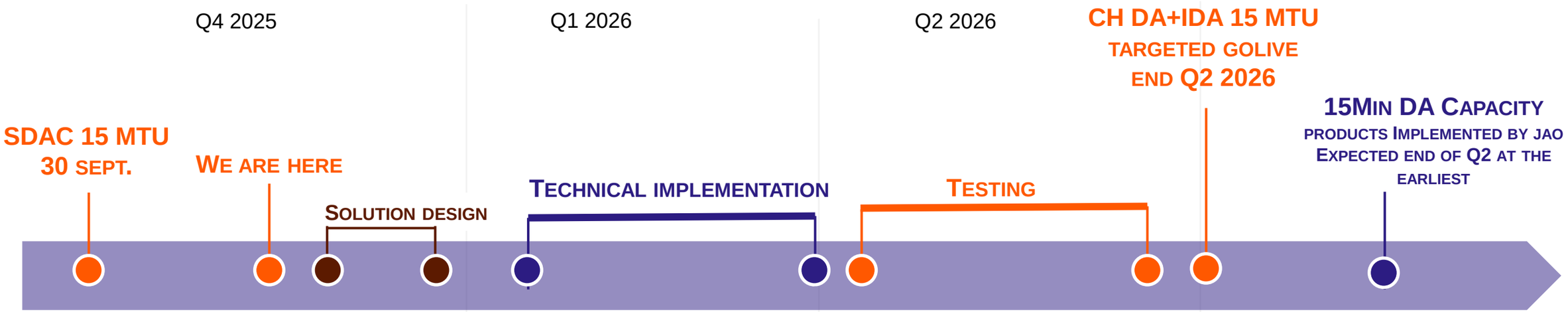
Source: MCSC

15min MTU Project CH

03

Introduction of 15 min MTU in Switzerland

High-level Roadmap*



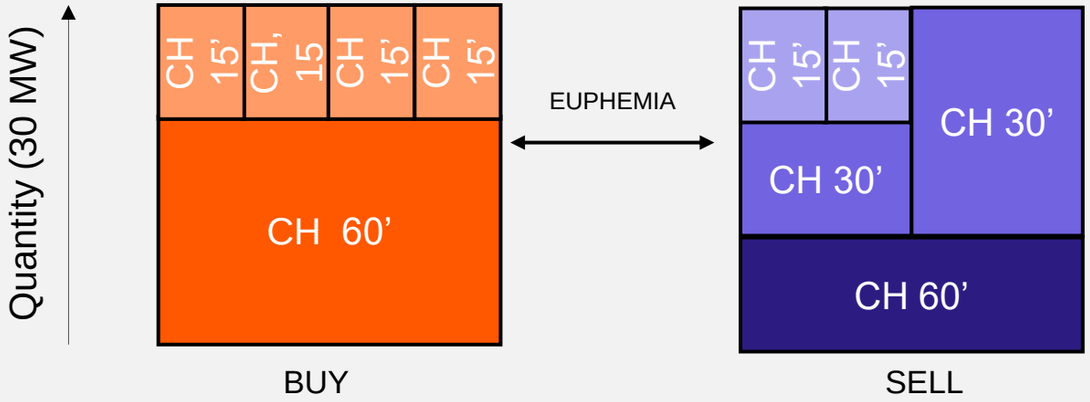
- **EPEX SPOT and Swissgrid have started the related project and will communicate to market participants ahead of key milestones and the go-live of the project**
- Implementation preferred to happen prior to the introduction of 15 min Day-Ahead capacity products at the Swiss borders by JAO expected earliest End Q2/2026

*subject to successfull testing and sufficient member readiness

CH 15 MTU – Product Offering

- EPEX SPOT plans to offer Cross-Product Matching (CPM) for CH DA (aligned with SDAC design), no CPM for CH IDA
- For CH DA this means members are **free to choose the time resolution with which they submit an order**, either 15-minute, 30-minute and/or 60-minute
- Trading participants can use **one unique portfolio** to submit all 3 time units

- **Cross Product Matching** feature in EUPHEMIA and EPEX trading system is needed to allow matching between all 3 time resolutions within a bidding zone.



- The presence of 15min, 30min and 60min orders will lead to the creation of 15min, 30min and 60min prices by the matching algorithm (Euphemia)

$$MCP_h = \frac{MCP_{hh1} + MCP_{hh2}}{2}$$

$$MCP_{hh1} = \frac{MCP_{q1} + MCP_{q2}}{2}$$

$$MCP_{hh2} = \frac{MCP_{q3} + MCP_{q4}}{2}$$

What to expect next ?

- EPEX SPOT has initiated the preparatory work for **simulations based on projected bidding behaviour on Euphemia level** to properly assess the CPM impact on price formation and paradoxical rejection for linear orders in the Swiss market

- Please share your intended bidding behaviour information* with your Key Account Manager if not done yet.

- EPEX SPOT plans to organize **Member tests planned to take place in Q2 2026** : The opening of MATS Simulation Environment with 15 min MTU configuration for CH will be communicated in due time.

- It is very important that **all Swiss market participants take part to these Members' test** with production-like orders to confirm first simulations check price formation with 60 / 30 / 15 minutes

* Please note : If simulation results are shared with stakeholders, only aggregated data will be communicated, no participant level data will be disclosed.

Q&A

05

part of eex group

epexspot

Thank you for your attention!

Contact: ***sales@epexspot.com***

Important updates on cross border capacity allocation

Benito Barberio
Senior Spec. Balance Group & Sched. Services

swissgrid

15 minutes market time unit day ahead and intraday (CH-IT) capacity on Swiss borders : Status at Swissgrid, JAO and Neighbouring TSOs

- Together with our neighbors TSOs, we have amended the day ahead auction rules and are currently in the consultation phase, which is published on the JAO website (website).

- The first-time window for testing between TSOs and JAO are scheduled for April 2026. After that, planned for May 2026, market participants will have the opportunity to take part in the test.

- Depending on project progress and test results, go-live at borders CH-FR, CH-DE and CH-IT is possible at the end of June 2026.

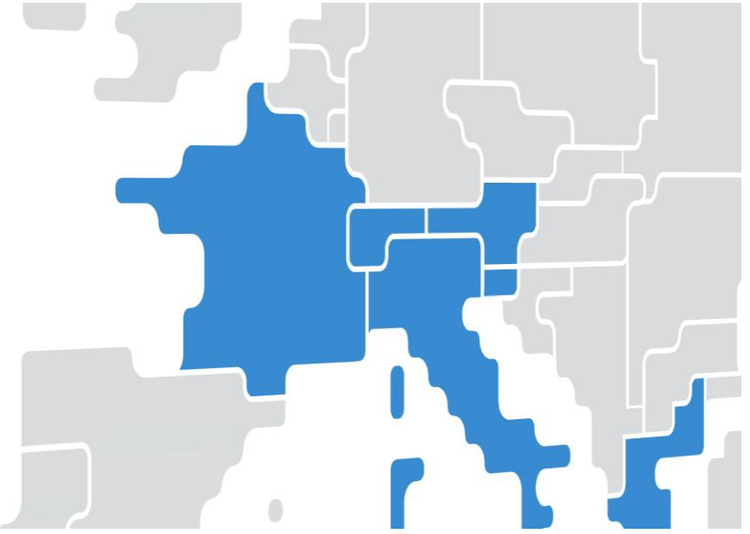
- Go Live at CH-AT border is planned for September 2026.

Continuous Intraday allocation on CH-IT border with 15 Min. market time units

- Work regarding technical and regulatory processes resumed
- Public consultation on Terna side regarding the new processes is planned for Q1/2026
- Expected Go-live at the earliest in Q1 2027
- More detailed information will be given on the Italian Borders Stakeholder Forum on 27 November 2025

Continuous Intraday allocation on CH-FR border with 15 Min. market time units

- Implementation and first tests are currently ongoing
- Amended intraday auction rules are currently in consultation by RTE
- Planned Go-live end of February 2026



Status yearly capacity auctions 2026 and 2027 on CH borders

Border CH > FR and FR > CH for 2026

1. Auction: September 2024 > product Y-2026
   CH > FR 50 MW
   FR > CH 50 MW
2. Auction: September 2025 > product Y-2026
   CH > FR 50 MW
   FR > CH 160 MW
3. Auction: December 2025 > product Y-2026
   FR > CH 160 MW (expected but not yet definitive)

Border CH > FR and CH > FR for 2027

1. Auction: December 2025 > product Y-2027
   CH > FR 50 MW (expected but not yet definitive)
   FR > CH 50 MW (expected but not yet definitive)

Nothing will change at all other Swiss borders. This means there will be only an annual auction for the year 2026, which will take place between November and December 2025.

Active balancing under the new imbalance price model

Lukas Loser
Specialist Balance Group & Sched. Services

Marc Rüede
Head of Balance Group & Sched. Services

swissgrid

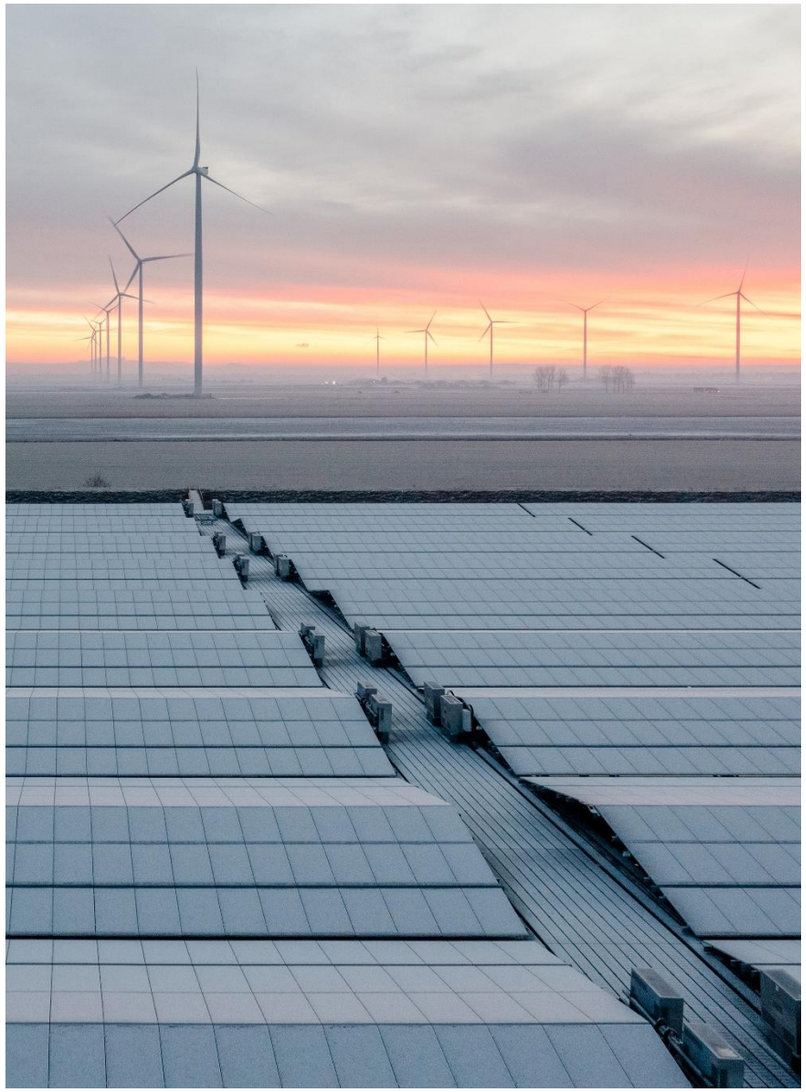
Simulation – Balance group of the future

New Imbalance Price

- One price system
- New incentives and changes in market behavior
- Trading balance groups actively participate in system balancing and are allowed to be imbalanced to a certain degree

Simulation

- Simulate market strategies (51’030) to figure out key aspects in the future:
  - Flexibility
  - PV
  - Storage
- Are the new incentives effective?
- Identify potential risks for Swissgrid.



Simulation – Balance group of the future

Used Data

- Technologies: PV, Wind, Hydropower, Nuclear
- Consumption: Households, Commercial, Industry

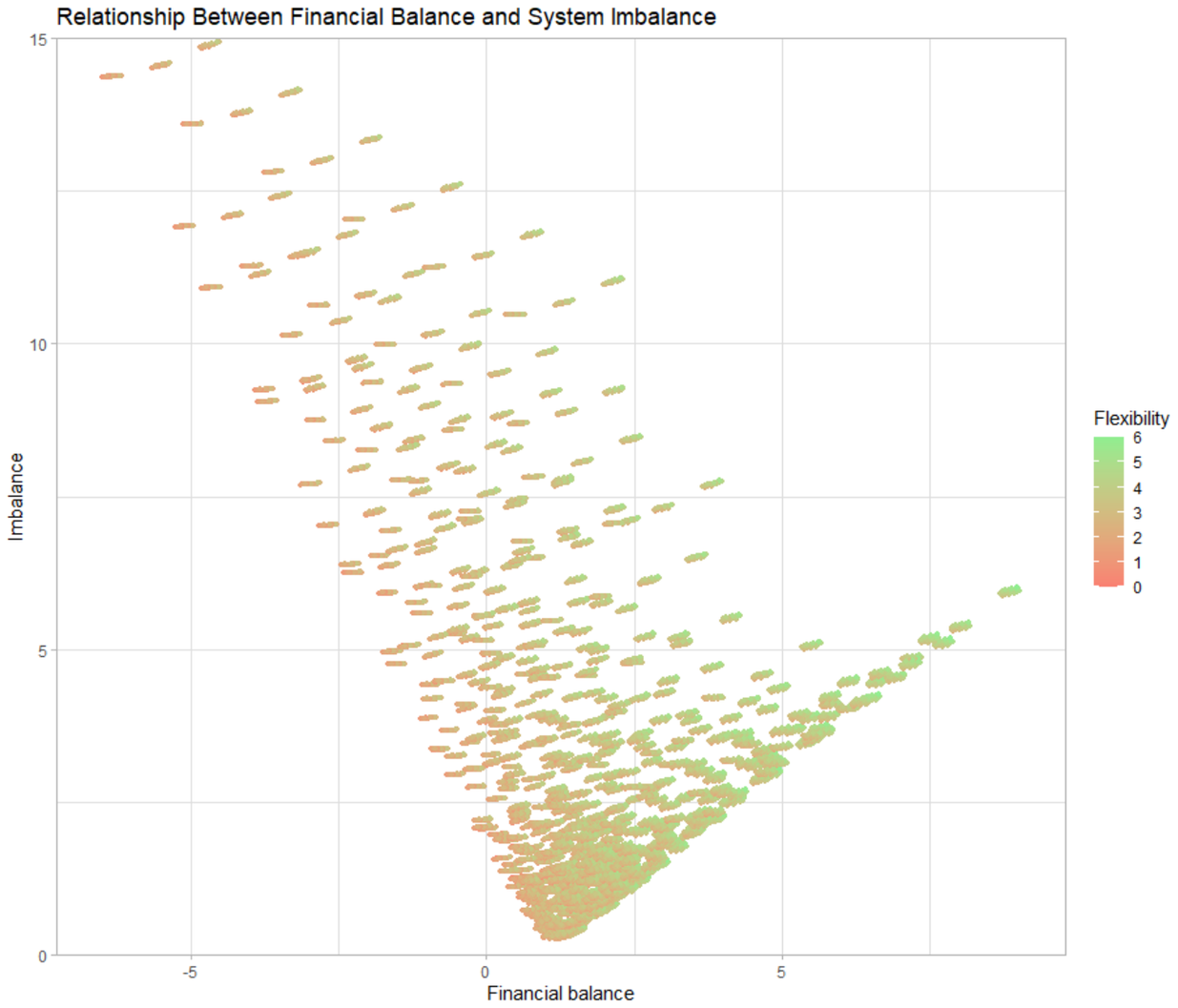
Market Strategies

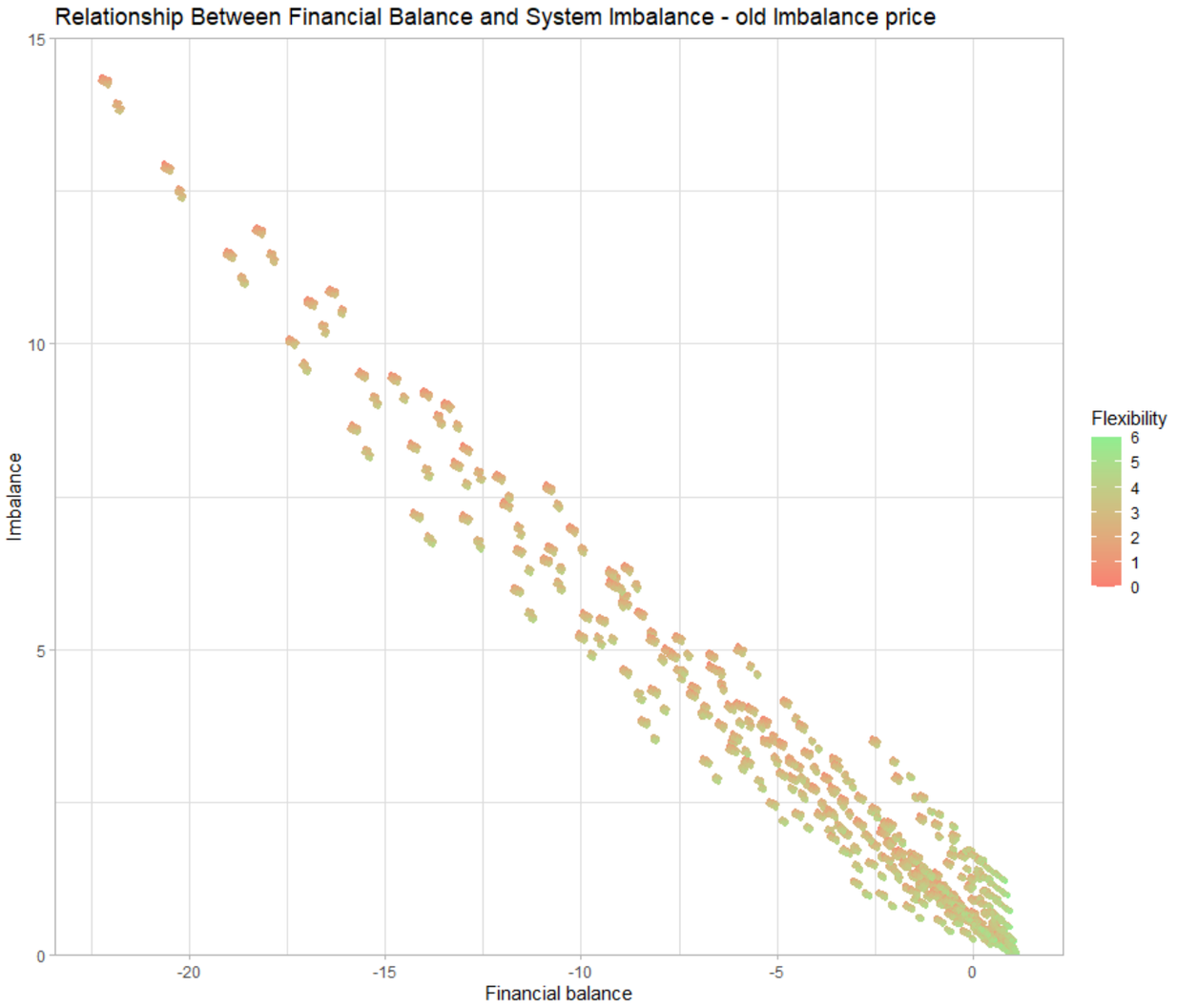
- Controllable PV output: 0–50% (steps of 10%)
- Decreasable load: 0–10% (steps of 5%)
- Increasable load: 0–10% (steps of 5%)
- Day-ahead market purchase behavior: 0–100% (steps of 25%)
- Pumped storage share: 0–20% (steps of 10%)
- Battery capacity: 0–100 MW (steps of 50 MW)

Simulated Years

- 2019, 2025, 2030, 2035, 2040, 2045, 2050
- Forecast up to 2050 according to Energy Perspectives 2050+ (Swiss Federal Office of Energy)

Simulation – Balance group of the future





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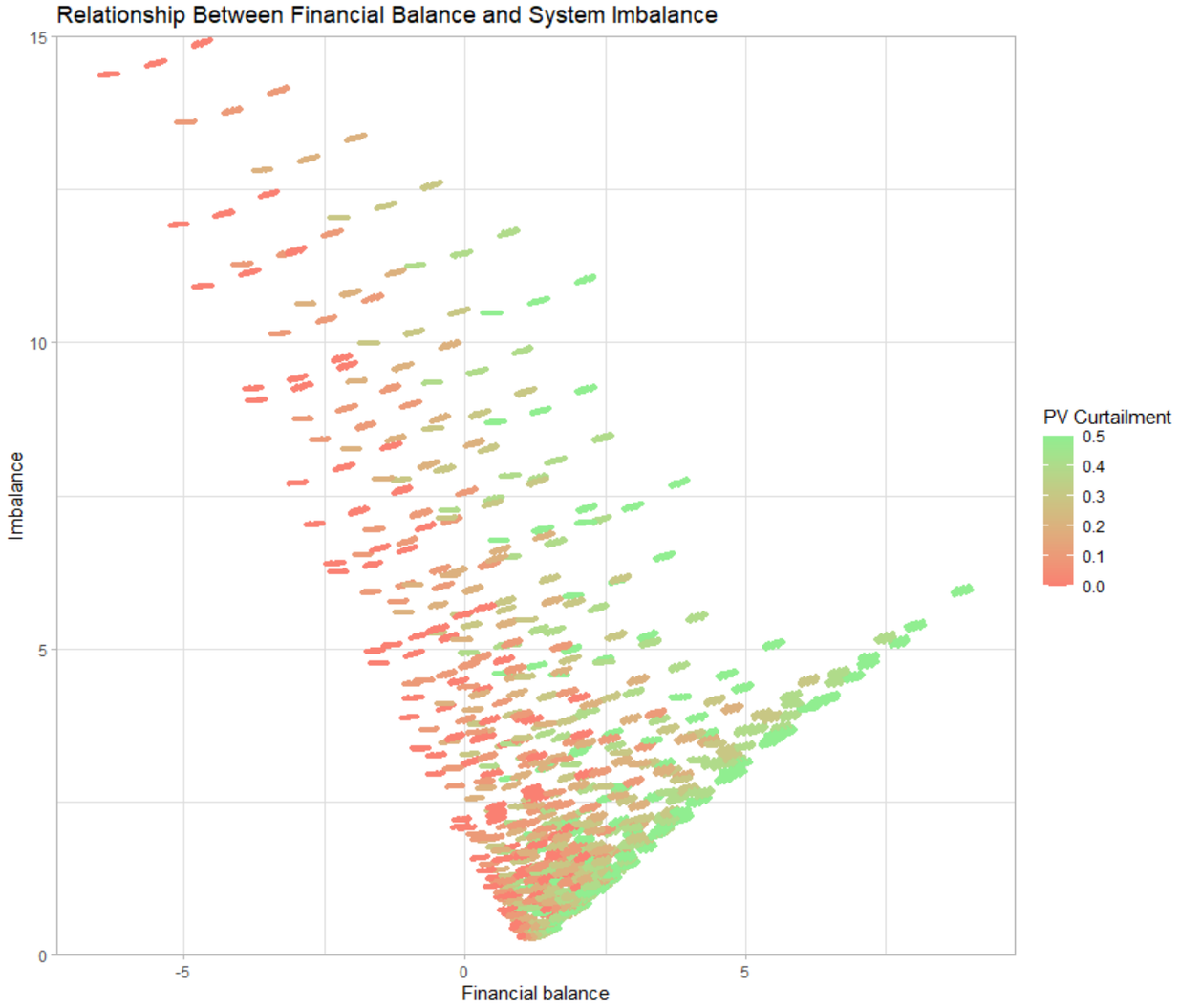
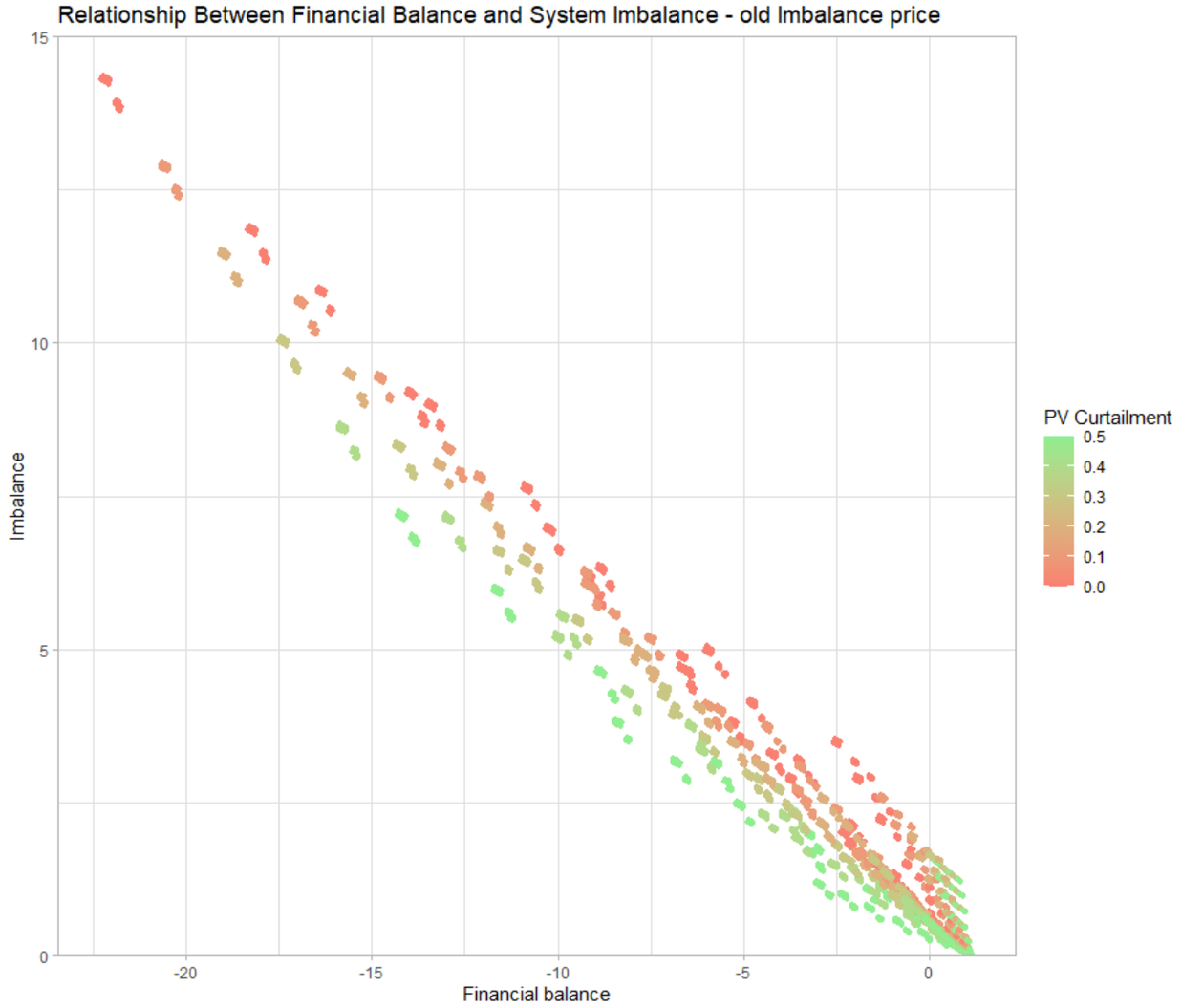
Simulation – Balance group of the future





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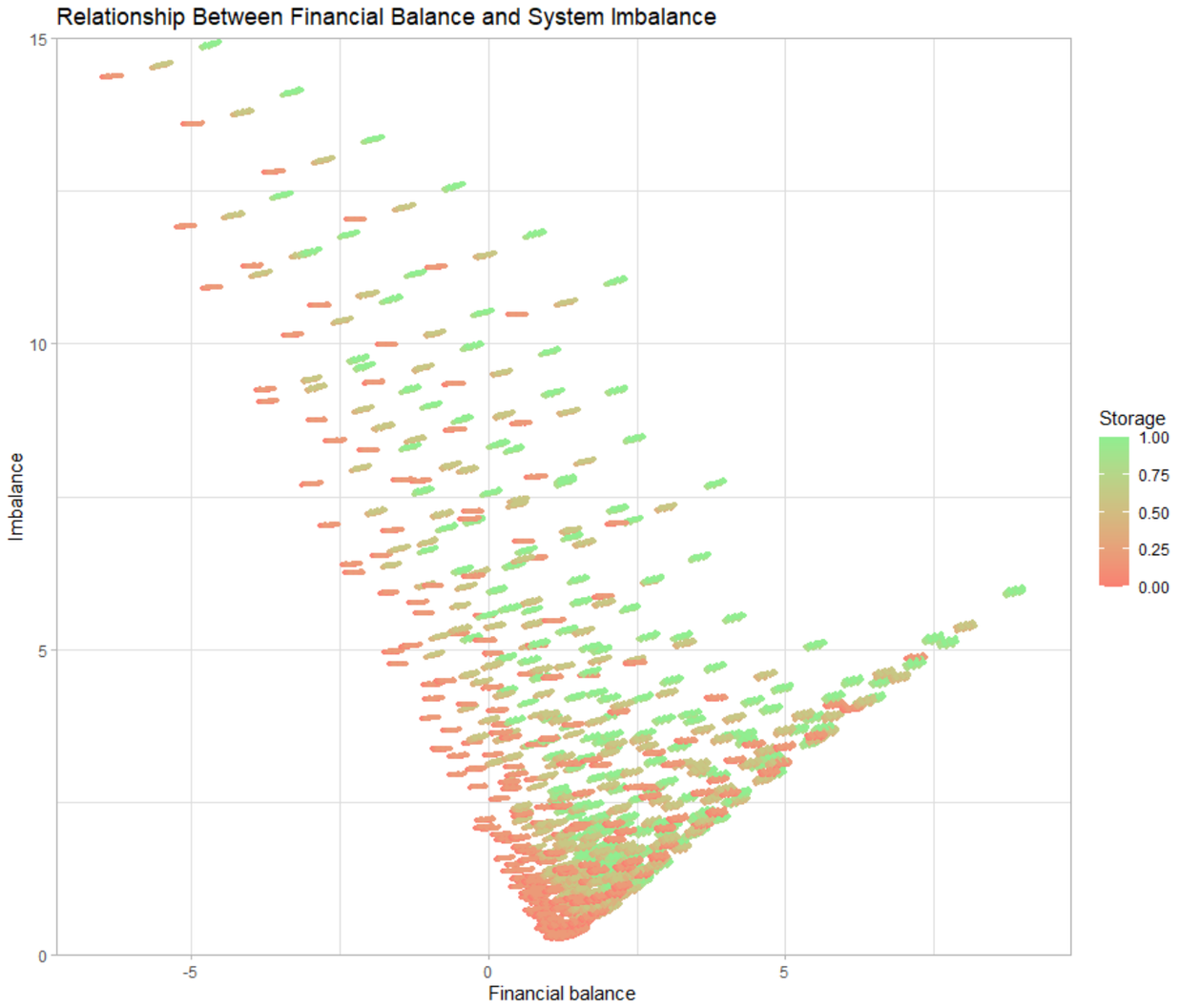
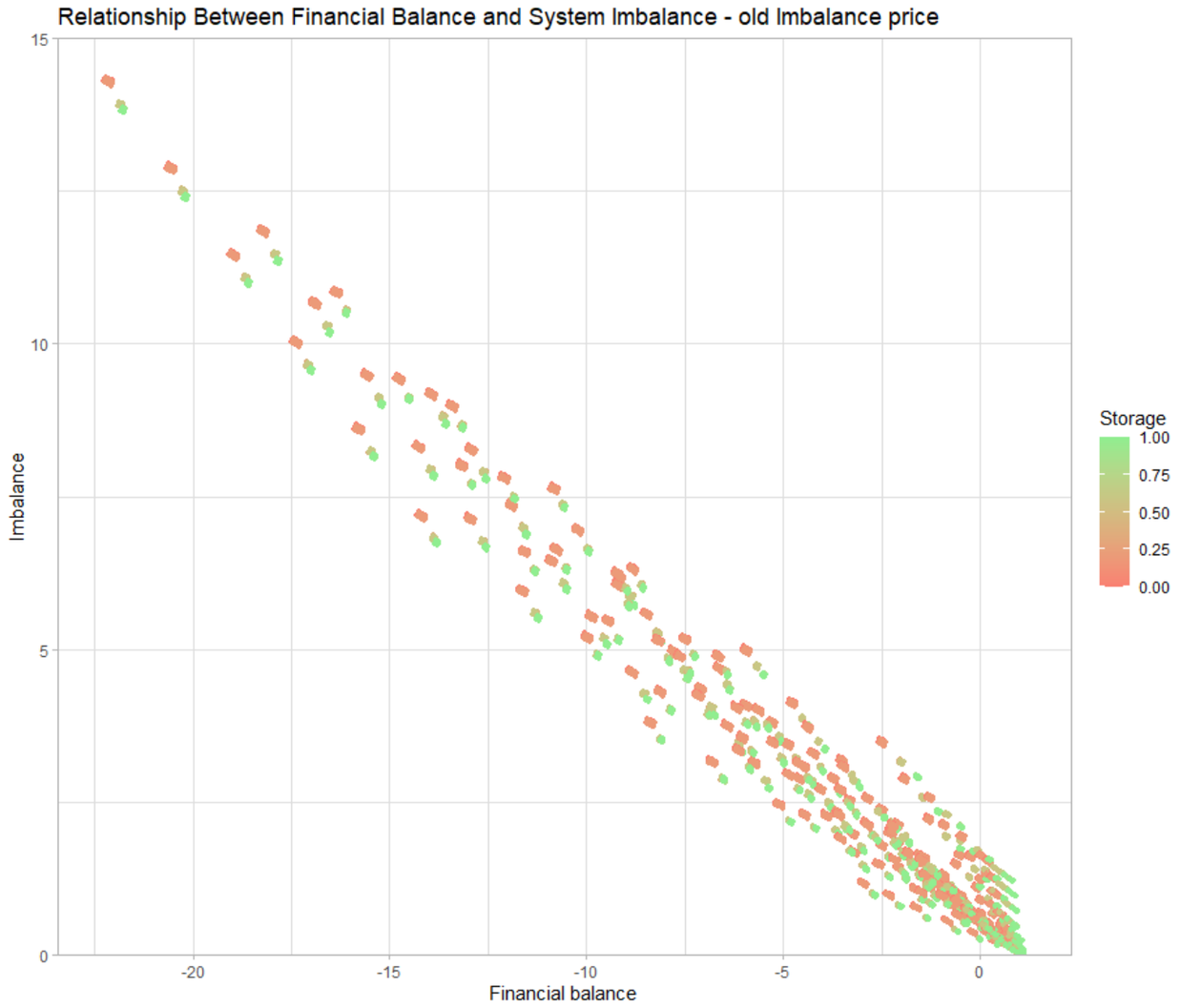
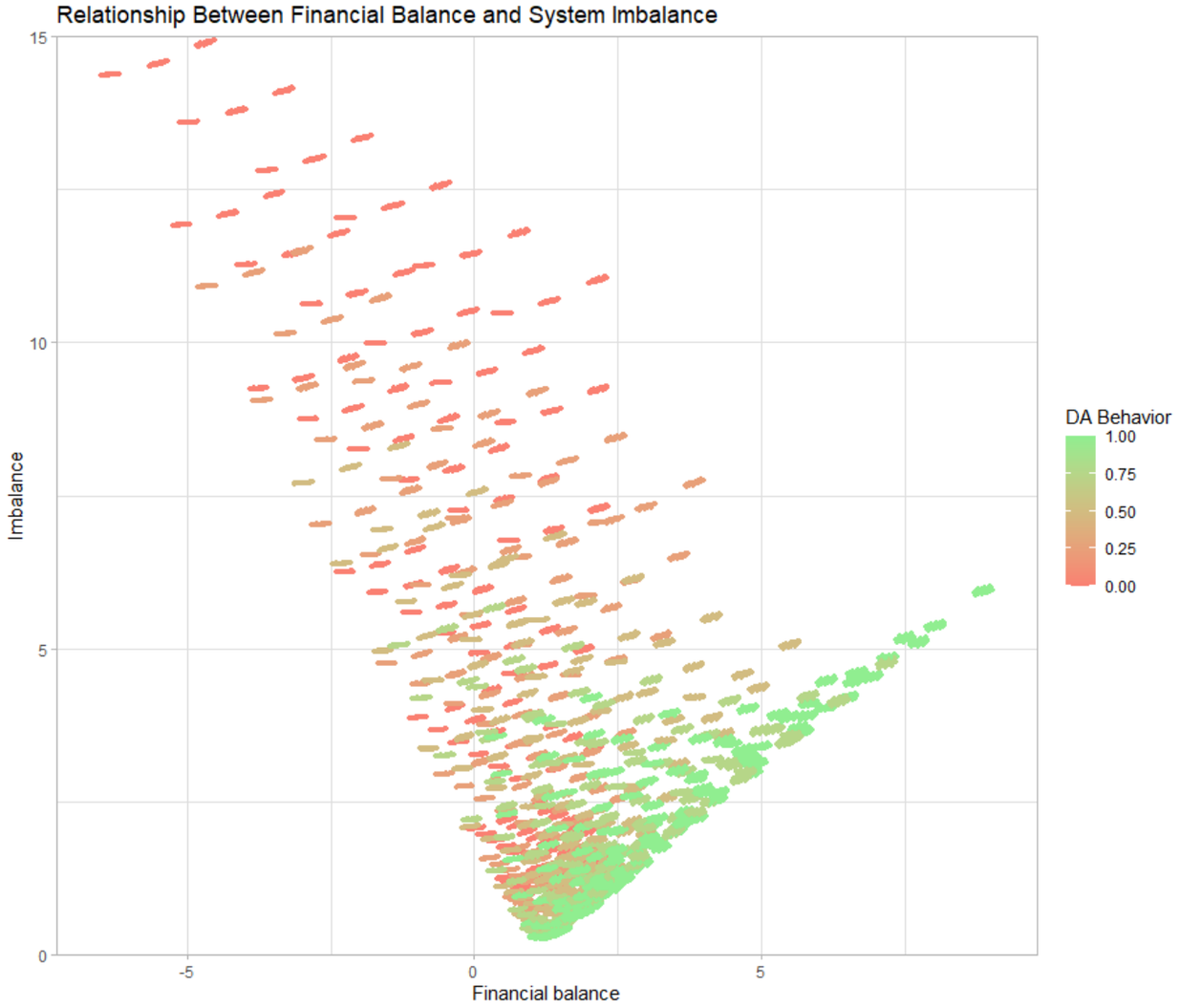
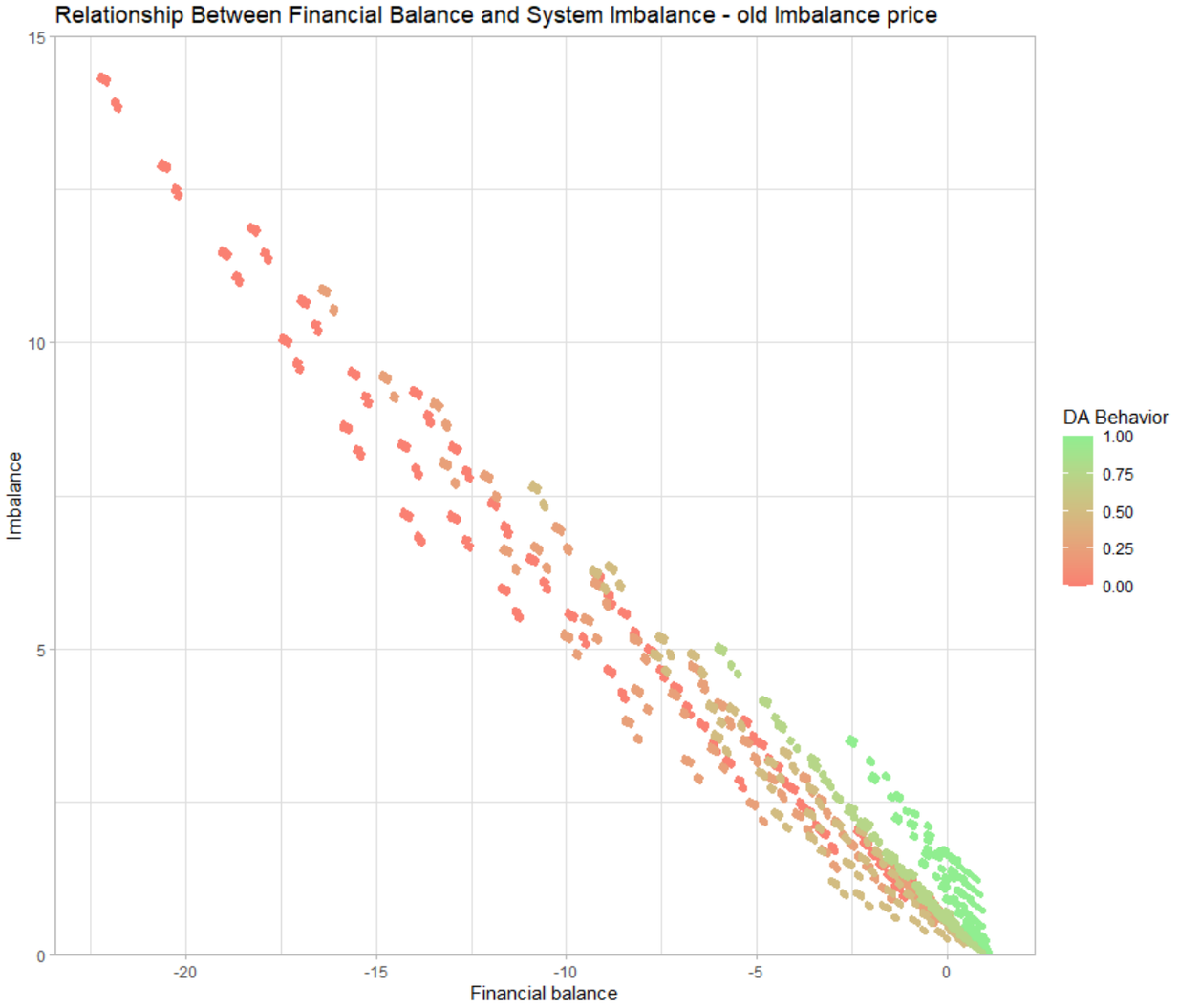
Simulation – Balance group of the future



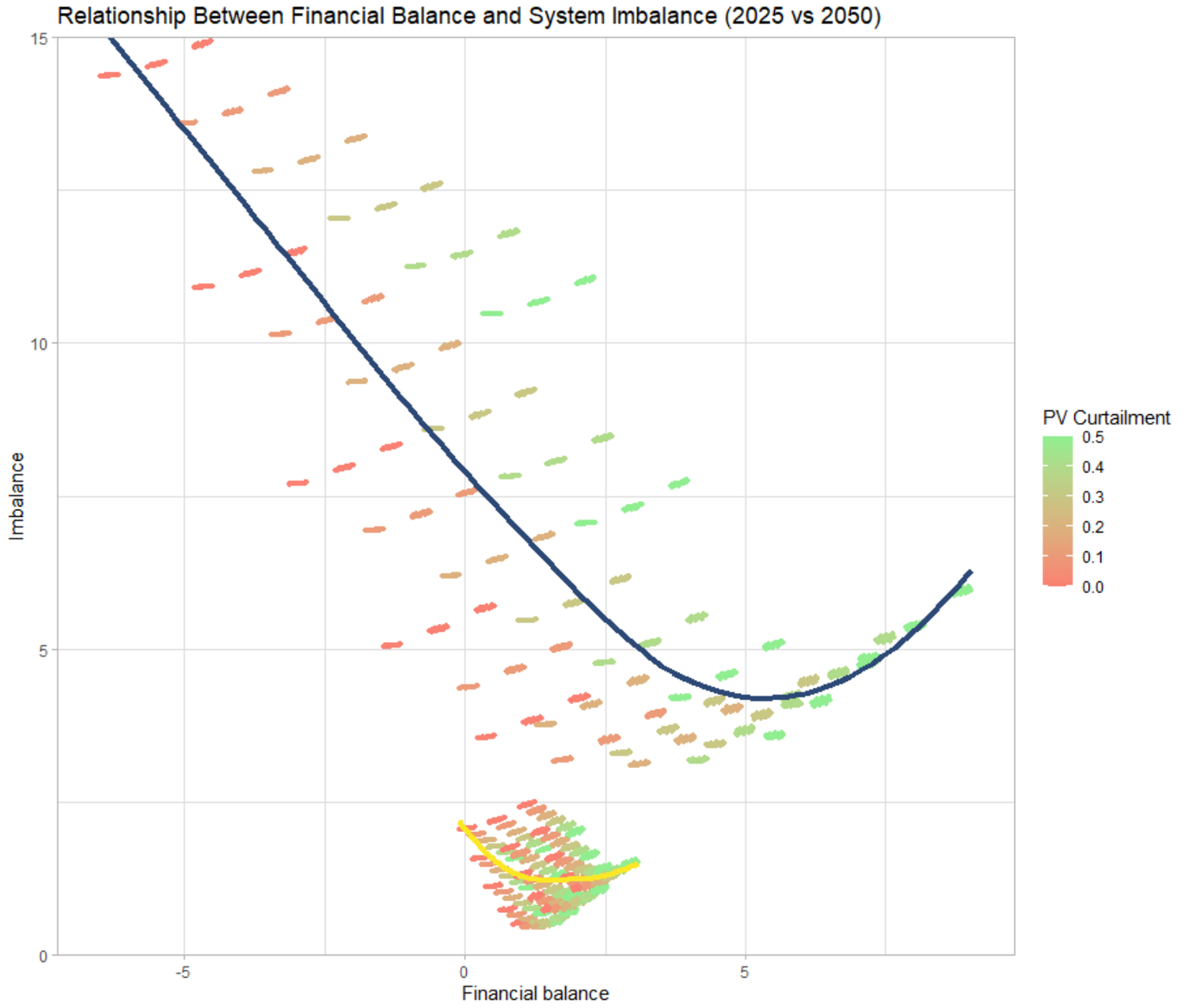


Simulation – Balance group of the future





Simulation – Balance group of the future



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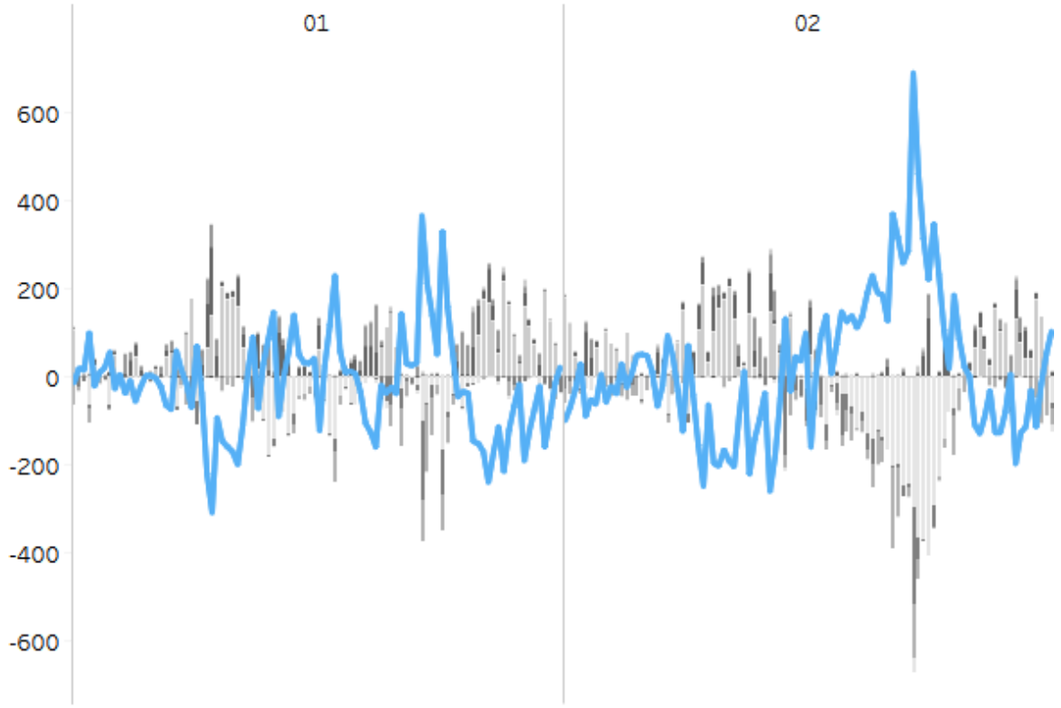
Analysis of the Swiss Control Area

- 18 months of data was analysed (January 2024 – June 2025)
- Focus on:
  - PV Forecast Deviation
  - System Imbalance
  - Streak – duration that the system stays long/short
  - Imbalance Prices
- First quartile (Q1) and third quartile (Q3) to show data spread
- Median as a robust measure of central tendency
- Mean (average) for overall distribution insight
- Outliers identified at the 98th and 99th percentiles

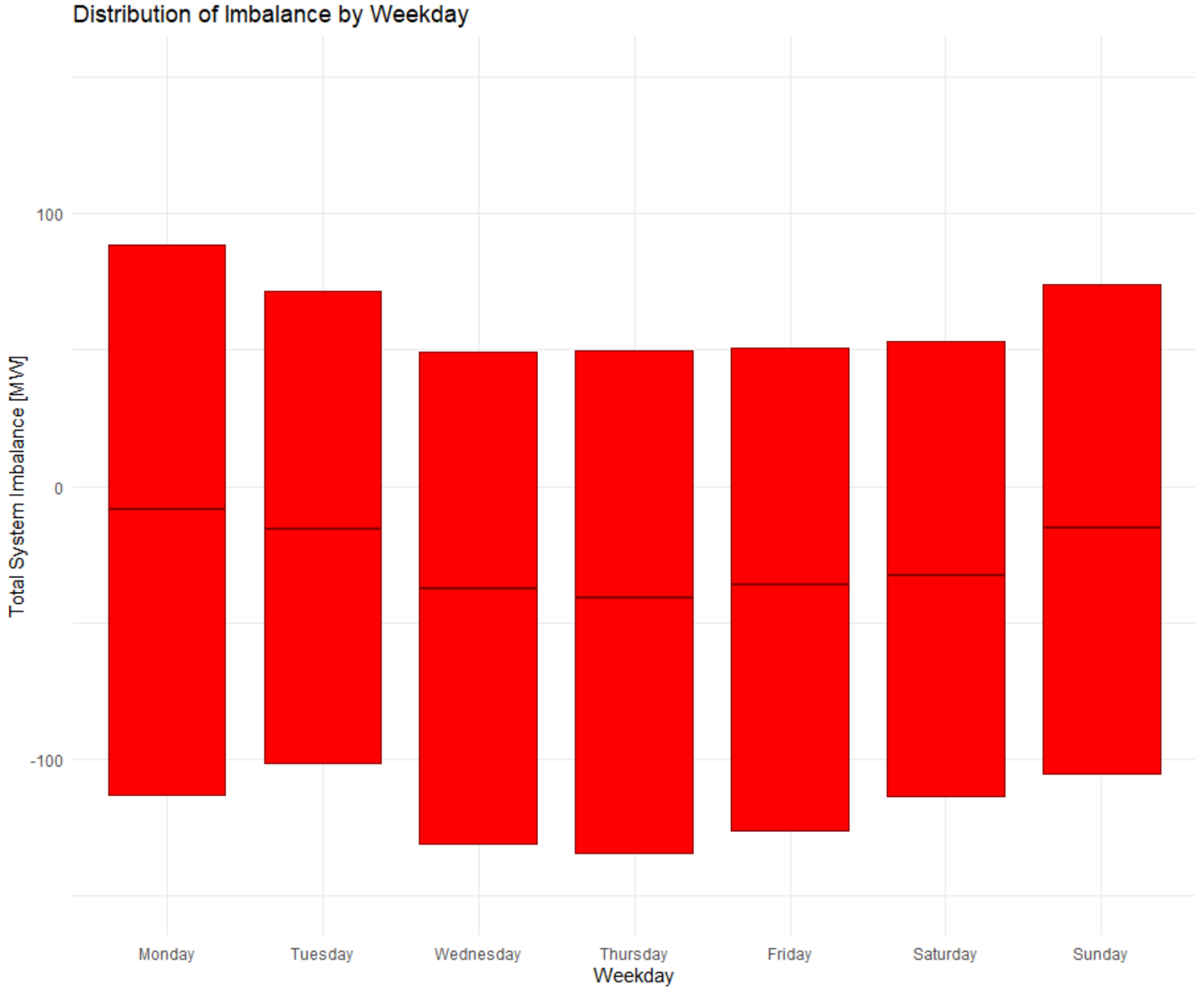


Analysis - PV Forecast Deviation

- Correlation between Total System Imbalance and PV Forecast Deviation

Weekday	D+1-D-3	D+1-D-2	D+1-D-1	D+1-2h
Monday	0.415	0.329	0.317	0.339
Tuesday	0.385	0.368	0.351	0.275
Wednesday	0.357	0.425	0.385	0.275
Thursday	0.412	0.357	0.374	0.201
Friday	0.360	0.526	0.472	0.134
Saturday	0.425	0.354	0.382	0.377
Sunday	0.469	0.441	0.381	0.233

Analysis - Total System Imbalance



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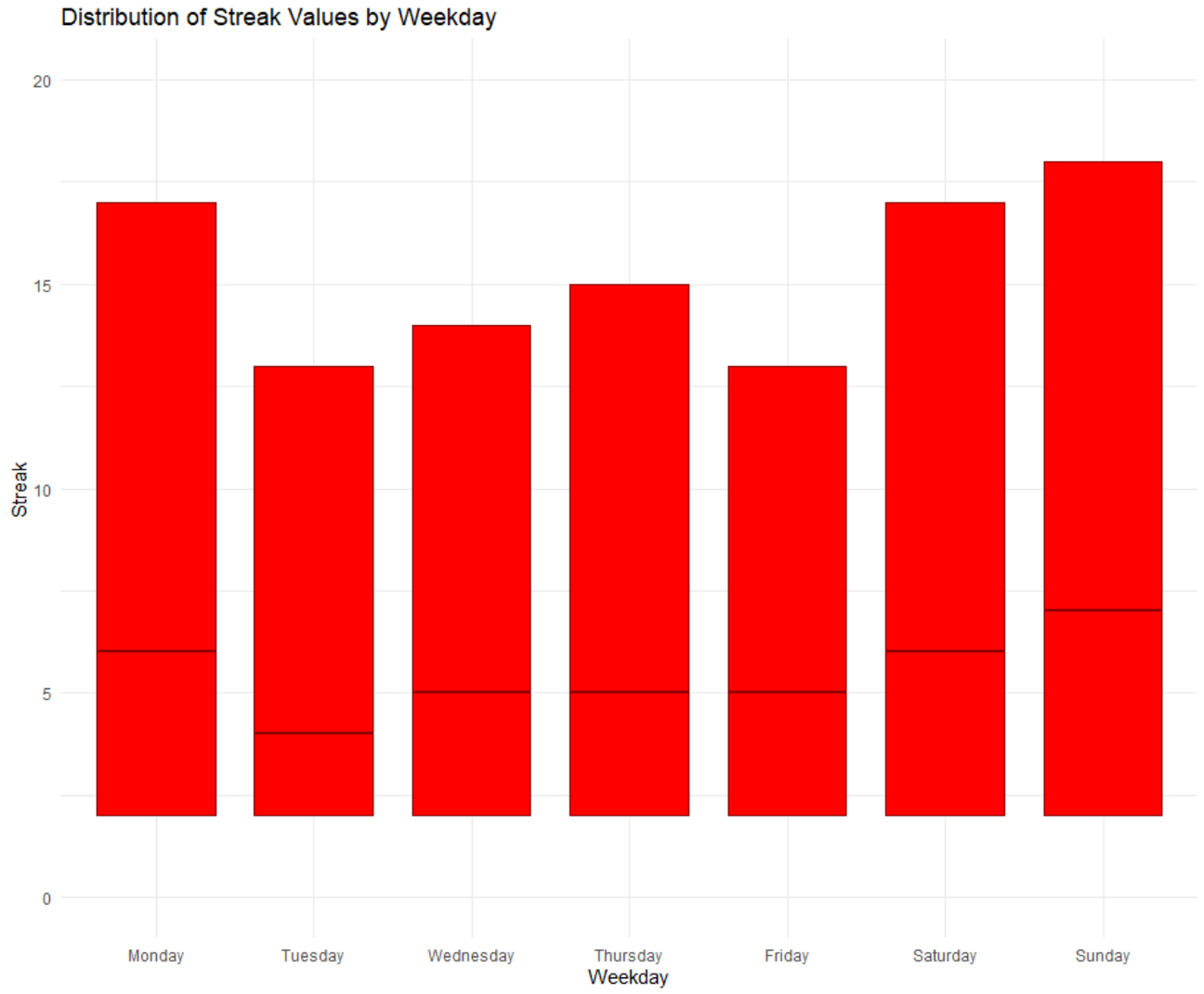
Analysis - Total System Imbalance

- Imbalance [MW]
- 18 months of data was analysed (January 2024 – June 2025)

Weekday	1 Quartile	Mean	Median	3 Quartile	98% - Percentile	99% - Percentile
Monday	46.89	134.37	101.66	183.44	483.67	581.81
Tuesday	40.43	119.53	87.87	165.37	431.79	504.62
Wednesday	42.80	124.43	94.40	172.24	446.29	523.84
Thursday	44.71	131.43	97.59	176.84	499.19	616.64
Friday	43.04	124.10	92.48	165.54	483.68	583.51
Saturday	40.56	121.50	87.56	157.70	478.31	560.44
Sunday	41.69	130.63	91.72	176.98	538.98	630.88

Analysis - Streak



Weekday	Mean
Monday	12.80
Tuesday	10.65
Wednesday	9.72
Thursday	10.63
Friday	10.09
Saturday	12.60
Sunday	12.74

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Analysis - Imbalance Prices

- AEP (absolut) in EUR/MWh
- 18 months of data was analysed (January 2024 – June 2025)

Weekday	1 Quartile	Mean	Median	3 Quartile	98% - Percentile	99% - Percentile
Monday	56.1	200.3	129.8	220.9	992.3	1681.9
Tuesday	58.2	191.5	136.8	232.0	778.1	1150.1
Wednesday	69.7	202.9	144.1	233.6	780.3	1179.0
Thursday	77.5	199.5	146.2	235.8	788.4	1005.8
Friday	71.4	212.3	136.4	225.2	809.5	1303.4
Saturday	77.9	204.4	143.6	224.0	820.7	1418.5
Sunday	68.5	233.1	136.0	231.0	1285.6	2065.4

Discussion

- What are your expectations regarding the new single imbalance price model?
- What do you see as the biggest opportunities for balance groups in active balancing?
- What uncertainties or open questions do you still have about the new single imbalance price model?
- What are the potential challenges of the new imbalance price model?
- What kind of data do you need to make informed decisions about active balancing?
- How useful is the data currently provided by Swissgrid, and what key elements are missing?
- What further regulatory or technical changes would help promote active balancing?

Publication of Data at Swissgrid

Roman Uhl
Principal Market Operations

Edi Cortesi
Senior Project Manager

swissgrid

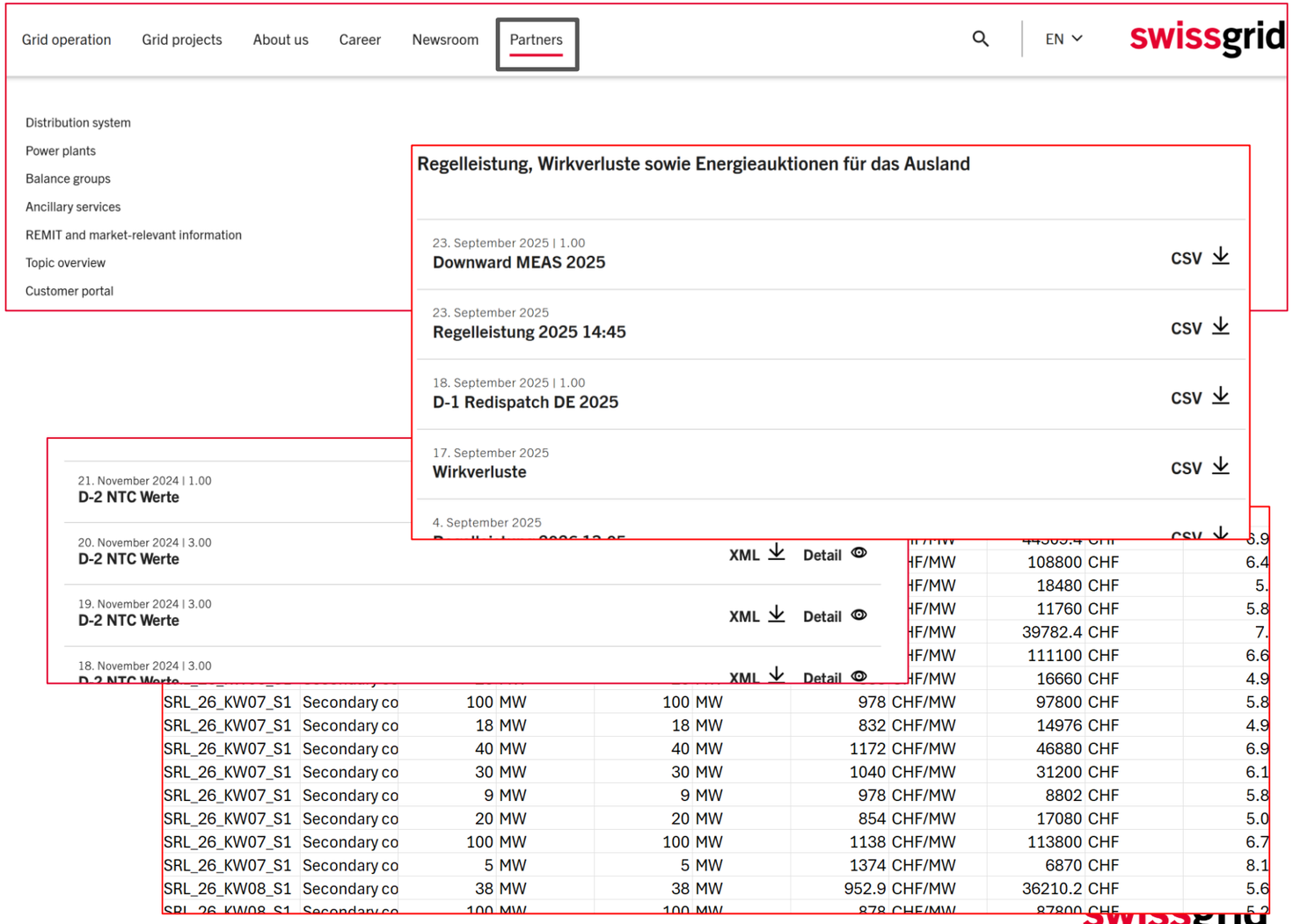
Goal of the Session

- Introduce participants to the ongoing evaluation at Swissgrid on improving the way data is published by Swissgrid.
- Understand the specific requirements of balance group managers towards Swissgrid’s data publication.

Data Publication by Swissgrid today

Today, Swissgrid publishes a number of datapoints through the Swissgrid website.

- Data is available for download usually either in .csv or .xml format.
- Files for download are being overwritten once new data is available.
- Interested parties download the files either manually or by use of a web scraping tool.



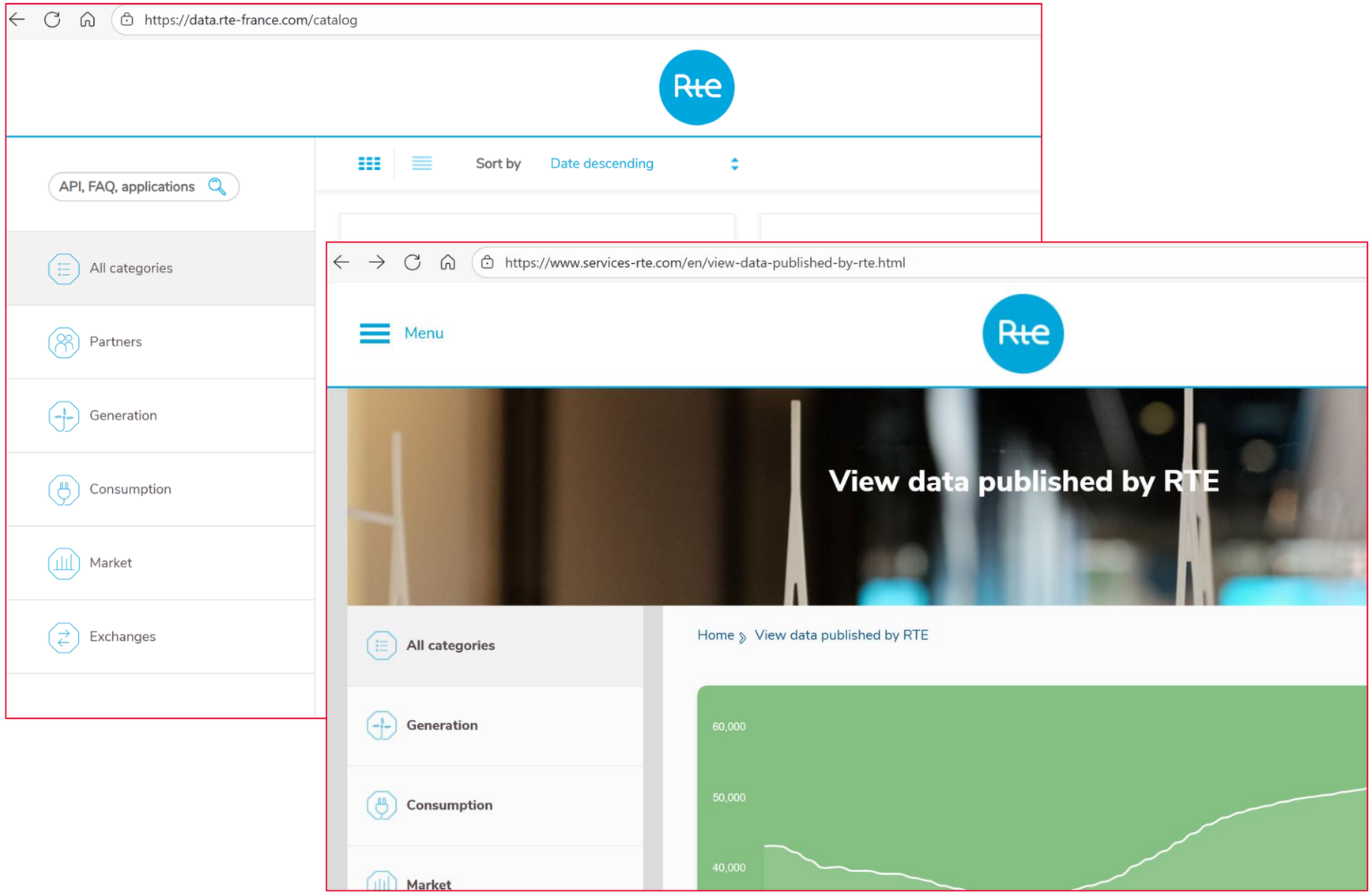
How do other TSOs do it? RTE

Link:

API Catalog - API Data RTE

Key features:

- Data visualization (use of graphs, bar charts, …)
- Background information on published/visualized data
- Filtering by date/time for visualization
- Download of visualized data
- API



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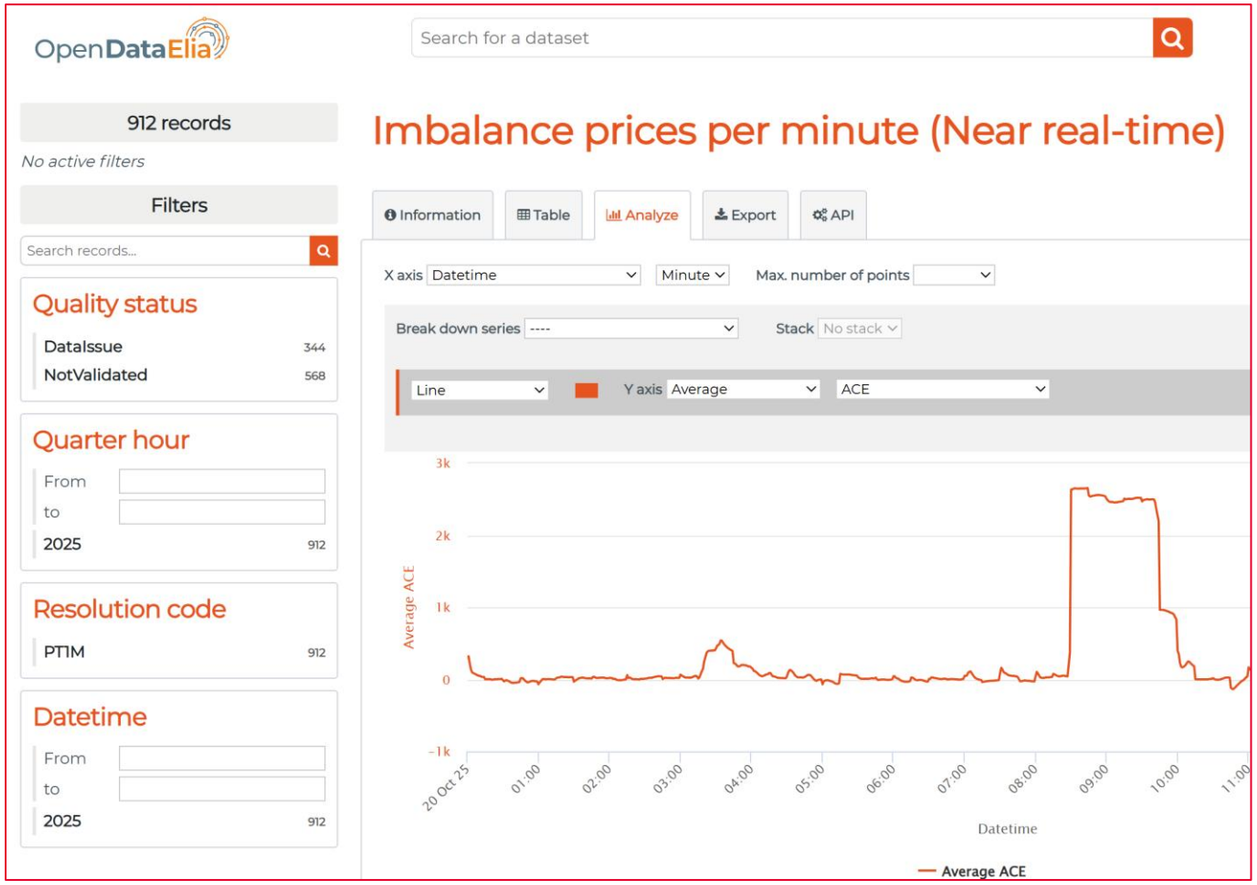
How do other TSOs do it? Elia

Link:

https://opendata.elia.be/

Key features:

- Highly customizable data visualization (use of graphs, bar charts, …)
- Background information on published/visualized data
- Filtering by date/time for visualization
- Comparison of selected datasets
- Download of visualized data
- Customizable API



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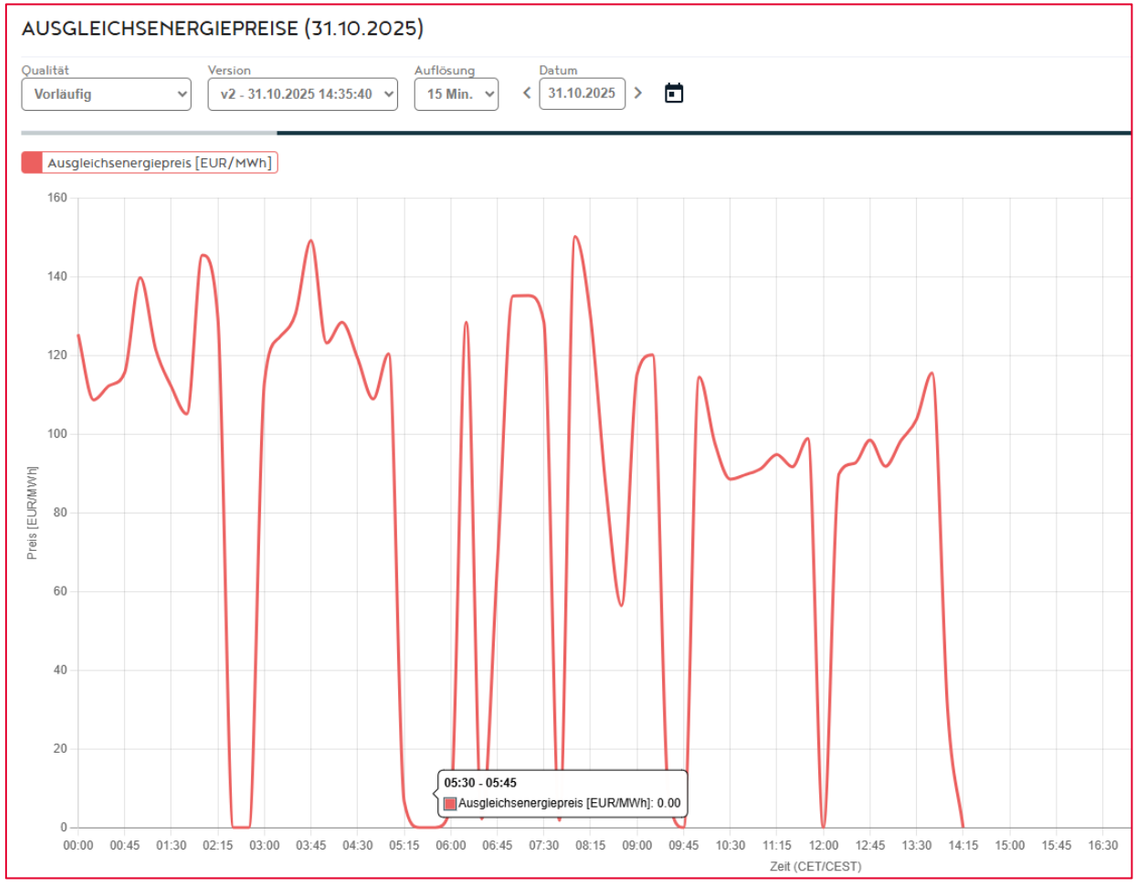
How do other TSOs do it? APG

Link:

APG Visualisierungen

Key features:

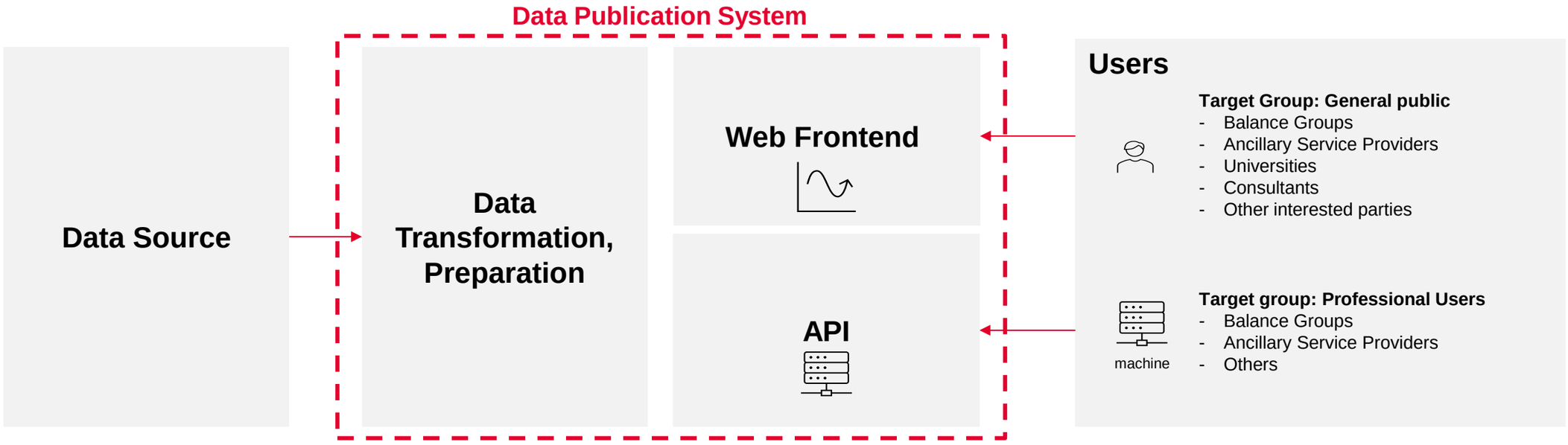
- Highly customizable data visualization (use of graphs, bar charts, …)
- Background information on published/visualized data
- Filtering by date/time for visualization
- Safe chart as image
- Download of visualized data



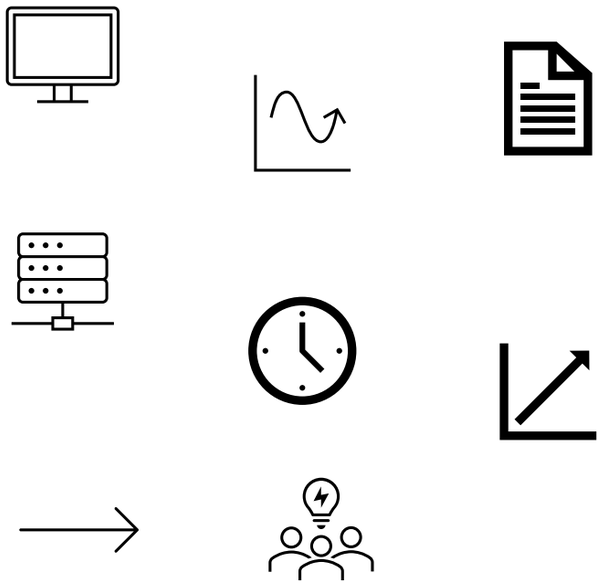
Our ideas

Our preliminary **ideas** to change Swissgrid's data publication:

- New system for data publication web frontend, API and modules for data tranformation and preparation.
- Web frontend for data visualization and manual downloads.
- High availability API for access to data.
- Shortening of time between creation and publication of data, improvement of data quality.



Tell us your requirements



- **Web Frontend**
- **API**
- **General**

(Survey for requirements sent after meeting, for those who are not able to attend)

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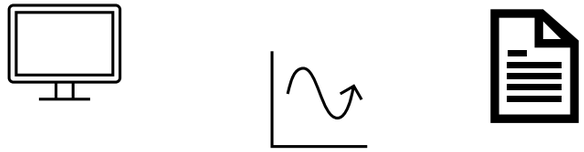
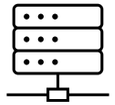
Tell us your requirements: Web Frontend



- Would you use the web frontend to access data if the same data is also available through API?
- What types of visualizations are most important to you—line charts, bar charts, heat maps, or others?
- Should the data also be presented in a tabular format alongside the visualizations?
- What filtering and comparison capabilities do you expect (e.g., by time range, category, or dataset)?
- Which file formats should be supported for manual data downloads (e.g., CSV, Excel, JSON)?
- Should users be able to download individual charts, full datasets, or both?

Tell us your requirements: API

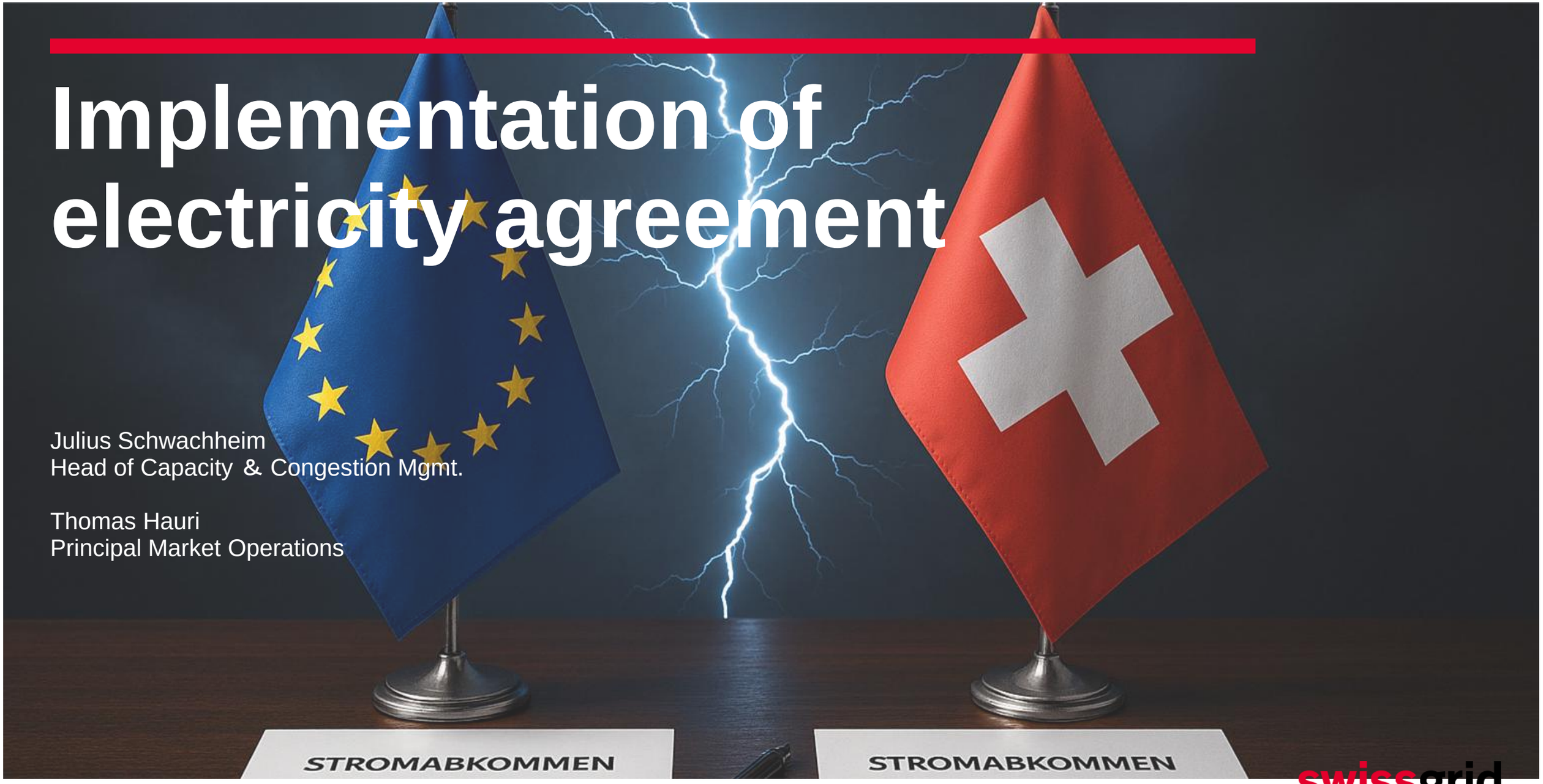


- What level of access should authorize users have via the API—read-only, full access, or something else?

Tell us your requirements: General

- What additional data records would you be interested in (on top of the already published data)?
- What is the acceptable time lag between data generation and its publication?
- Should the system support 15min. updates or shorter refresh cycles?

Implementation of electricity agreement



Julius Schwachheim
Head of Capacity & Congestion Mgmt.

Thomas Hauri
Principal Market Operations

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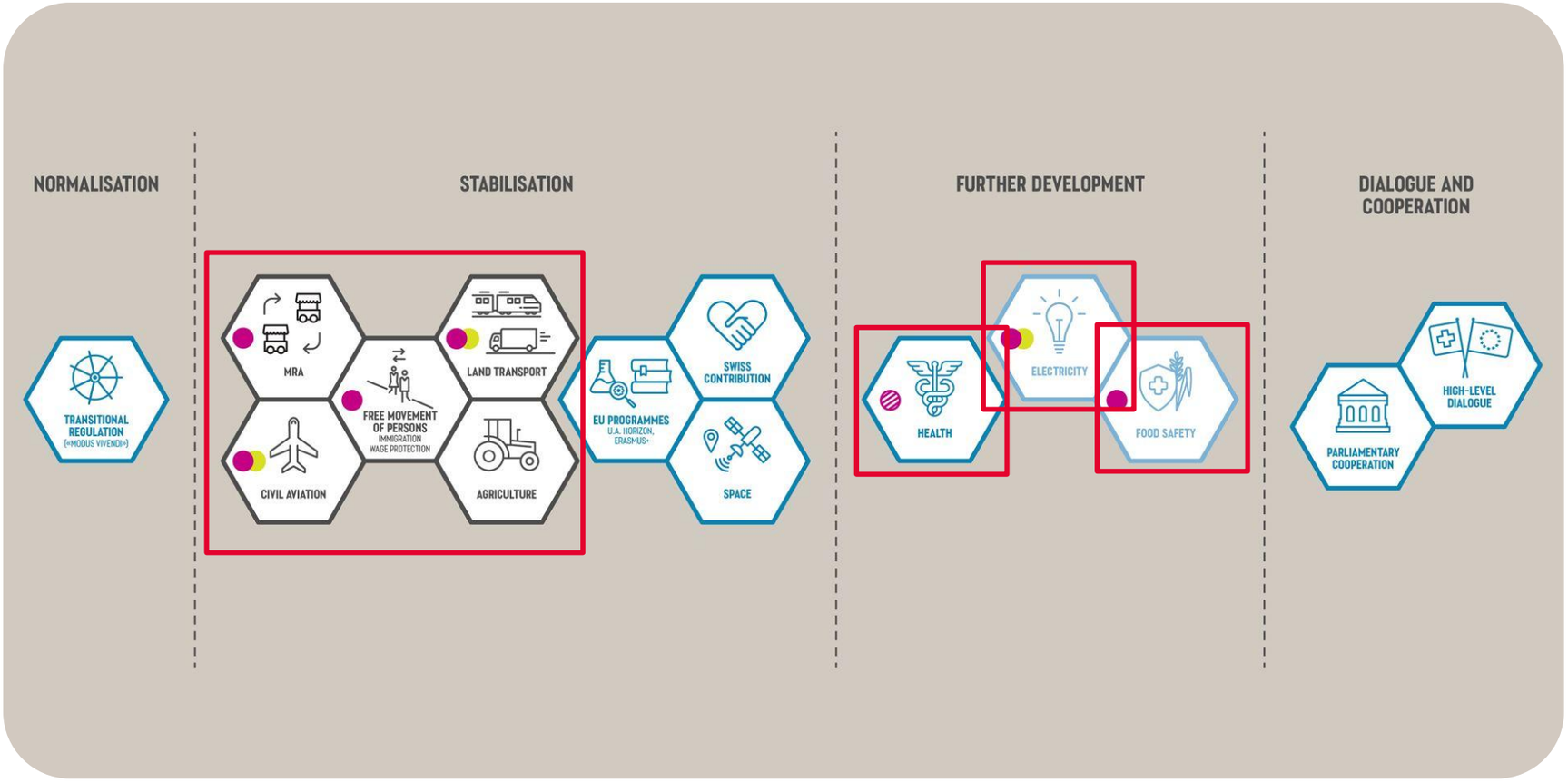
The objective of today's session is:

i) Provide an overview about the market relevant aspects of the Electricity Agreement

ii) Start a dialogue with the Branche to get feedback

EU-CH Package includes extensive cooperation agreements



Approval of stabilisation package is a precondition for the electricity agreement

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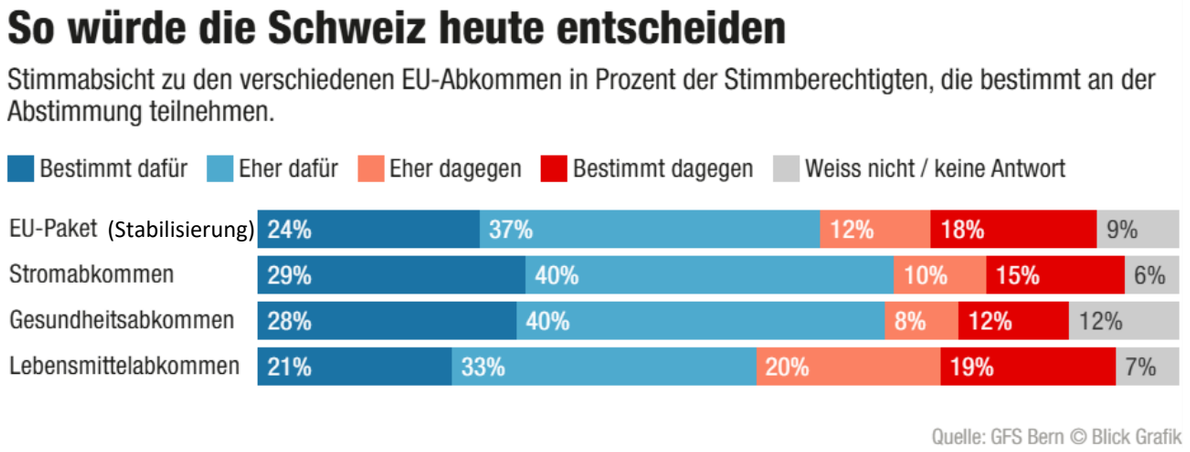
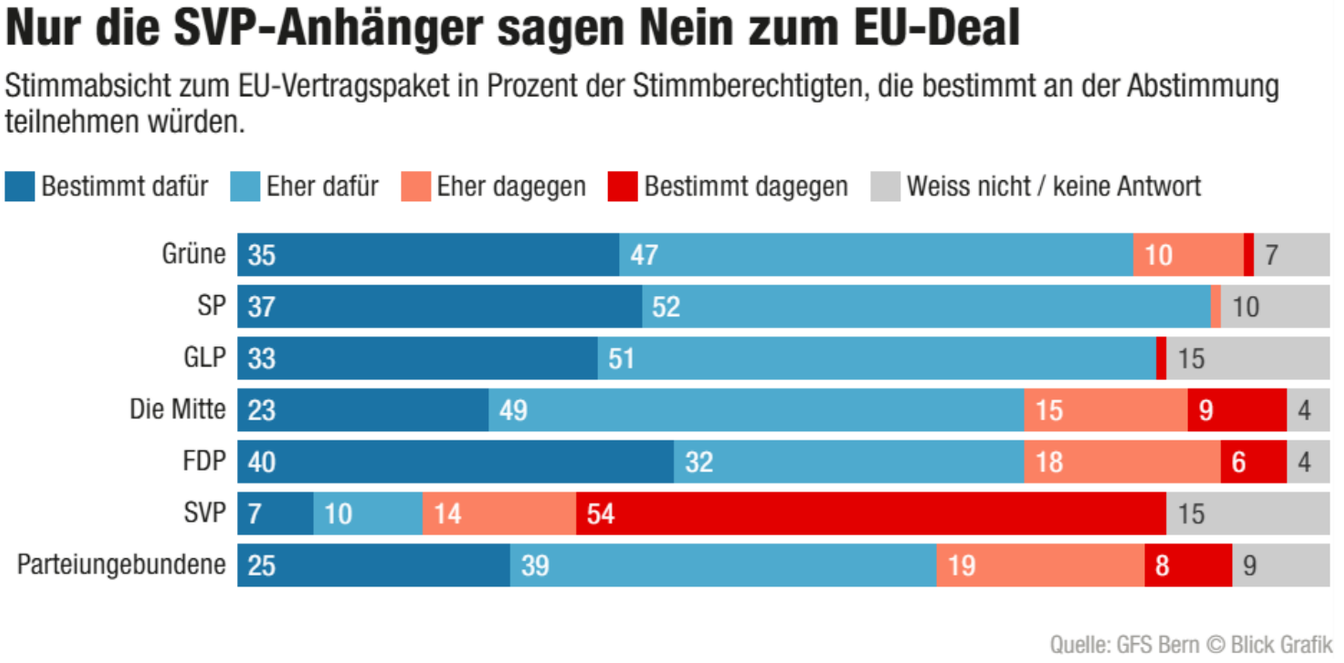
Why the electricity agreement is an opportunity for Switzerland

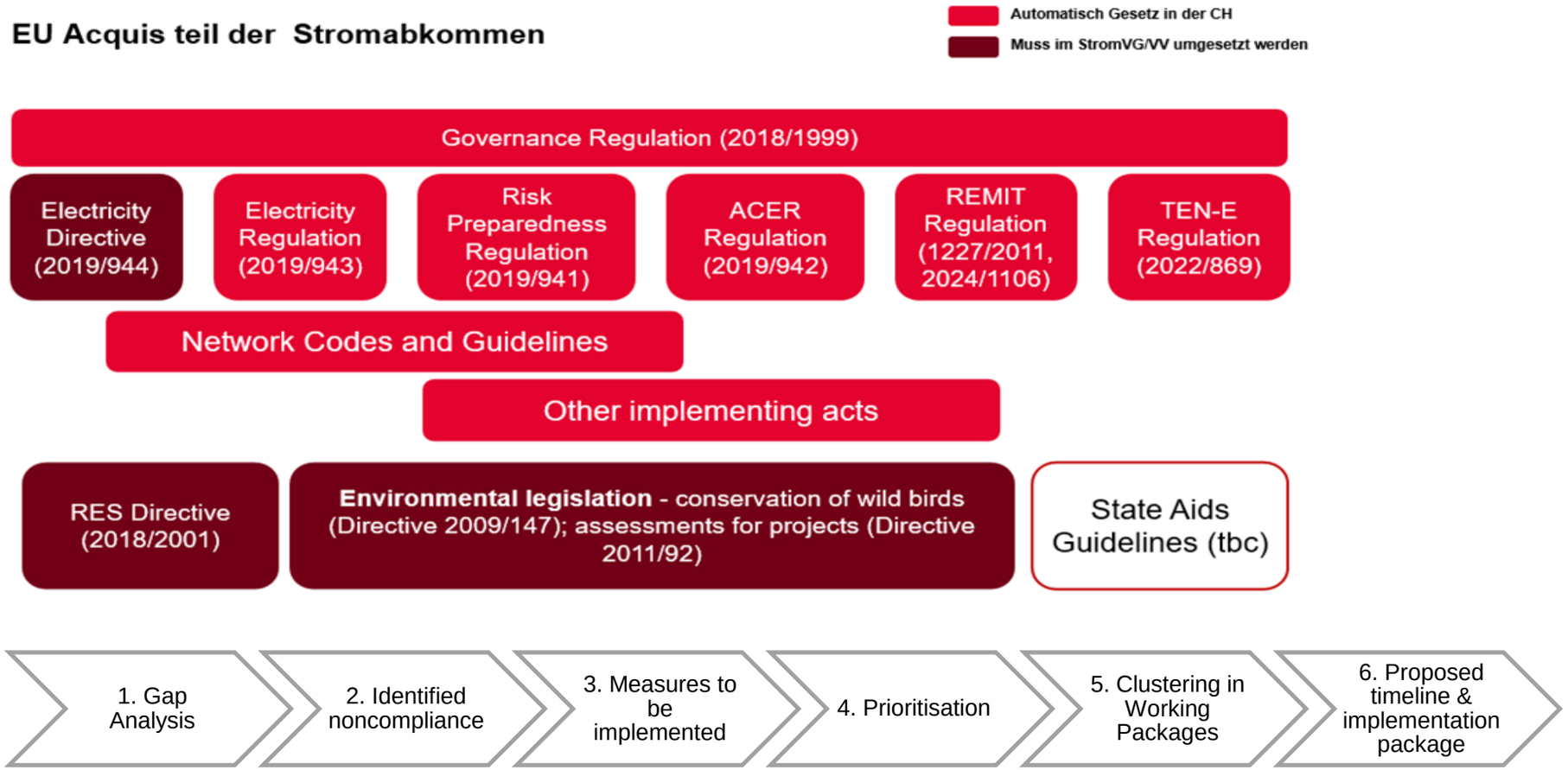
Energy Future	Coordinated market & grid development with EU will facilitate RES integration
Economic Hub	Ensuring that CH maintains its attractiveness through access to affordable power
Stable Grid	Access to more affordable balancing power through European platforms
Power Exchange	Strained electricity supply in winter can be attenuated through larger transfer capacities with ATSOs
Decision-making power	CH has a say in the planning and organisation of the European electricity system
Legal security	Dependency on yearly private contract terminations ends. CH avoids complete exclusion from trading platforms and coordinating bodies

Current polling suggests a favourable view towards the entire EU-CH package





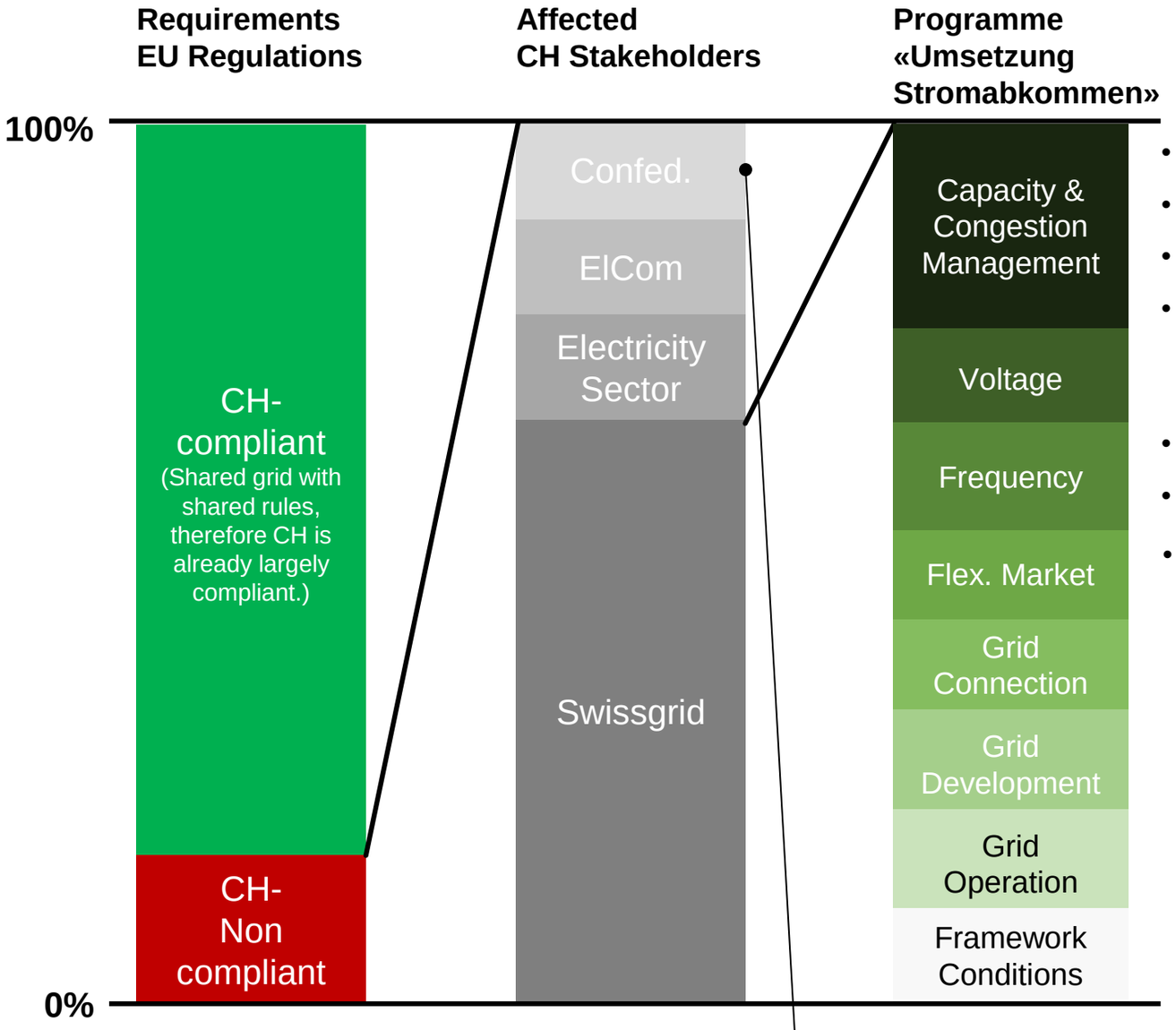
Scenario with Electricity Agreement – How did we proceed?



1. Gap Analysis → 2. Identified noncompliance → 3. Measures to be implemented → 4. Prioritisation → 5. Clustering in Working Packages → 6. Proposed timeline & implementation package

Swissgrid is already now ramping up activities in order to prepare for a possible Go Live of the various processes after the Electricity Agreement is finally confirmed in 2028.

Scenario with Electricity Agreement: Path to implementation & compliance



- Flow-Based Capacity Calculation
- Day-Ahead Market Coupling (SDAC)
- Intraday Market Coupling (SIDC/XBID)
- FTRs/PTRs in long-term

- MARI/PICASSO
- cross-zonal capacity reservation for balancing
- Implementation of NC Demand Response (more access / requirements for access to flex)

NEMO set-up (incl. Multi-NEMO arrangement)

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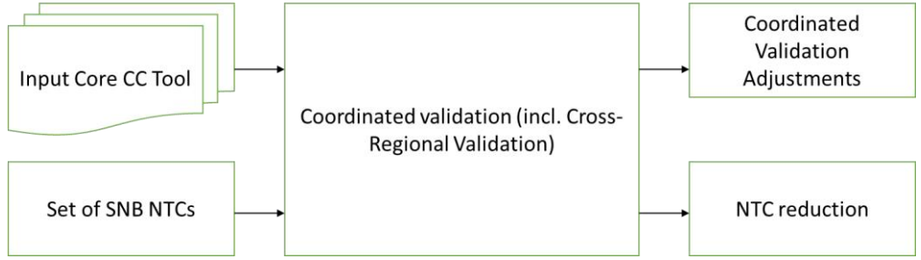
Substantial changes will be happening on the CH borders due to the implementation of Flow-Based Market Coupling with a huge increase of market efficiency

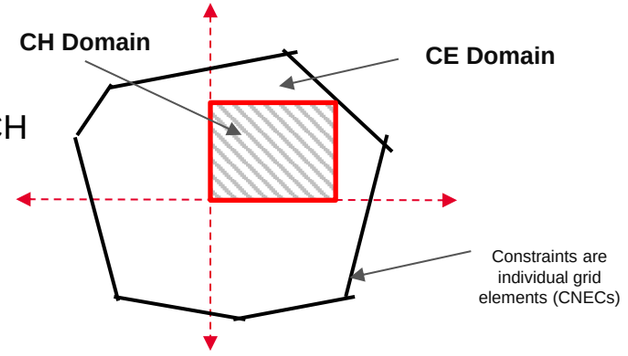
Coordination with Core

- 2026: interim solution focussing on grid security
- 2027: potential full solution incl. optimisation of capacities



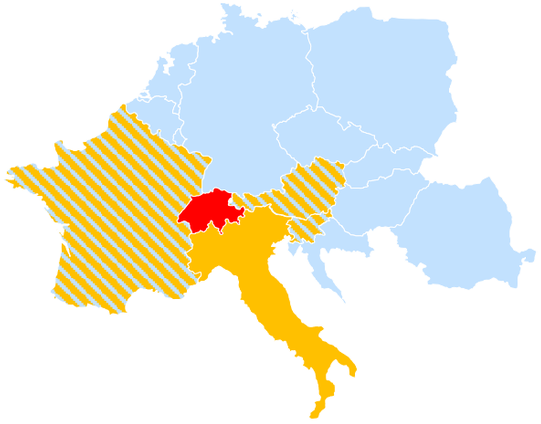
Central Europe CCR – without Market Coupling (replacement of Core + ITn)

- Go Live expected 2028
- Full Flow-Based calculation incl. CH
- But: extraction of NTCs
  → **big inefficiency**



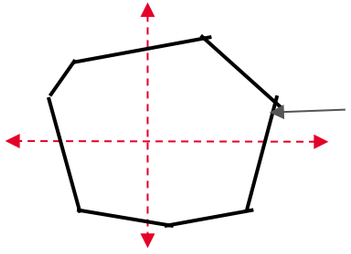
Status Quo

- DA: Explicit auctions all borders
- ID: Continuous explicit SNB & Explicit auctions ITn
- Coordinated Cap. Calc. in Itn
- No coordination with Core (only bilateral SNB coordination)



Central Europe CCR – with Market Coupling

- Full Flow-Based calculation incl. CH
- No specific treatments anymore
- Full utilisation of all CE capacities by the market
- Implicit allocation via SDAC (& SIDC for ID)



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Start a dialogue with the Branche to get feedback

Detailed questions to the attendees

Market Coupling

- What risks do you see particularly with regards to the implementation of Market Coupling?
- What do you need to be ready?
- If you could choose, would you have Day Ahead or Intraday Market Coupling first?

Long Term Markets

- Do you prefer to introduce physical- or financial transmission rights (PTR or FTR) in the long-term timeframe?

General

- Would you welcome the fact that several NEMOs are active in Switzerland?
- What opportunities and risks do you see in the market liberalization?

Questions & Inputs from the participants

Optimizer under Stress: Challenges of the Balancing Energy Autopilot

Jennifer Abou-Najm
Data Scientist

Jacob Tran
Head of Product Development

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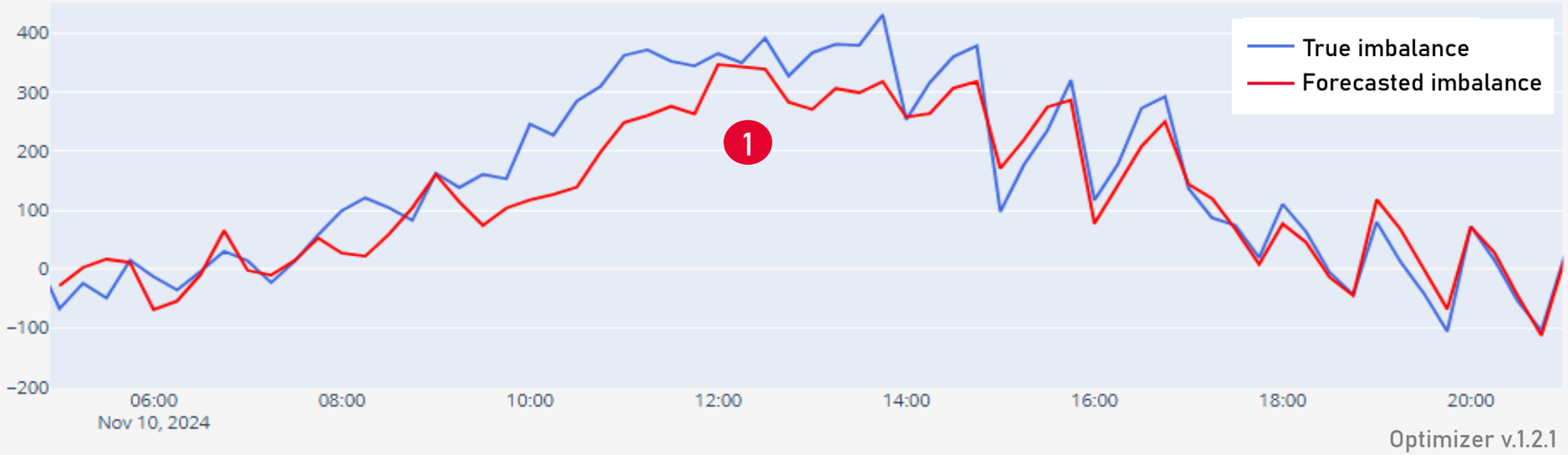
Optimizer Autopilot: AI at the service of Balancing Energy Procurement

How does the Optimizer Autopilot work?

1 Prediction of the balancing energy need with ML



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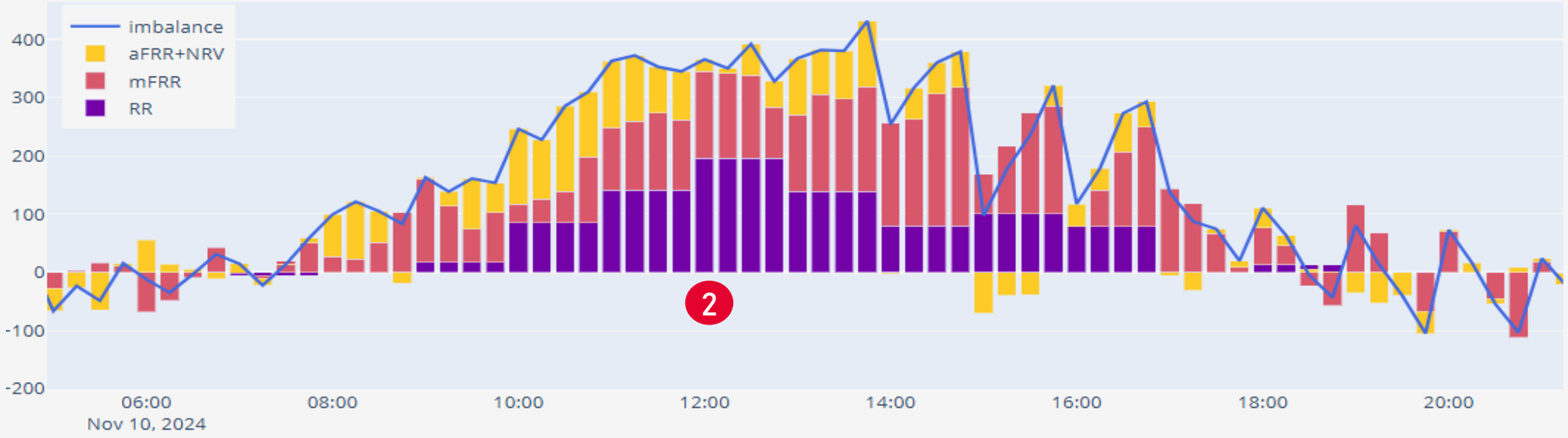
Optimizer Autopilot: AI at the service of Balancing Energy Procurement

How does the Optimizer Autopilot work?

1. Prediction of the balancing energy need with ML
2. Economic optimization over RR, mFRR, and aFRR

Portfolio optimization

Average costs: RR < mFRR < aFRR



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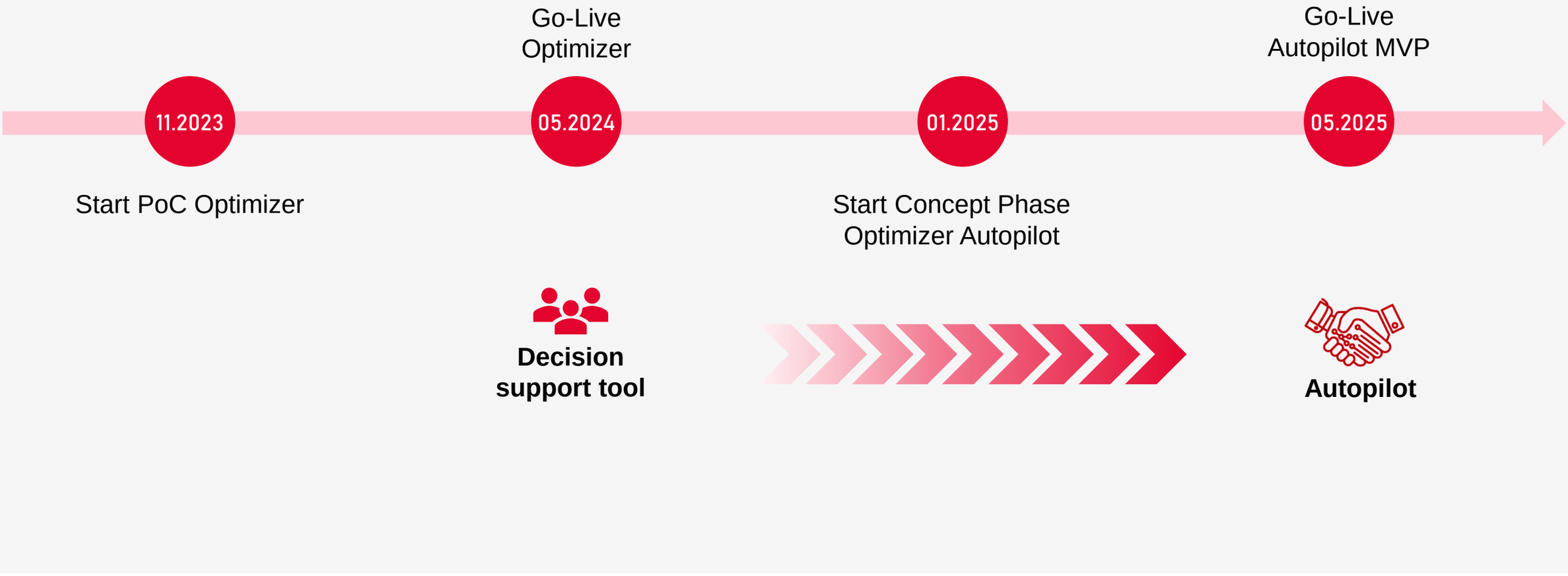
Optimizer Autopilot: AI at the service of Balancing Energy Procurement

From an Idea to Operation in 1.5 Years



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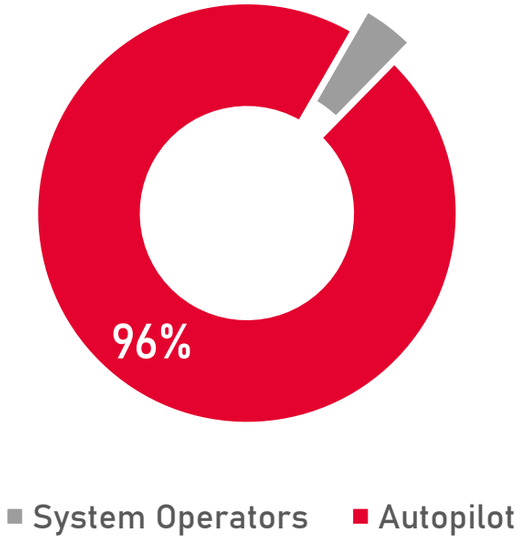
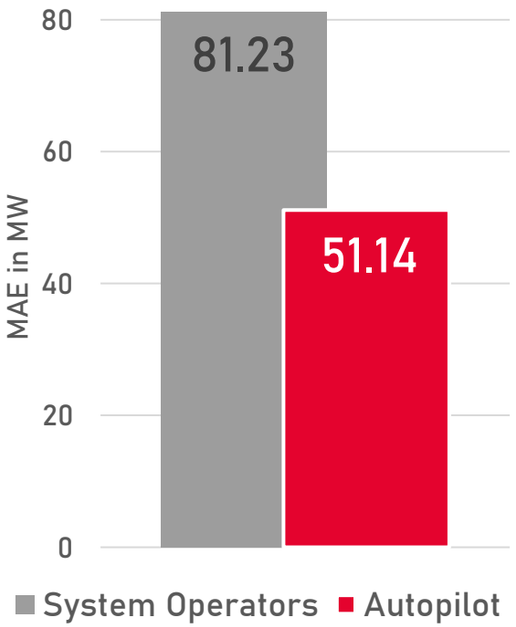
Optimizer Autopilot: Performance

Measuring the real-world impact of the Optimizer Autopilot



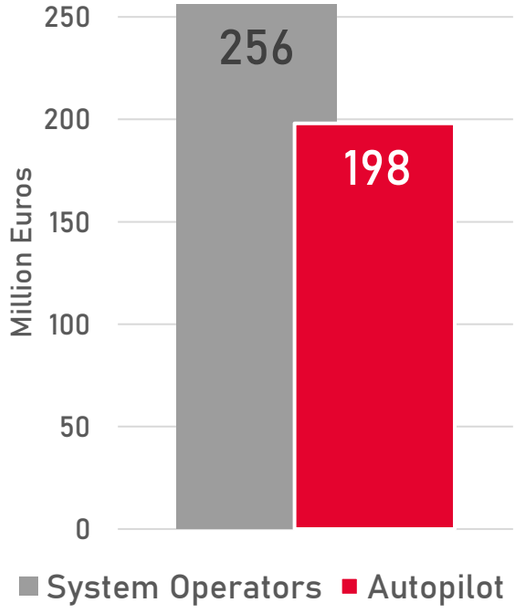
Balancing energy activations:

96% performed by the Optimizer



Error of system imbalance forecast:

Decreased by 37%



Projected annual costs:

Decreased by 23%

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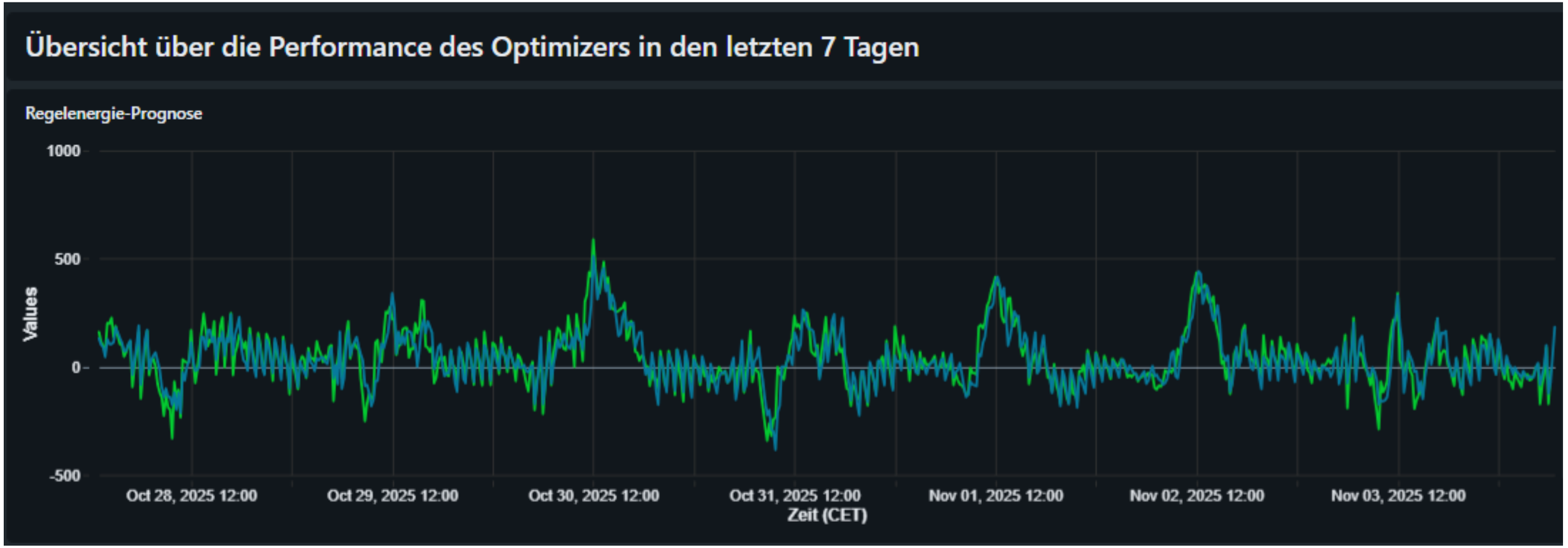
Optimizer Autopilot: Performance

Measuring the real-world impact of the Optimizer Autopilot



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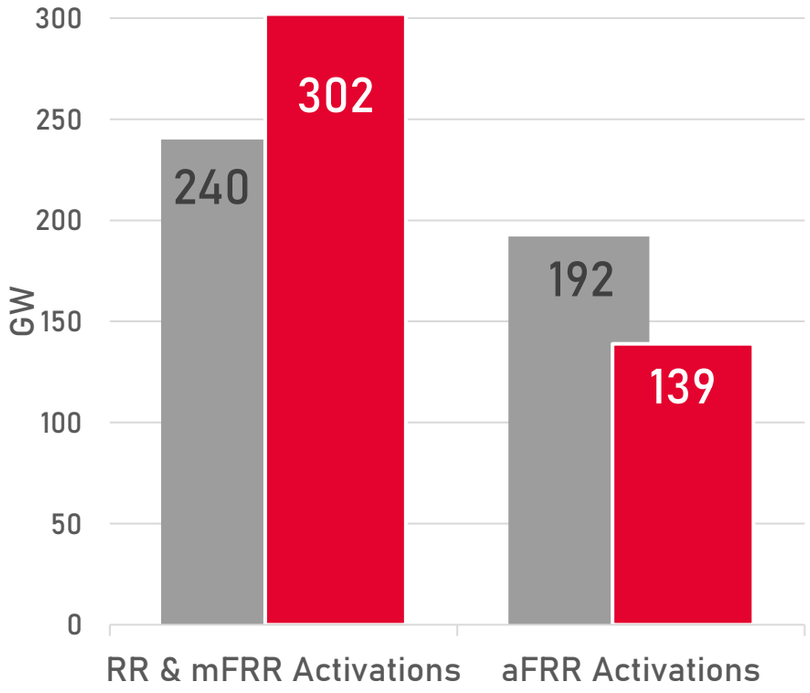
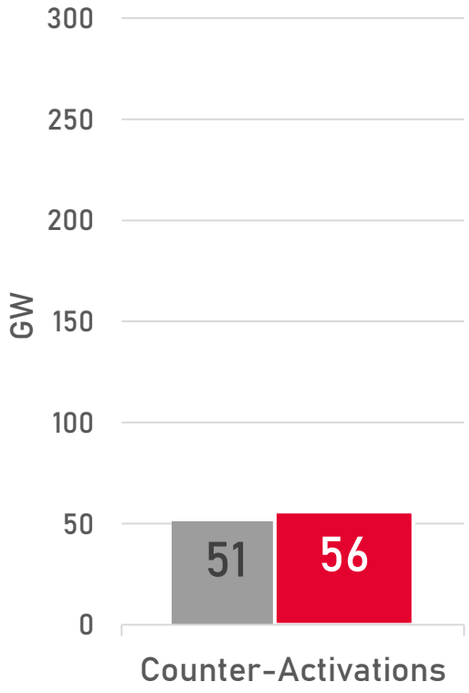
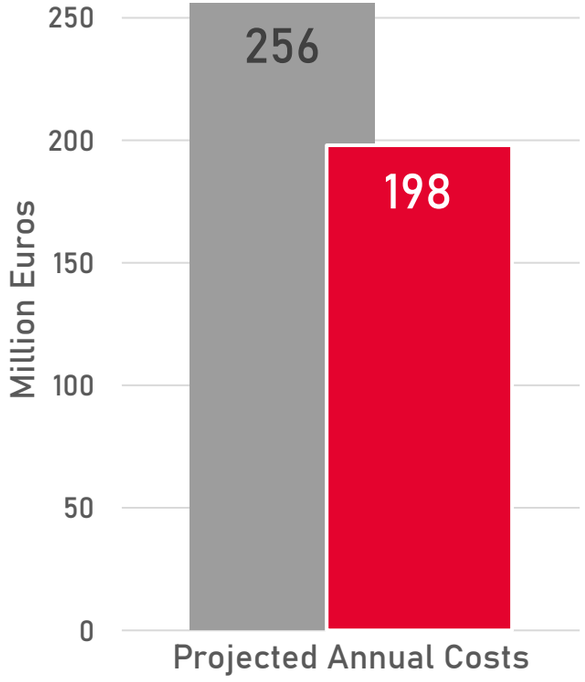
The Curious Case of Counter-Activations

The Optimizer Autopilot can afford to take the riskier, but economically optimal path

- Accurate forecasts allow the Autopilot to activate more RR & mFRR instead of costly aFRR
- To cover unavoidable errors, counter-activations increase
- We still achieve a significant cost decrease







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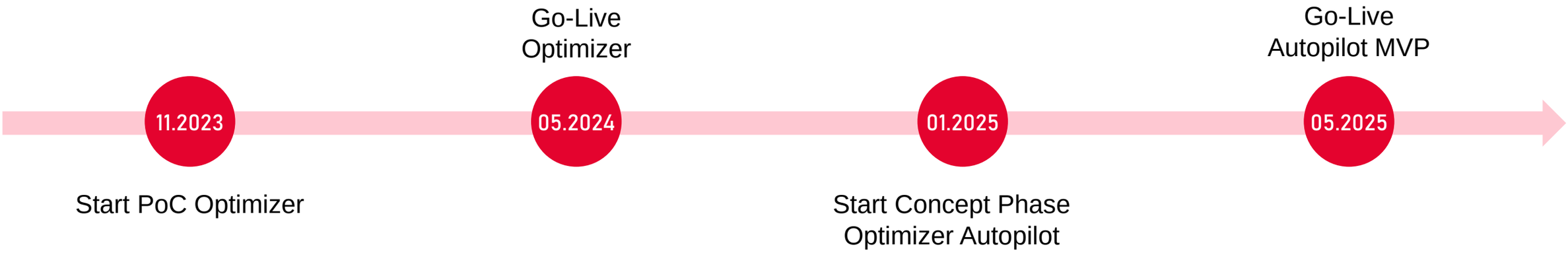
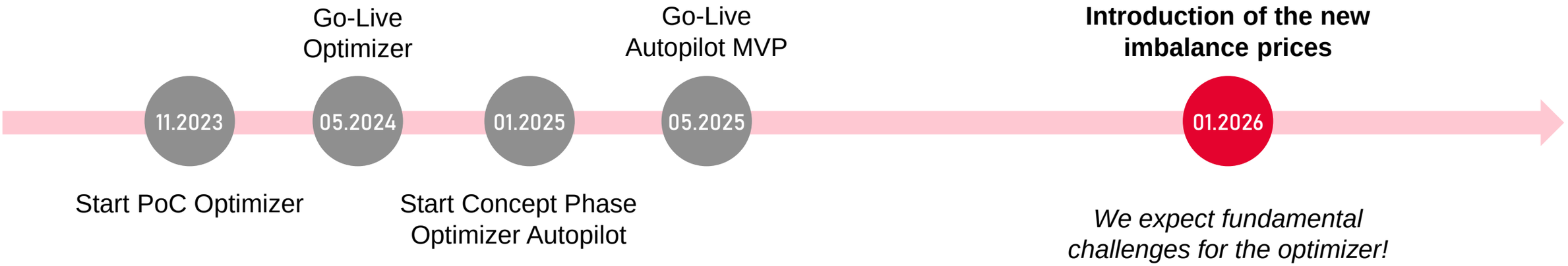
Introduction of the Single-Price Mechanism

A new challenge awaiting…



Introduction of the Single-Price Mechanism

A new challenge awaiting…



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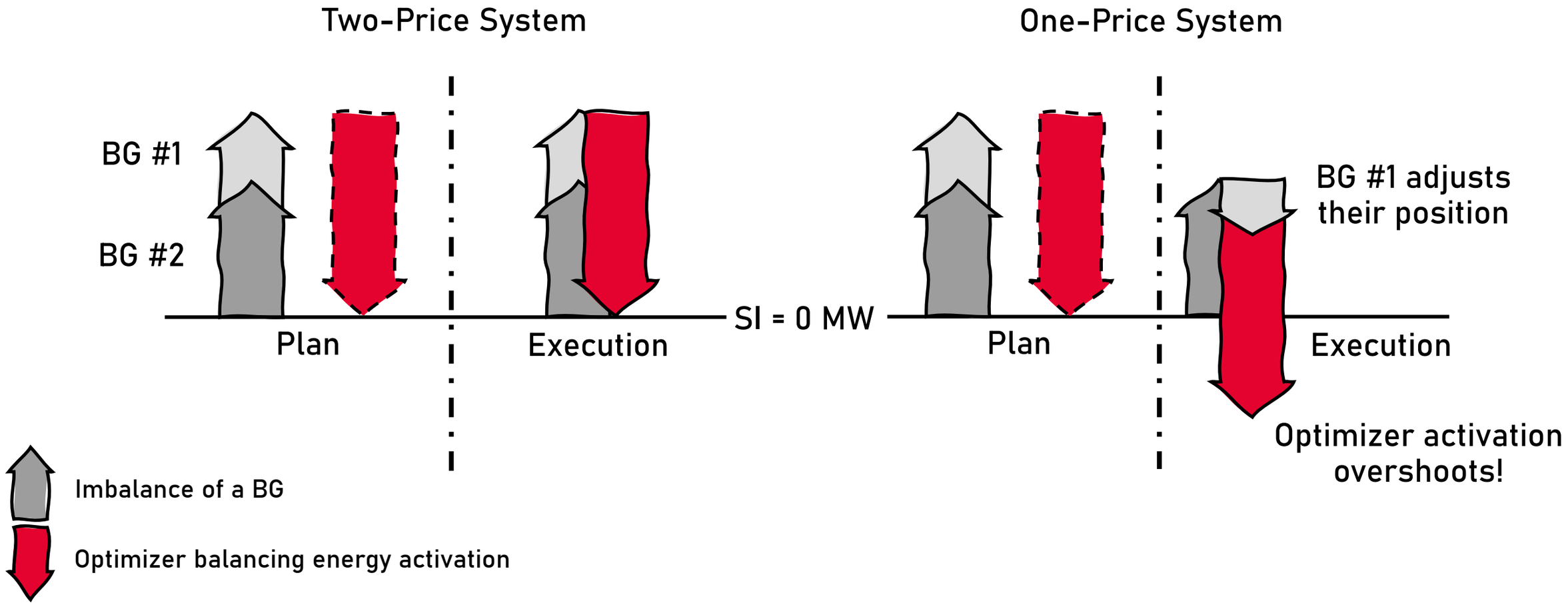
The Challenge of the One-Price System

Why does the Optimizer Autopilot need to adapt to the coming changes?

- BGs will be encouraged to maintain an intentional imbalance
- By trying to decrease system imbalance (SI), **active balancing** might work **against** the Optimizer



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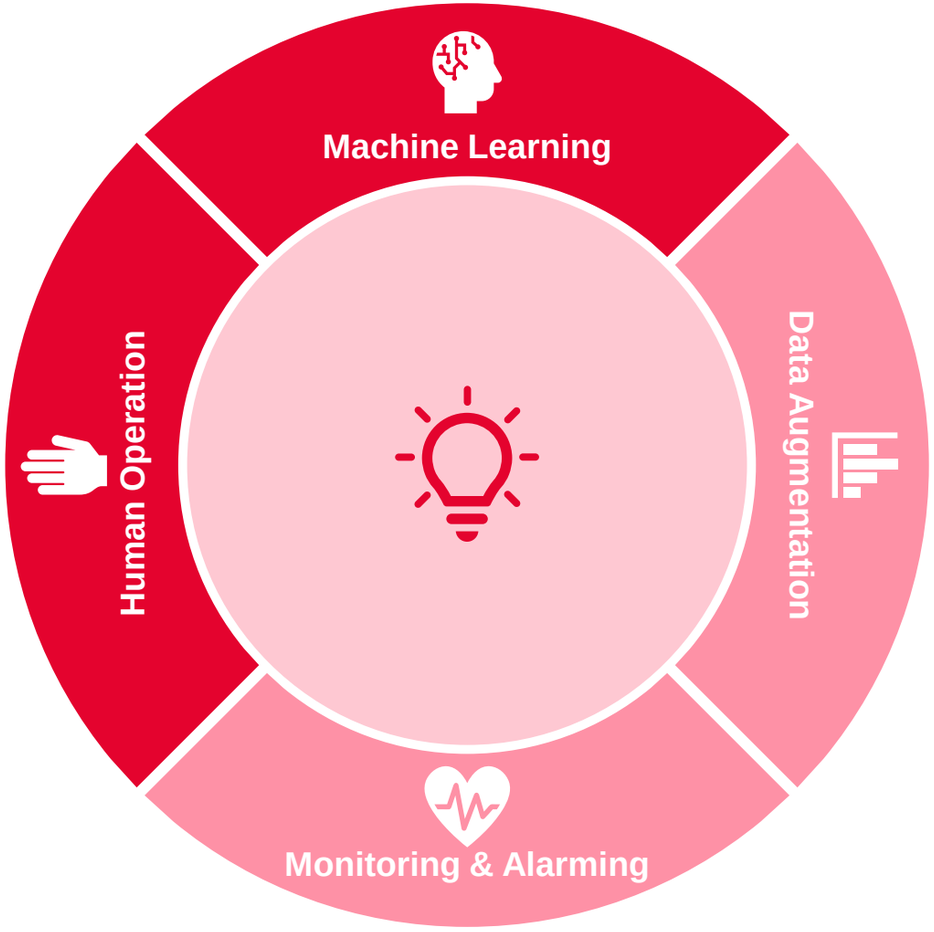
Preparing the Optimizer Autopilot for the One-Price System



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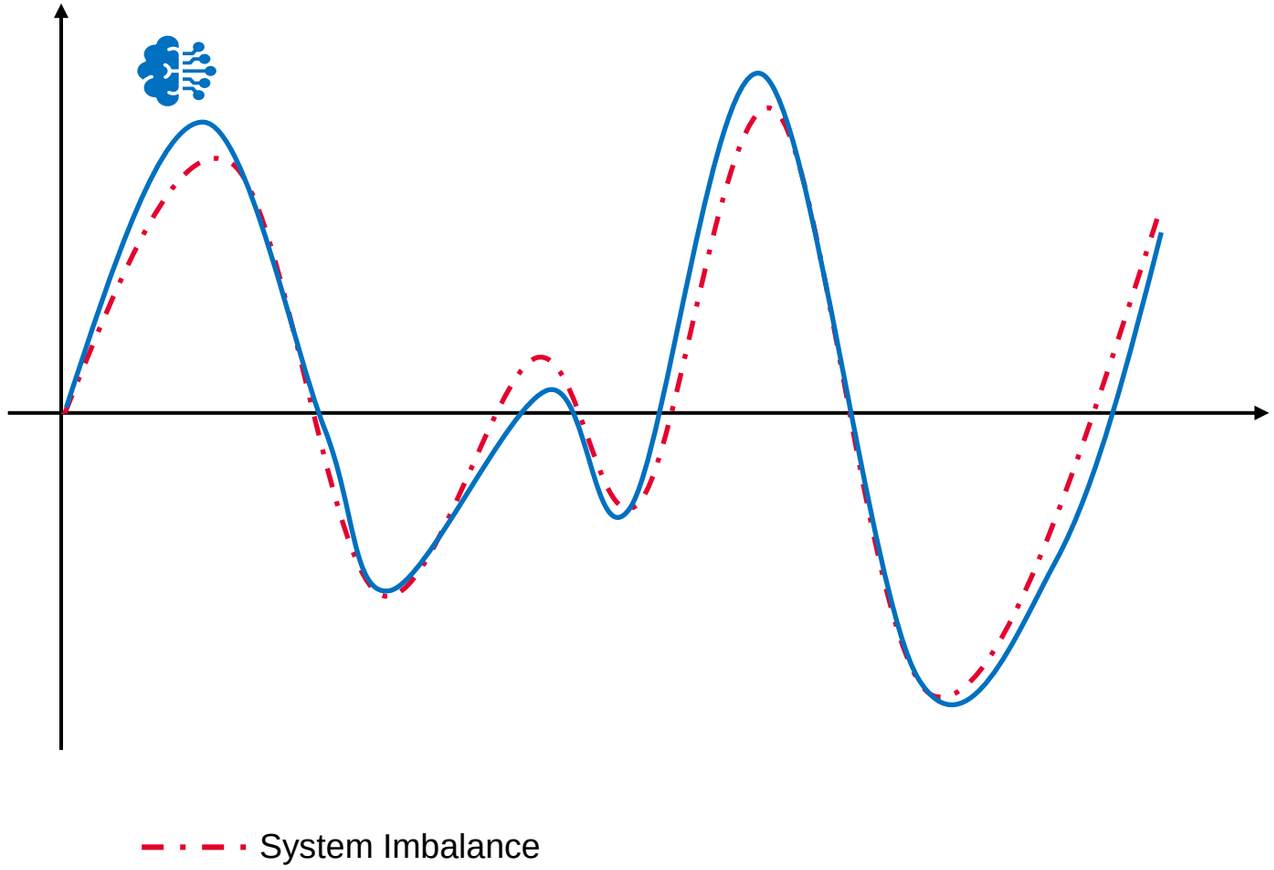
Our Solution – ML & Data-Based Strategy

Adapting the Optimizer to the One-Price Balancing Regime

- Current Approach:
  - One good ML model requiring **two years** of historical training data.



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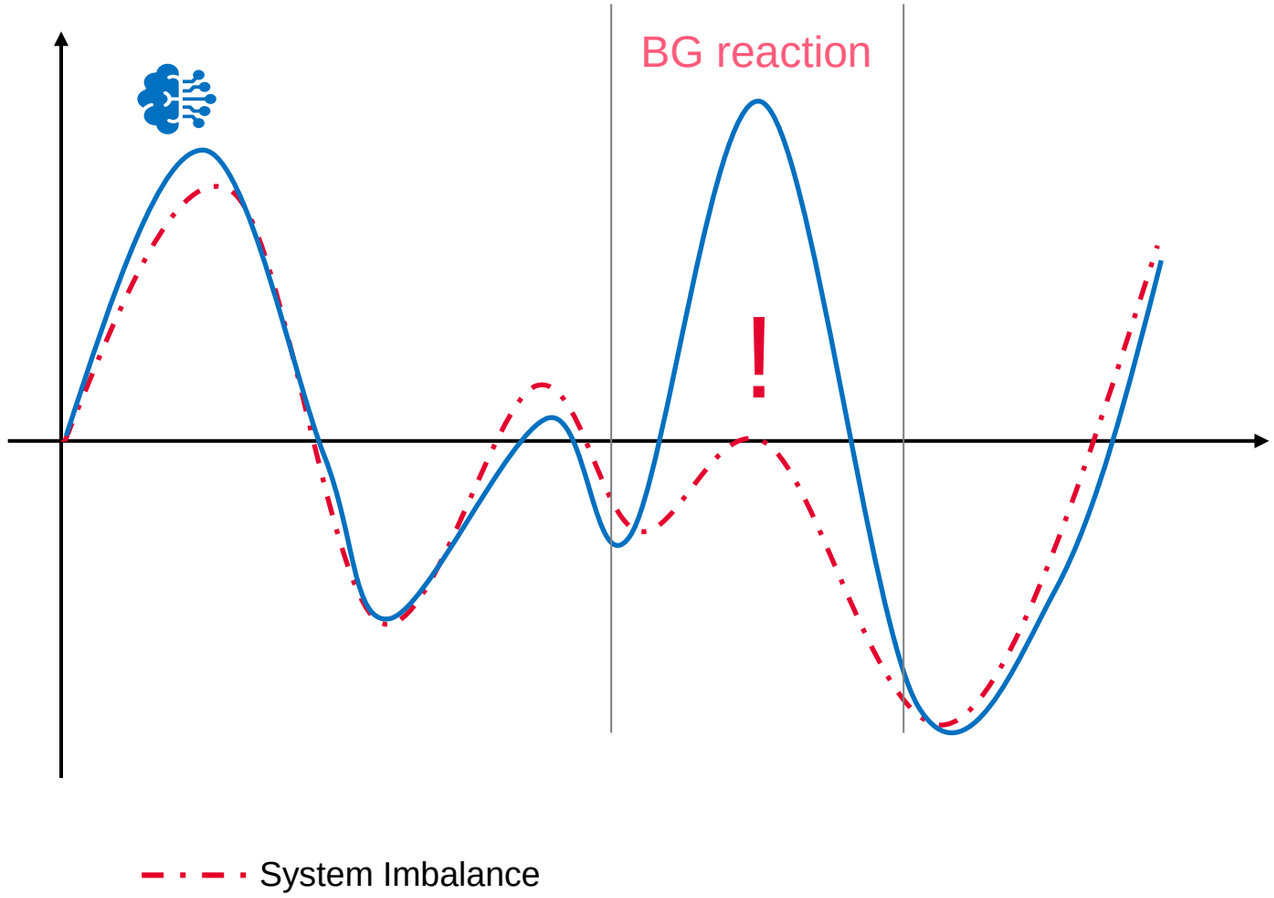
Our Solution – ML & Data-Based Strategy

Adapting the Optimizer to the One-Price Balancing Regime

- Current Approach:
  - One good ML model requiring **two years** of historical training data.
  - Can not anticipate BG reaction/behavior in the new balancing regime



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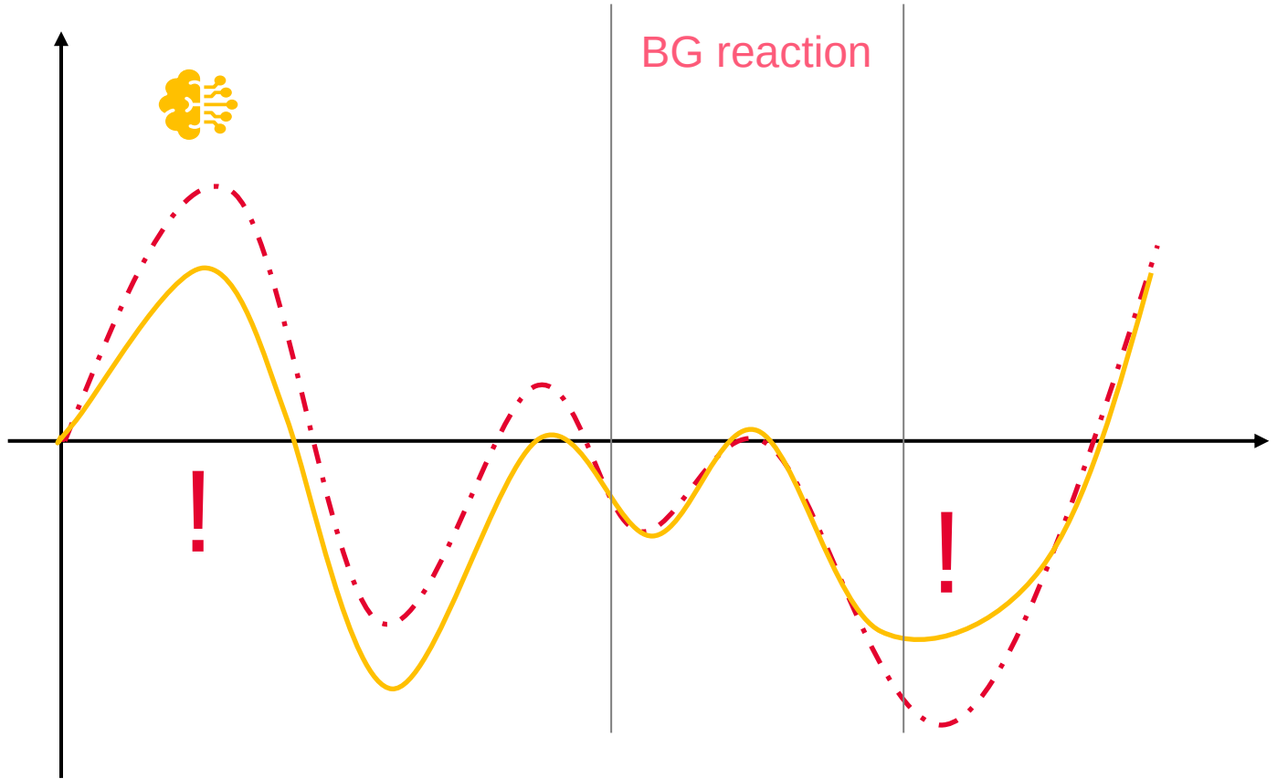
Our Solution – ML & Data-Based Strategy

Adapting the Optimizer to the One-Price Balancing Regime

- Alternative Potential Approach:
  - One ML model with increased short-term awareness and trained on recent one-price system data.
  - Performs better for the few times where BG reaction is expected but worse in other scenarios.



Our Solution – ML & Data-Based Strategy

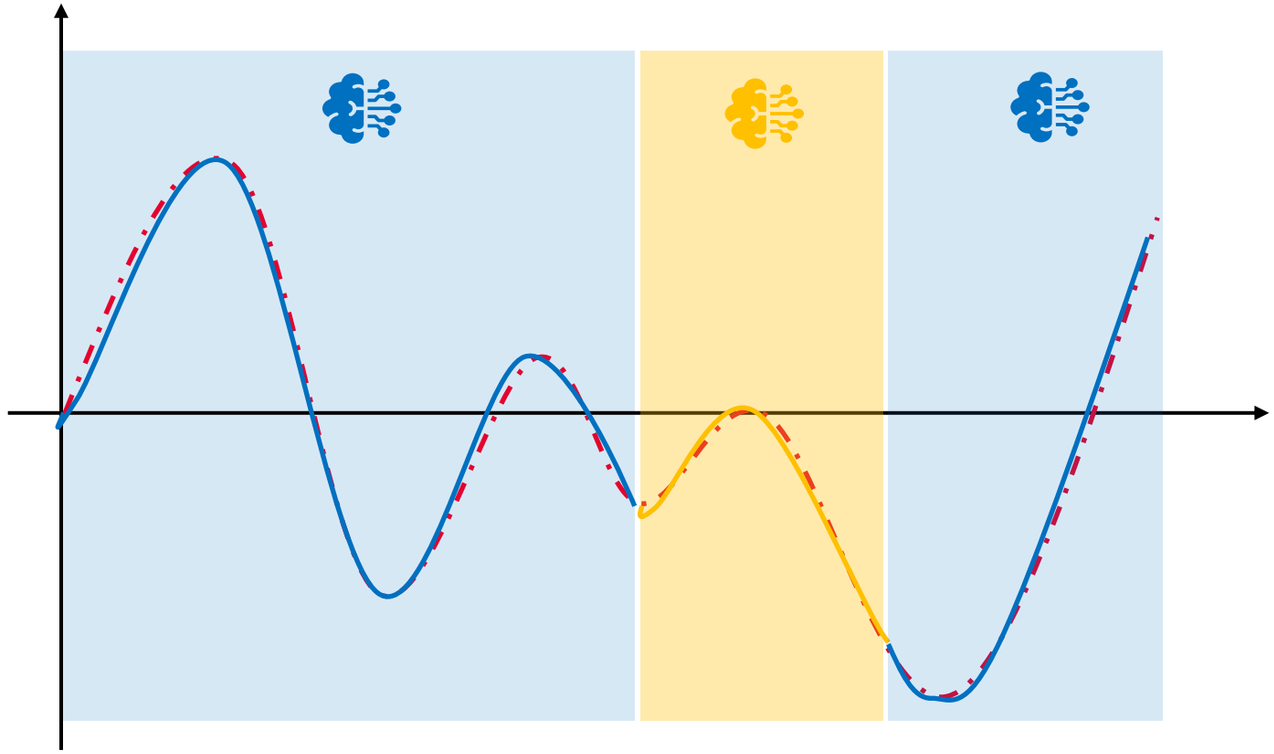
Adapting the Optimizer to the One-Price Balancing Regime

- Potential Solution:
  Combination of multiple models with a meta learner:

Long-Term Model
trained on existing data

Short-Term Model
trained on recent data

Meta Learner
combines the base models



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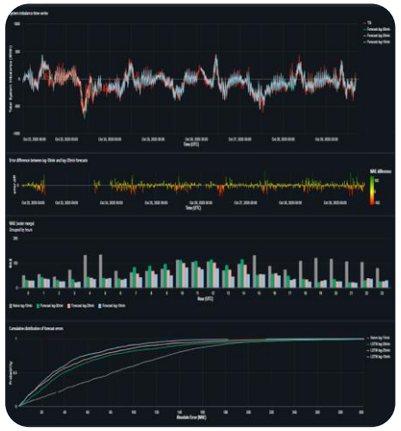
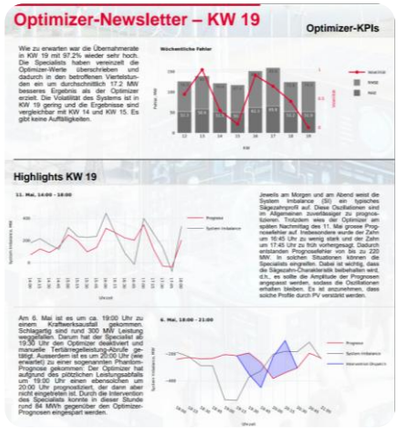
Our Solution – Empowering Specialists

Supporting operational excellence through information, collaboration, and continuous learning



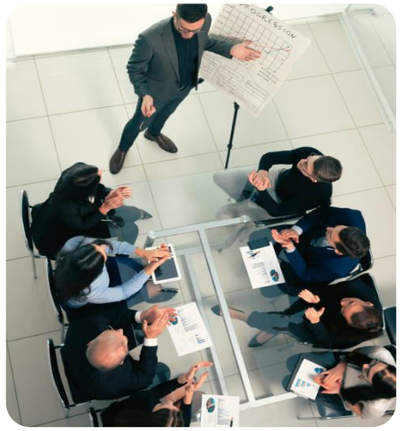
Dashboards

Centralize essential real-time operation information



Weekly Newsletter

Share analytical insights and performance updates



Joint Trainings

Build preparedness and collective expertise

Communication Channels

Facilitate direct feedback and problem-solving

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PV for Balancing: an opportunity for the future

Dona Mountouri
Senior Specialist Market & Product Design

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Our motivation: Turn Photovoltaic from a problem into part of the solution

Photovoltaic (PV) **production is steadily increasing** and poses challenges for grid operation.

Incorrect forecasts of PV generation cause imbalances in the balance groups and correspondingly high **use of balancing energy**.

At the same time, PV systems usually receive **no price incentive and no signal** to react to external conditions (market prices, grid status, system imbalance).

Our approach:

Integration of PV systems as virtual power plants (Pooling) in the balancing energy market and thus generation of a control option.

The Challenge

- Today' **s reserve and energy products** are not designed for variable generation and are only **suitable to a limited extent**.

- In addition, as Swissgrid, the system service managers (SDVs), the PV operators and PV owners, we have **little experience** with market integration and with the control of PV.

- **Our solution:**
  Gain **experience with the products and the plants** through **the joint work** of Swissgrid, the SDVs and the plant operators as part of a pilot project.

Specifically in the PV4Balancing pilot project

Together with the industry, we define a **product suitable** for small flexibilities and specifically **for photovoltaics** with storage and energy supply components.

We implement and test the control of PV systems as virtual power plants (PV pools) for the supply of **negative tertiary control** in real system operation.

In doing so, we show that PV can play a **relevant role in system stabilization.**

Through experience and joint solution finding**, we eliminate the challenges** in controllability, predictability and process integration of these plants.

We continuously evaluate the **cost-effectiveness and effectiveness of the product** in order to be able to make a decision on the introduction or any adjustments at the end of the pilot phase.

Interesting figures

6

SDVs participate in the pilot

12

Parties participate in the pilot (incl. SDVs)

~60

MWp connection for pilot test

24

MW PV maximal in TRE-

75

units participate

63

kW is the smallest unit

4.9

MW is the largest Enclosure

<0.6

MW are 70% of the units

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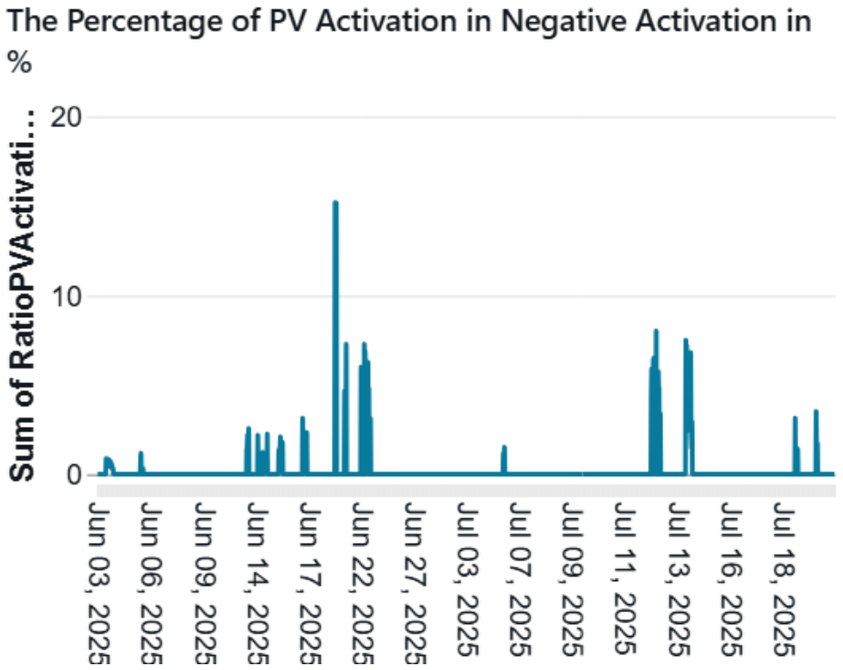
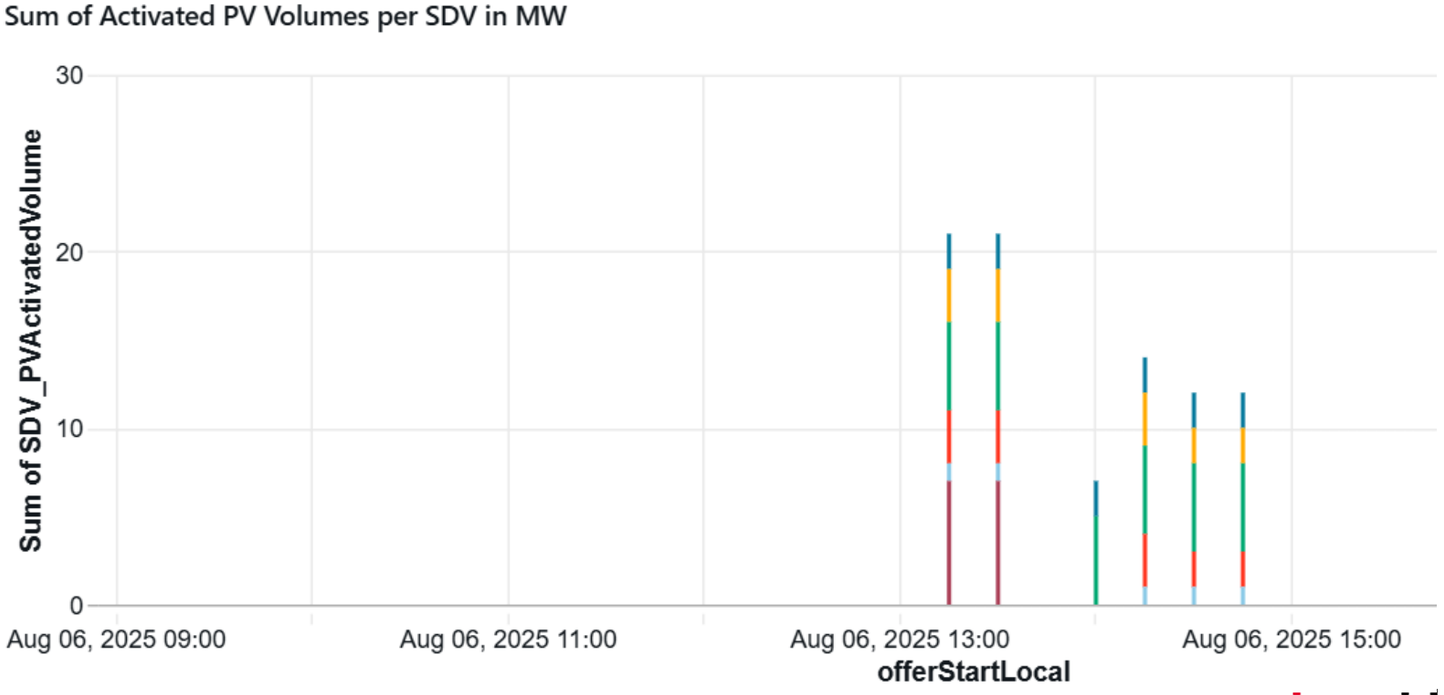
First experiences from the pilot: importance and potential of the product

Already many activations (evaluation until mid-August):

- During 155 quarter-hours spread over 22 days, bids were activated.
- On June 20, between 3:00 p.m. and 4:00 p.m., PV activation accounted for more than 15% of the total TRE activation.
- On August 6, all 6 SDVs with a peak power of 21 MW were activated.
- Profitability analysis has shown potential for cost savings (cost savings already realized in the pilot)

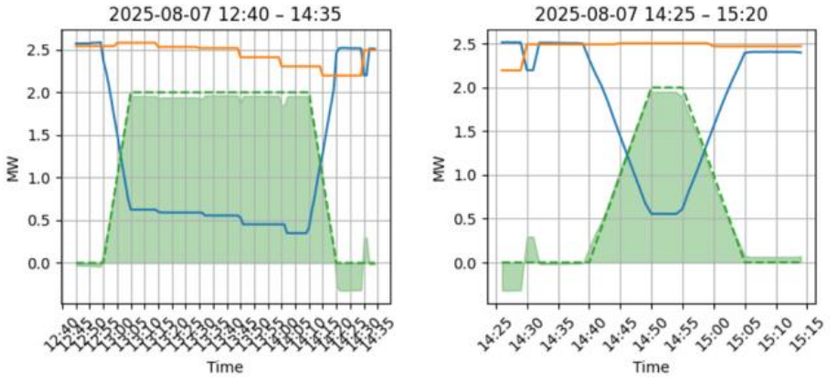


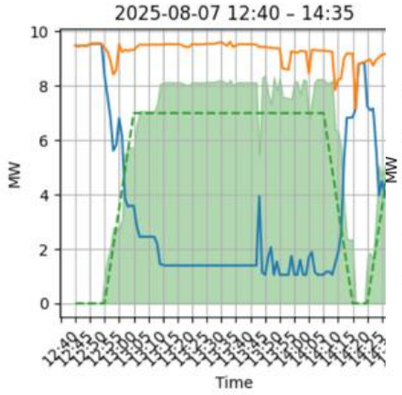


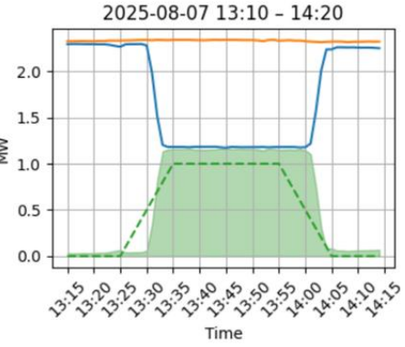
First experiences from the pilot: Readiness for scaling

The challenges are real:

- Expost monitoring data shows the successes but also the challenges of activation with PV.

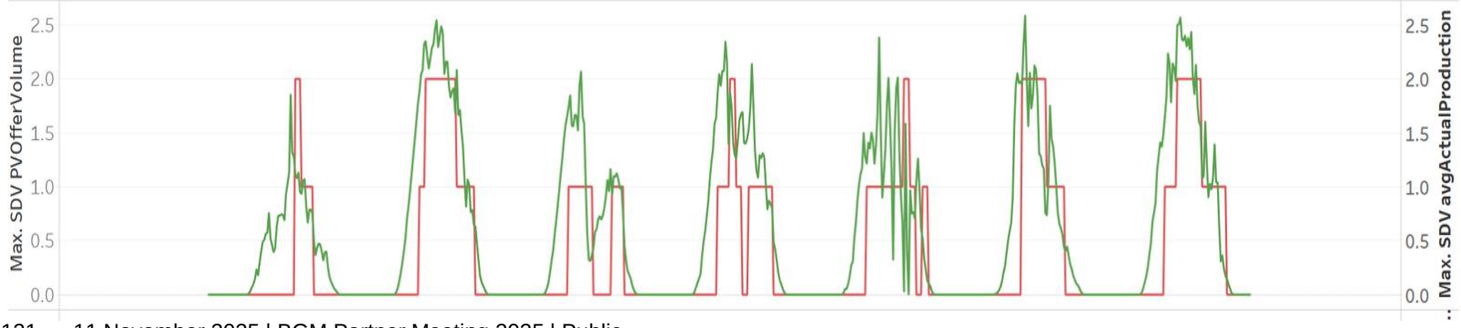






Activated quantity higher than retrieved, missing ramps, unstable communication

- Proper Bidding requires automated and dynamic processes.



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Next steps

- Continuous improvement of the quality of offers and activations (close exchange with FSPs) (until June 2026)
- PVTRL product design analyses (from January 2027)
- Pooling Pain Points:
  - Possibly: Introduction of new business type for PV (mid-2026)
  - Adjustments to PQ: Baselining for PV, definition of reference systems and information to BRPs and DSOs

Pooling Paipoints and possible solutions

- **Category: Flexibility, Supplier and BG Matching**
  - Pain: Incorrect assignment of Flex, supplier and BRPs
  - Pain: Missing information to BRPs and/or DSO
  - Solution in the medium term: Datahub phase 1 / and phase 2 flex register
  - Short-term solution: open > discussion together with VSE (FSPs and BRPs)

- **Category: Prequalification**
  - Pain: Prequalification of batteries in the basic supply
  - Solution: Clarification in PQ, agreement must be made by FSPs and basic supplier
  - Pain: Prequalification of PV
  - Solution: Clarification in PQ: accepted baselining methods, dealing with suppliers and return suppliers

Pooling Paipoints and possible solutions

- **Category: Forecasts and plausibility test by INS**
  - Pain: missing information about activations
  - Solution: Define PV as separate BT in INS, reference systems and not prequalify them
  - Pain: missing plausibility checks DPS
  - Solution: Possible introduction of delivery verification
  - Pain: Earlier delivery of DPS-INS
  - Solution: open > discussion together with FSPs and BRPs

- **Category: Documentation**
- Pain: Lack of documentation Pooling (incl. processes, deadlines and responsibilities)
- Solution: Updating the documentation

See you again in a year

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Presentations are available on Swissgrid website:
https://www.swissgrid.ch/en/home/customers/topics/bgm.html#operational-documents

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