

BGM Partner Meeting 2024

Zurich Airport and Online Meeting, 12 November 2024

Agenda

09:30	Welcome address	Bastian Schwark
09:45	Challenges with regard to the PV integration in the Swiss power system	Bastian Schwark / Marc Rüede
10:15	New imbalance price mechanism in Switzerland	Marc Rüede / Thomas Hauri
11:00	Power break	
11:15	Evaluation of the Swiss Net Transfer Capacity during summer 2024	Julius Schwachheim
11:40	EPEX Spot market developments	Davide Orifici, EPEX Spot
12:00	Updates on cross border capacity allocation	Benito Barberio
12:15	Lunch break	
13:15	Breakout Sessions: • New imbalance price mechanism: Opportunity to discuss detailed questions about the envisaged concept • Details on the effects determining the Export NTC on the border Switzerland-Germany • Optimal activation of balancing energy and status of Swissgrid's PV forecast	Marc Rüede / Thomas Hauri / Marko Pranjic Julius Schwachheim / Domenic Senn Jacob Tran / Thomas Lanz
14:15	Balancing processes and impact on imbalance price	Dimitrios Nousios
14:35	Swiss balance group management and operational incidents	Marco Lenzin
14:55	Feedback and questions	Bastian Schwark

Survey of meeting participants

What are your expectations for the BGM Partner Meeting 2024?

48 responses



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
Head of Capacity &
Congestion Management

Day ahead schedule management

Phone +41 58 580 30 77
scheduling@swissgrid.ch

Intraday schedule management

Phone +41 58 580 29 11
scheduling.intraday@swissgrid.ch



Thomas Hauri
Responsible for
BGM Partner Meeting



Cécile Jost
Head of Balancing &
Scheduling



Marco Lenzin
Responsible for
BGM Expert Group

Balance group registration

balancegroup@swissgrid.ch

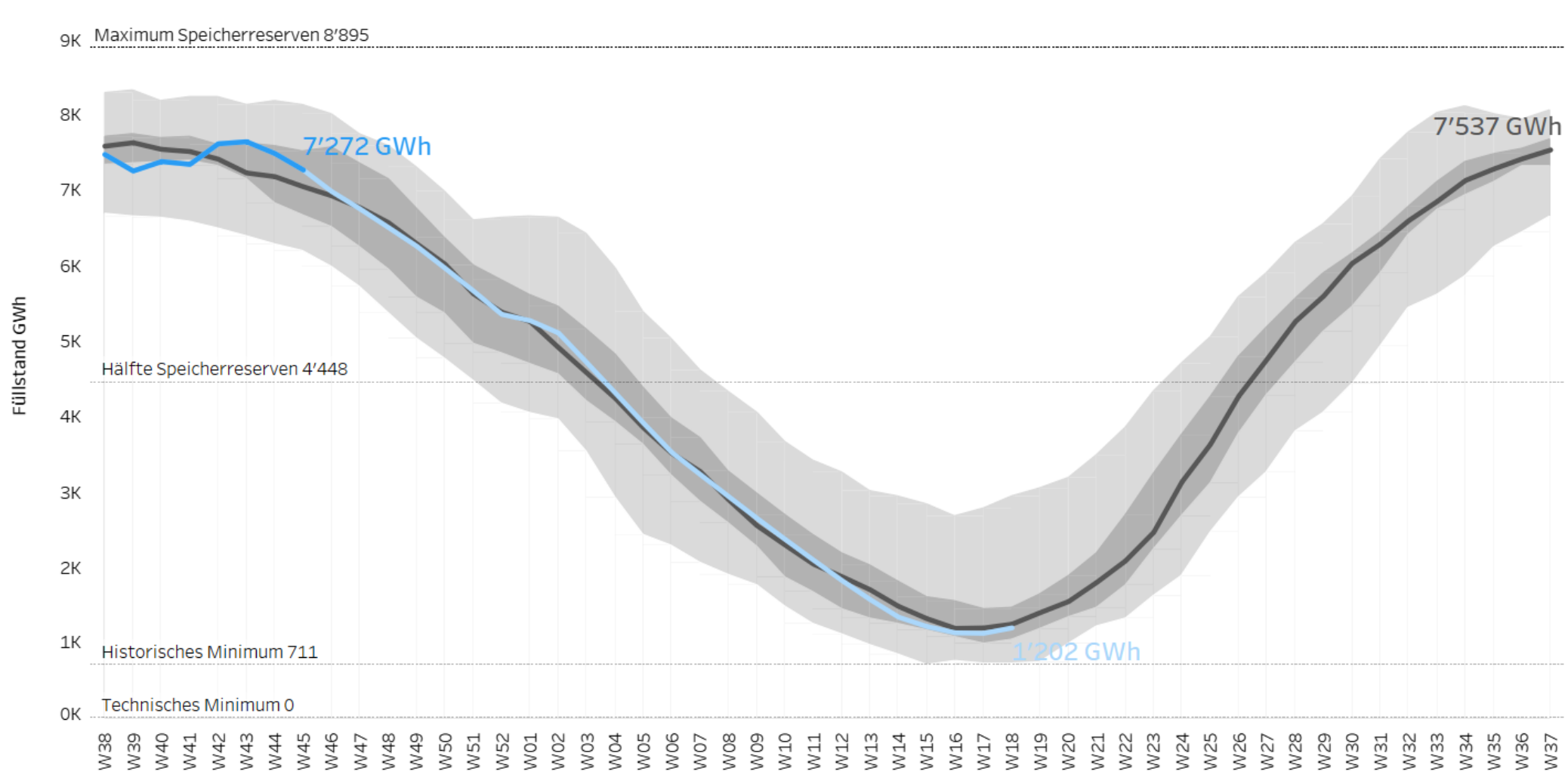
Challenges with regard to the PV integration in the Swiss power system

Bastian Schwark
Head of Market Operations

Marc Rüede
Head of Capacity Allocation & Market Systems

We currently have a non-critical supply situation

- ✓ Levels of the Swiss reservoirs are along the median of previous years
- ✓ High availability of nuclear power in France with good outlook for winter 2024/25
- ✓ Full available Swiss transmission grid without significant outages



The «winter measures» have been successfully implemented

A. Hydropower reserve

- Reserve was successfully tendered for last two winters
- Will be obligatory based on new legal situation
- For winter 2024/25 procurement done (250 GWh), lower than last year (400 GWh)



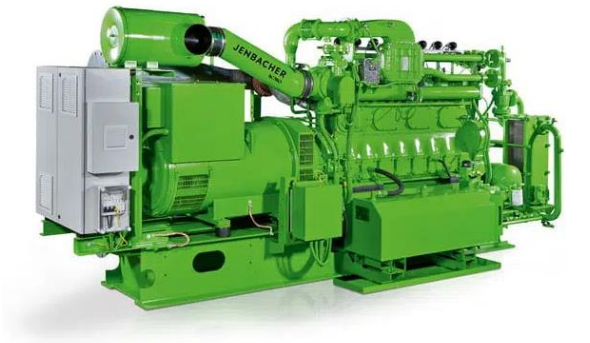
B. Reserve power plants

- Birr: Since Feb 2023 all eight turbines are available (250 MW); test still outstanding. Will be dismantled by the end of 2026
- Cornaux: Existing Groupe E power plant (36 MW)
- Monthey: Existing power plant in the Lower Valais (50 MW)
- Future reserve power plants past 2026 still under discussion



C. Emergency power generators

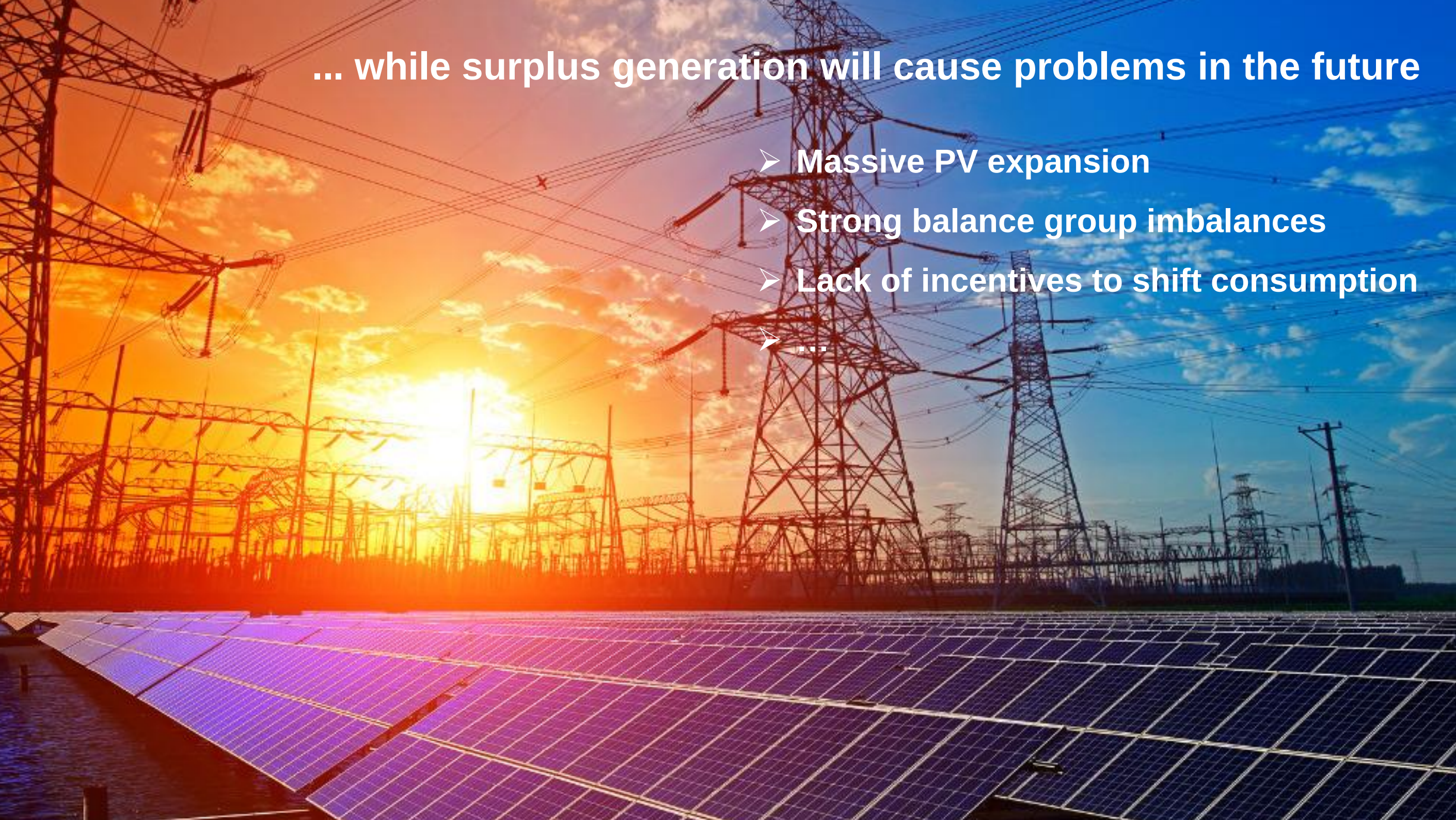
- National, virtual reserve power plant from emergency generators with 280 MW
- Participation possible via pooler; technical conditions identical to tertiary control reserve
- Logistics concept still in discussion



Up to now, the focus has been on a possible lack of energy in winter...

- Unprecedented energy crisis in Europe
- Many individual measures with political interventions
- New tasks for Swissgrid as Supplier of Reserve Energy (SOR)
- ...





... while surplus generation will cause problems in the future

- Massive PV expansion
- Strong balance group imbalances
- Lack of incentives to shift consumption
- ...

Media coverage on imbalances such as on 22 April 2024

Der Schweiz drohte am 22. April plötzlich ein Blackout



Am 22. April gab es im Schweizer Stromnetz plötzlich ein starkes Defizit. Schuld war das Wetter, das schnell umgeschlagen hat. Es sind Kosten in Millionenhöhe entstanden.

Blick

DE |

Stromproduzenten verkalkulieren sich komplett!

Aprilwetter sorgte beinahe für Blackout

Das Wetter spielte im April verrückt. Die Stromproduzenten verkalkulierten beim Wintereinbruch ihre Solarproduktion komplett. Die Konsumenten kostet das jetzt 20 bis 30 Millionen Franken.



DIE WELTWOCH

Abonnieren

Die spinnen in der Strombranche: Die Regulierungsbehörde entwarnt, während die Netzgesellschaft Blackout-Alarm schlägt – am selben Tag. Was sagt uns das?

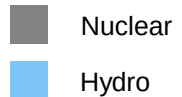
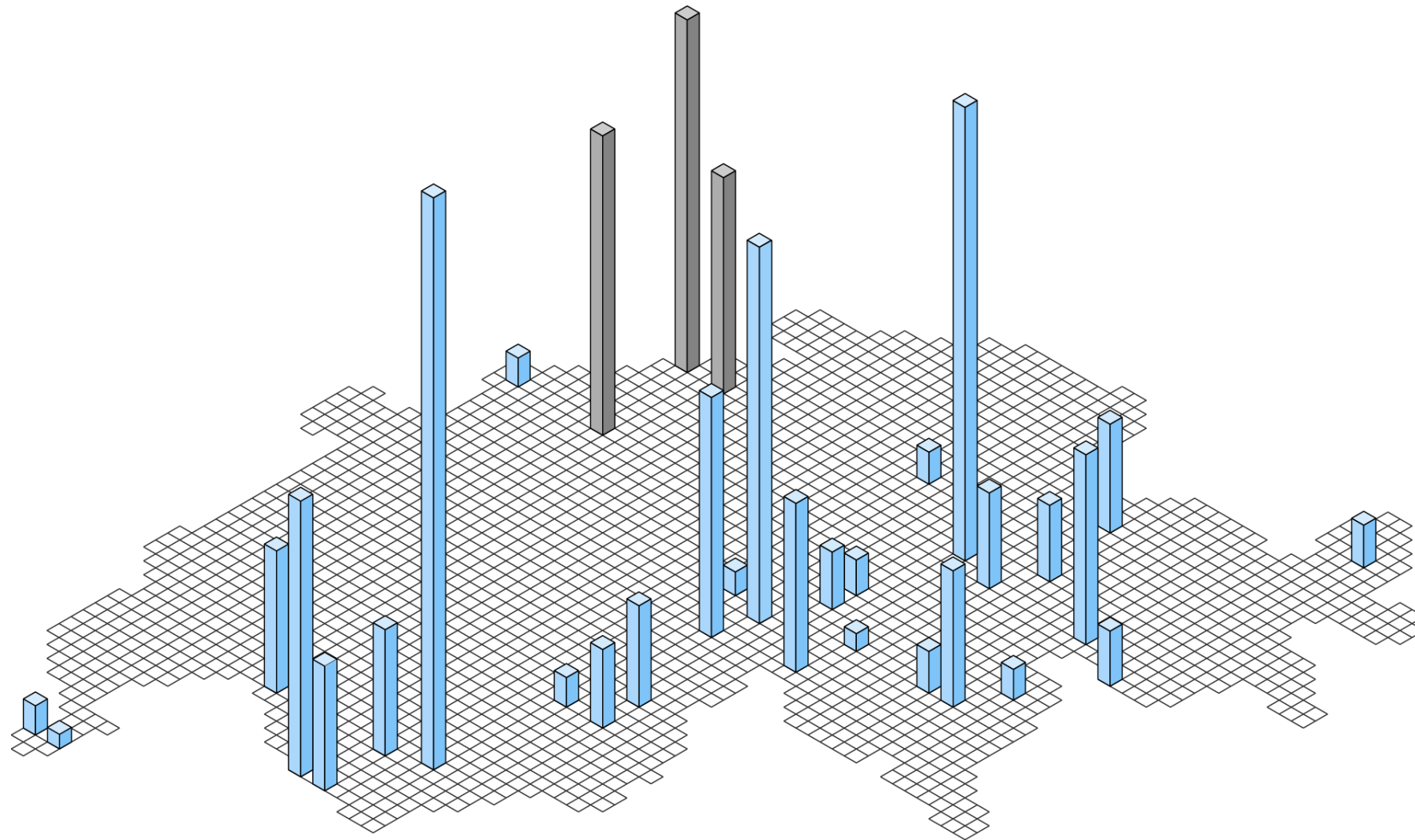
NZZ

Fehlprognose beim Solarstrom: Plötzlich fehlte der Schweiz die Produktion eines grossen Kernkraftwerkes

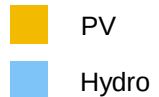
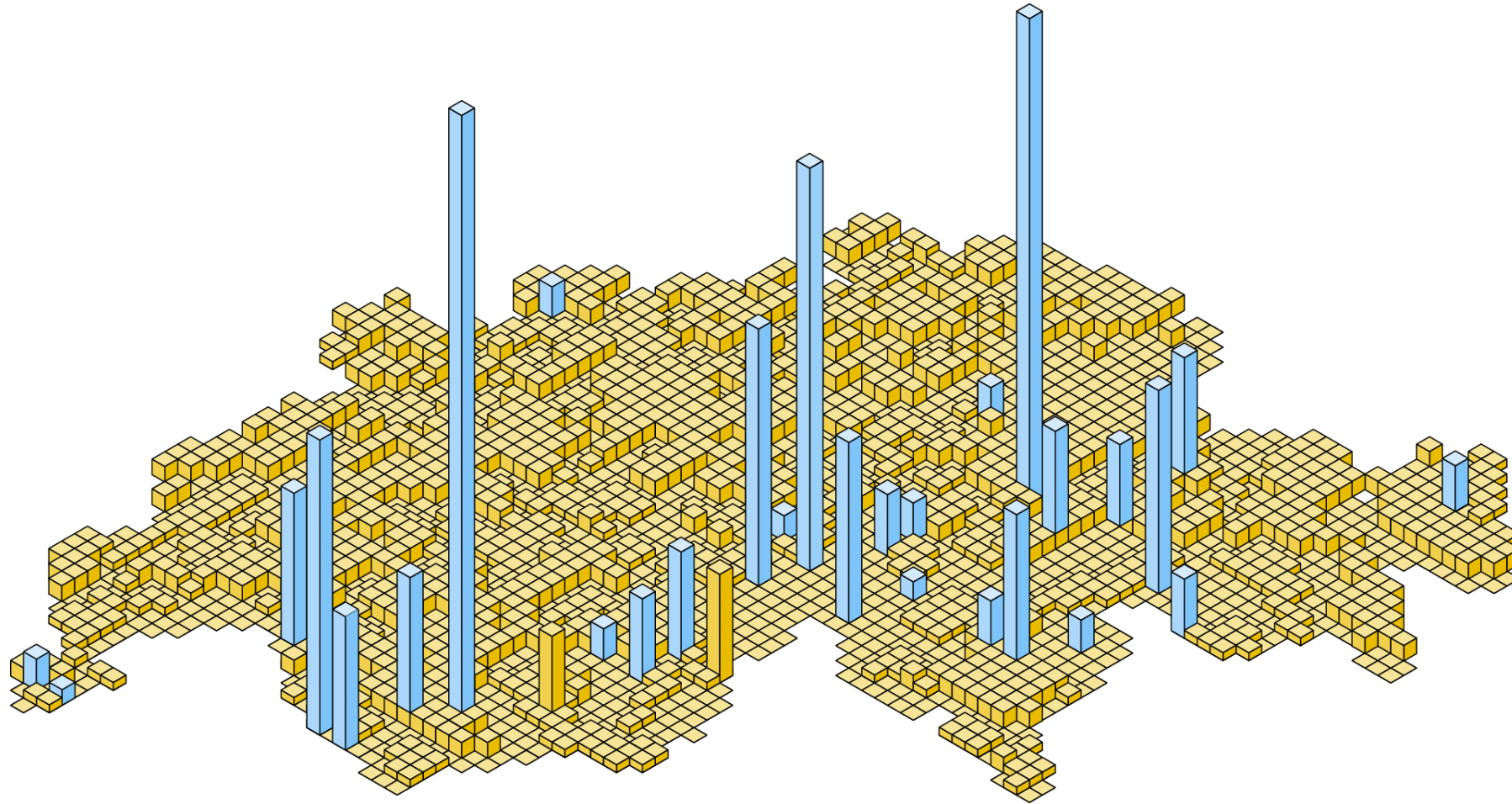
Schlechte Prognosen über die Einspeisung von Solarstrom haben vor einer Woche dazu geführt, dass viel zu wenig Strom im System war. Die Netzgesellschaft Swissgrid konnte für einen Ausgleich sorgen – zu horrenden Kosten von schätzungsweise 30 Millionen Franken.

swissgrid

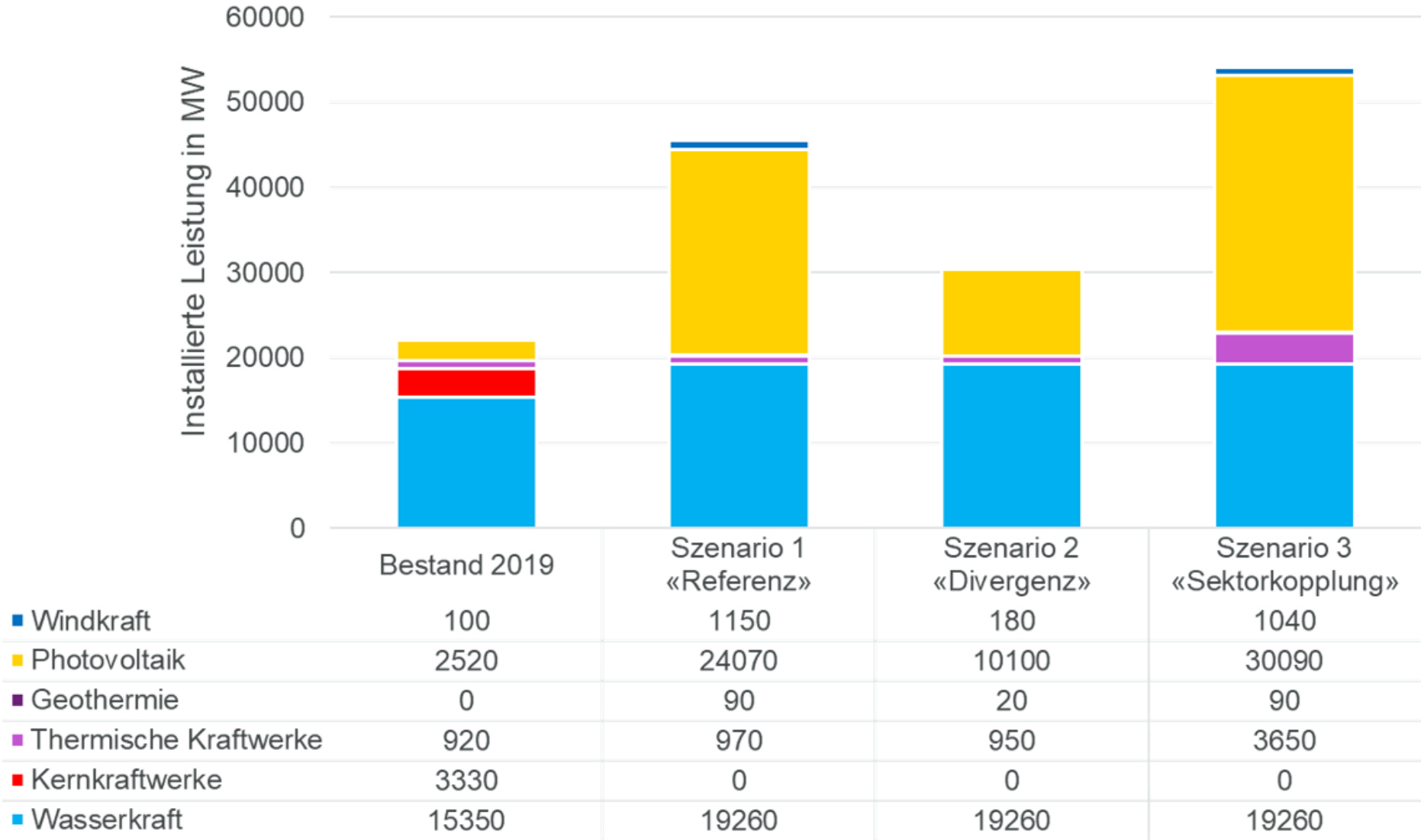
Today's electricity system will evolve from few large controllable power plants that stabilize the grid, ..



...to an enormous amount of decentralized PV generators without nuclear power plants

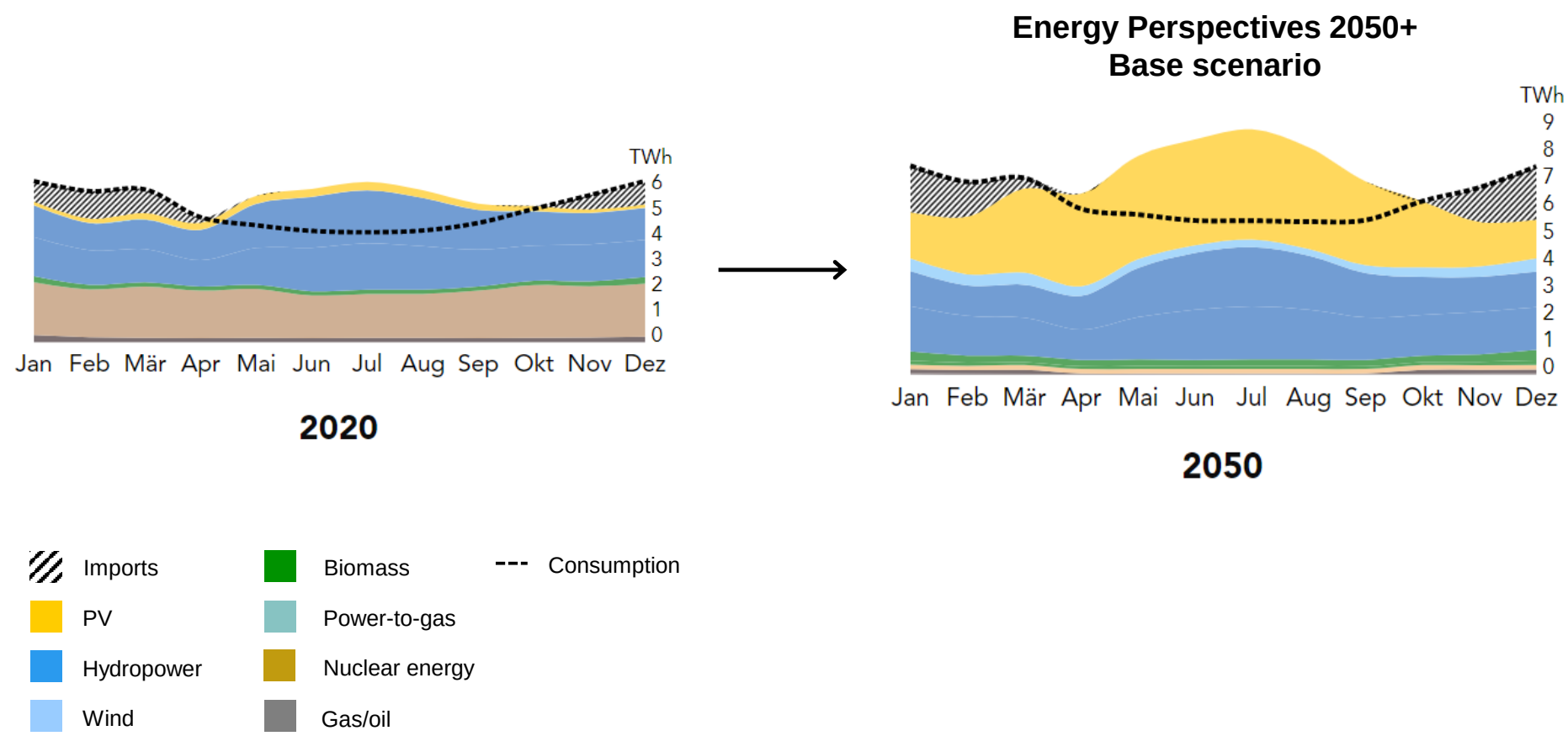


Development of generation capacities according to the scenario framework for 2050...



Quelle: SZR CH, BFE

... which will lead to a significant PV overproduction in summer that needs to be intelligently fed into the grid or curtailed



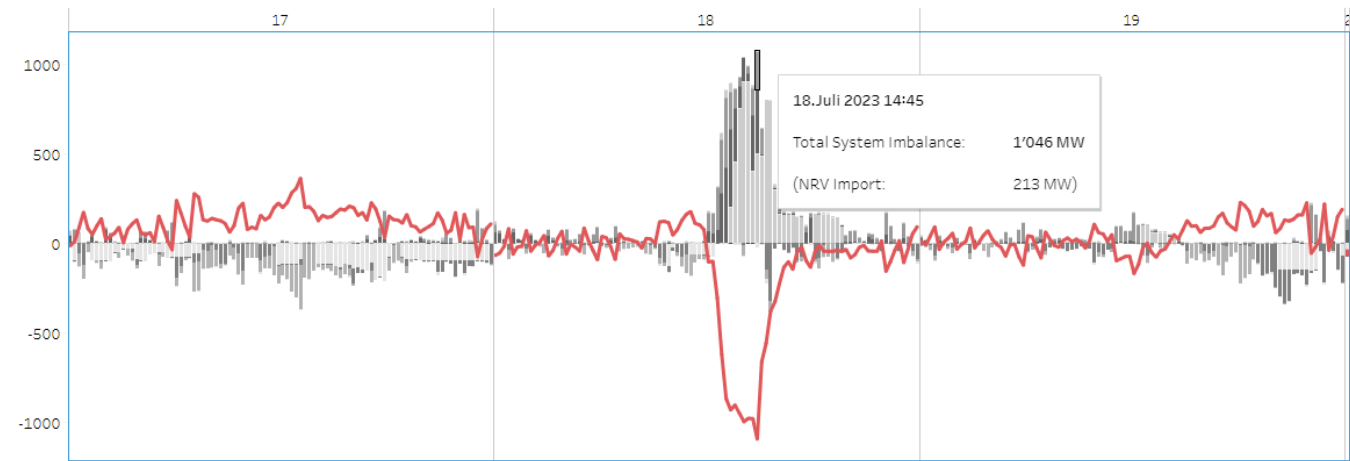
Source: Axpo Energy Switcher

Without intelligent rules we face the dark side of photovoltaics...

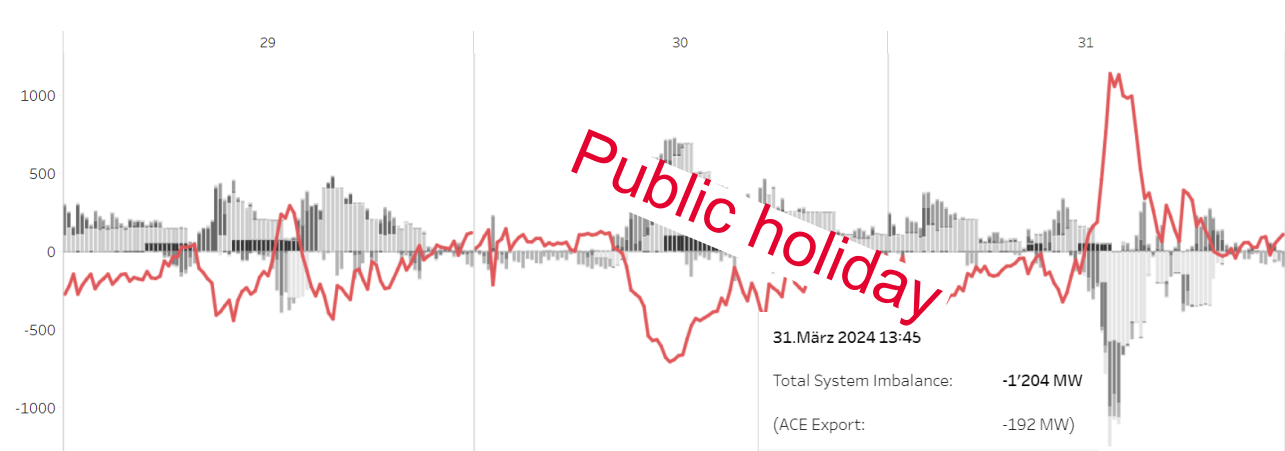


In the last 18 months, the Swiss system faced many cases with imbalances > 1,000 MW...

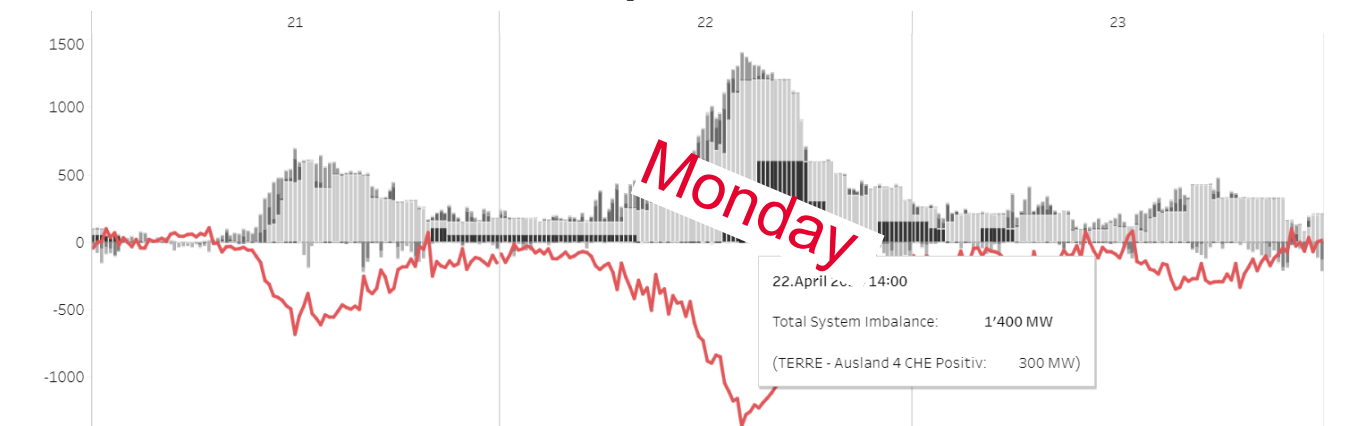
18 July 2023



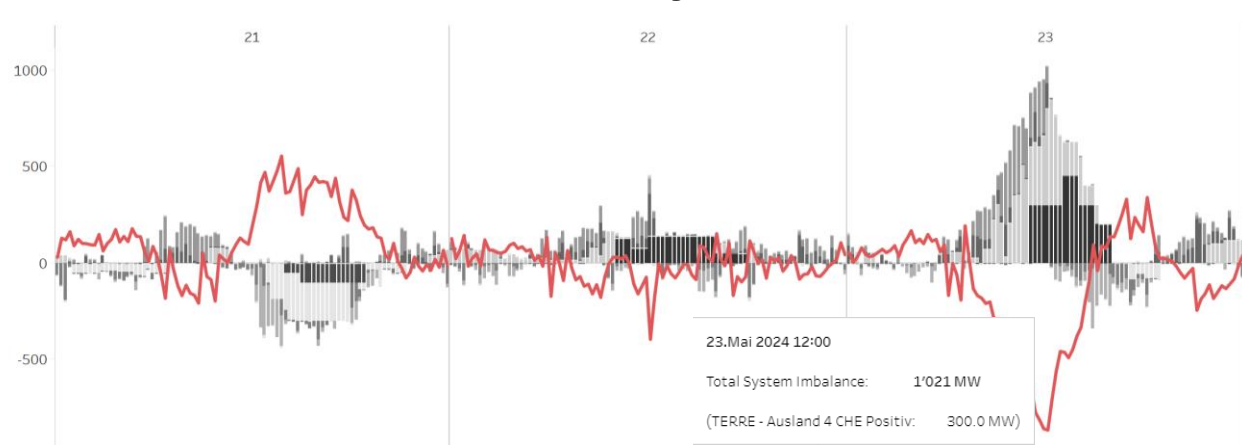
31 March 2024



22 April 2024

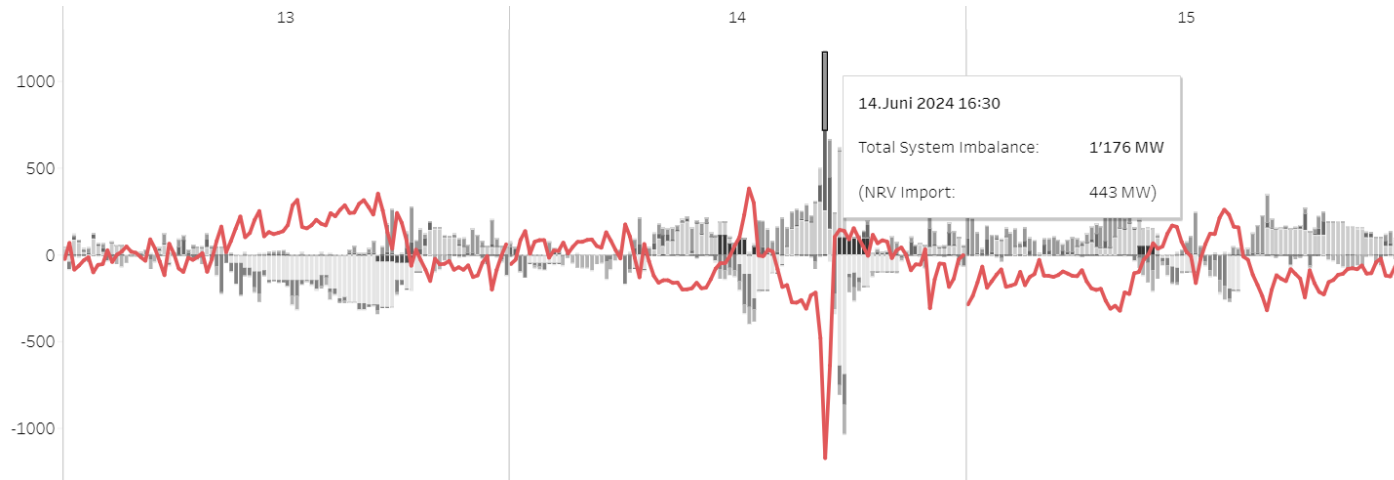


23 May 2024

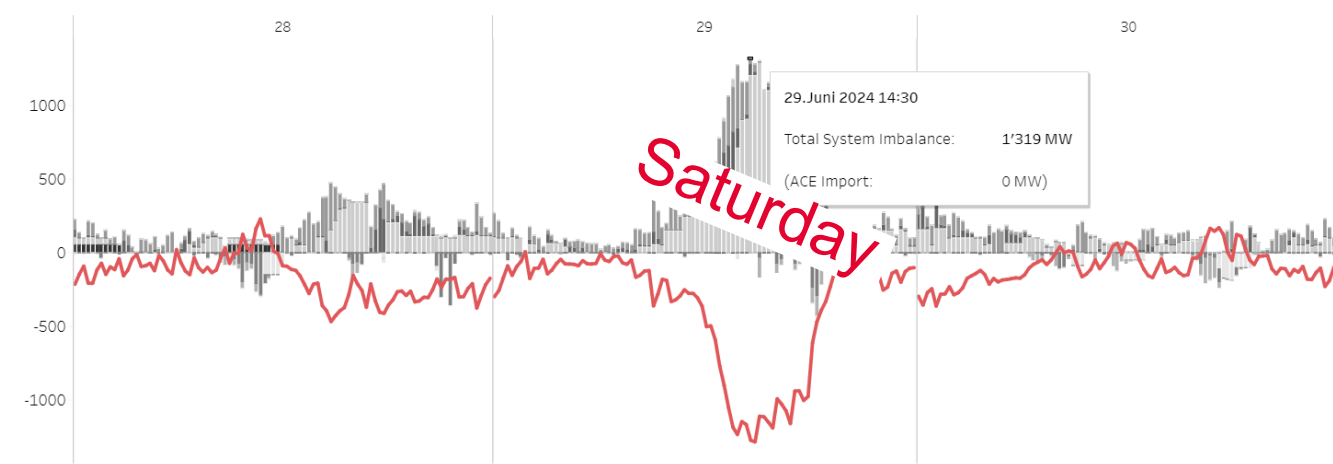


...which have become more frequent in recent months

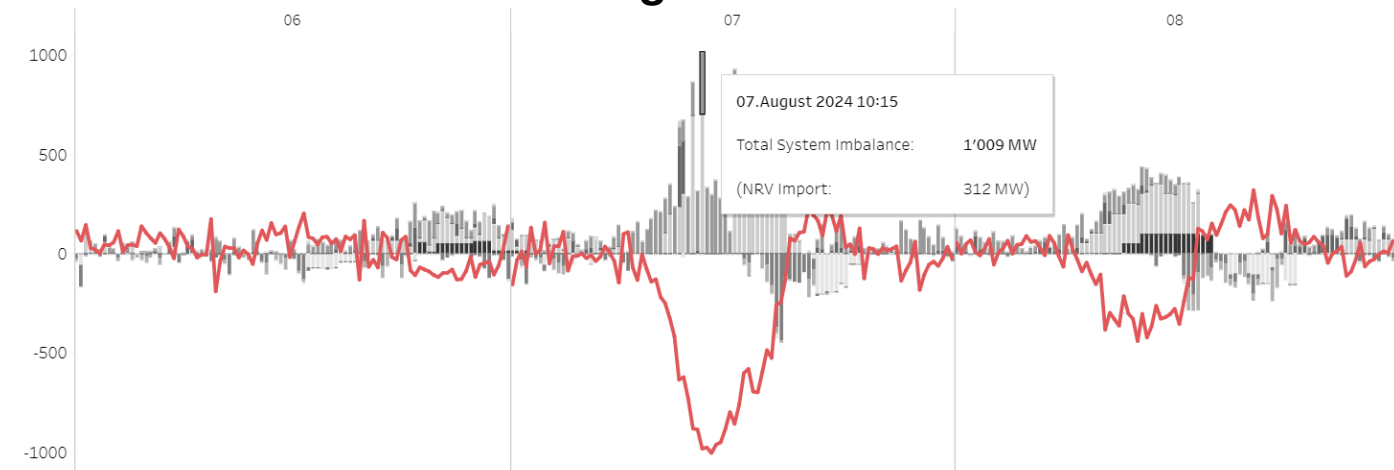
14 June 2024



29 June 2024



7 August 2024



Further imbalances greater than 900 MW during this summer:

- 17 June (Monday)
- 21 June
- 21 July (Sunday)
- 31 July
- 01 August (public holiday)

Dilemma of the current market model

- **Strong imbalances** occur more frequently **at weekends, on public holidays and on Mondays** - coincidence?
- Balance groups make consumption and production forecasts for their own supply area
- Most sub-balance groups only report their **consumption and production forecasts** to the balance group **once a day in day ahead**
- Weather changes on weekends and public holidays are usually not considered by the sub-balance groups
- There is **no incentive**, as the **costs** for balancing energy can be passed on **to the trapped end customers**



What can suppliers/producers do to prevent such high imbalances in the future?

1. **Better data quality** and earlier data delivery to **increase the quality of forecasts**
2. Regular **updating of forecasts**, including at weekends and on public holidays
3. **Readout of real-time data** for rapid detection of imbalances
4. Provision of **more flexibility (e.g. battery storage)** to compensate for imbalances in real time

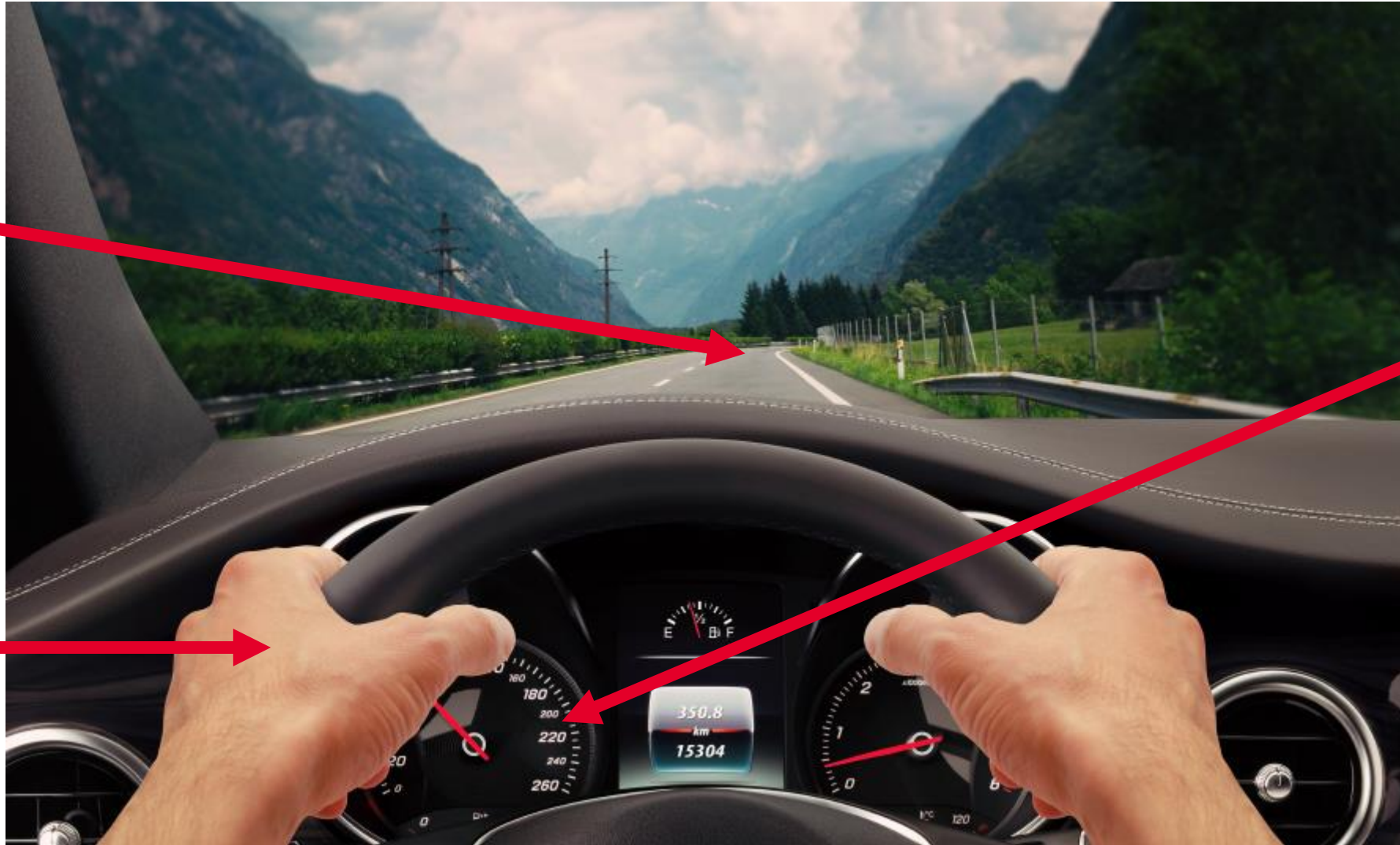
Predictability, Observability and Controllability as central properties to operate the system

Predictability

The relevant system variables can be predicted ahead

Controllability

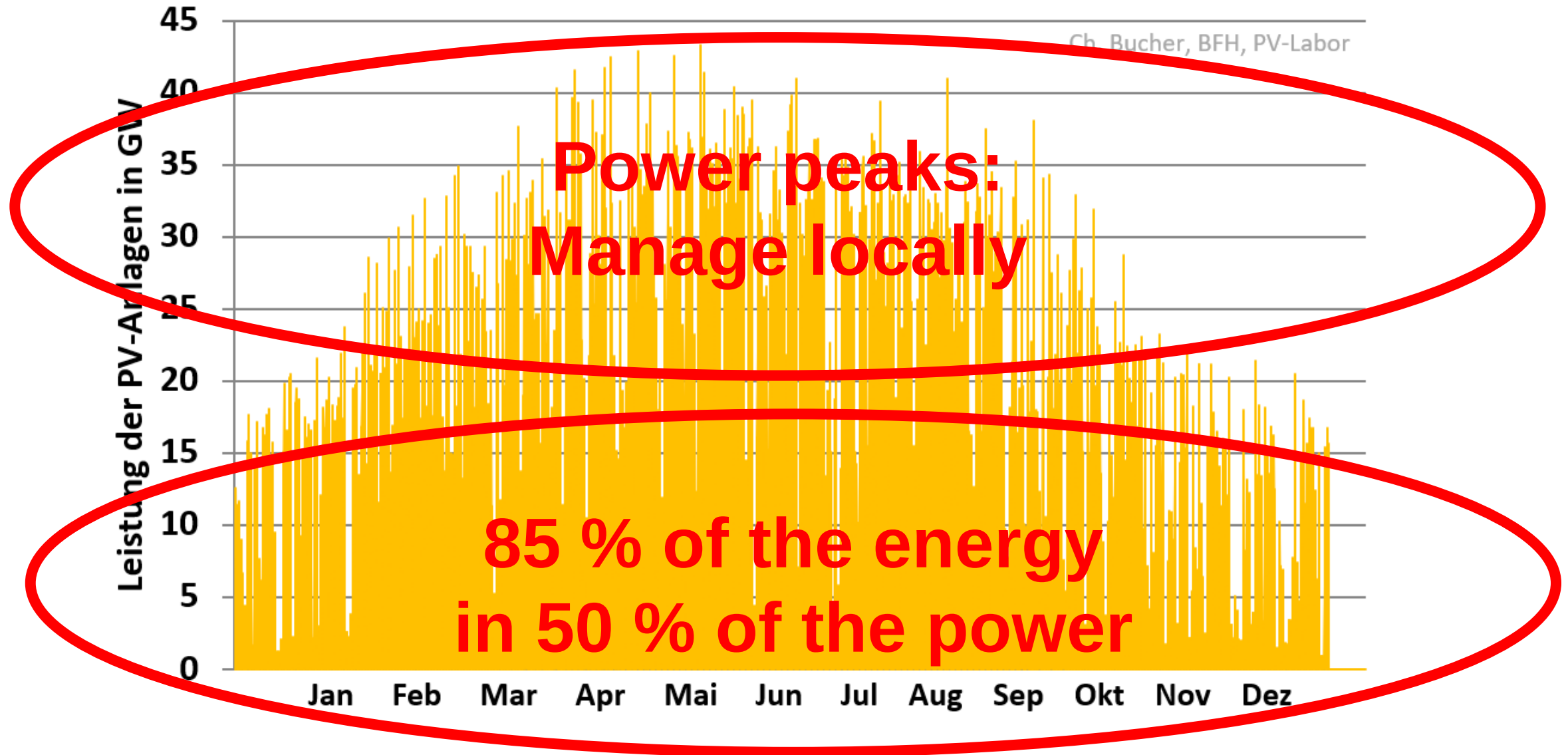
Measures exist to efficiently steer relevant system variables



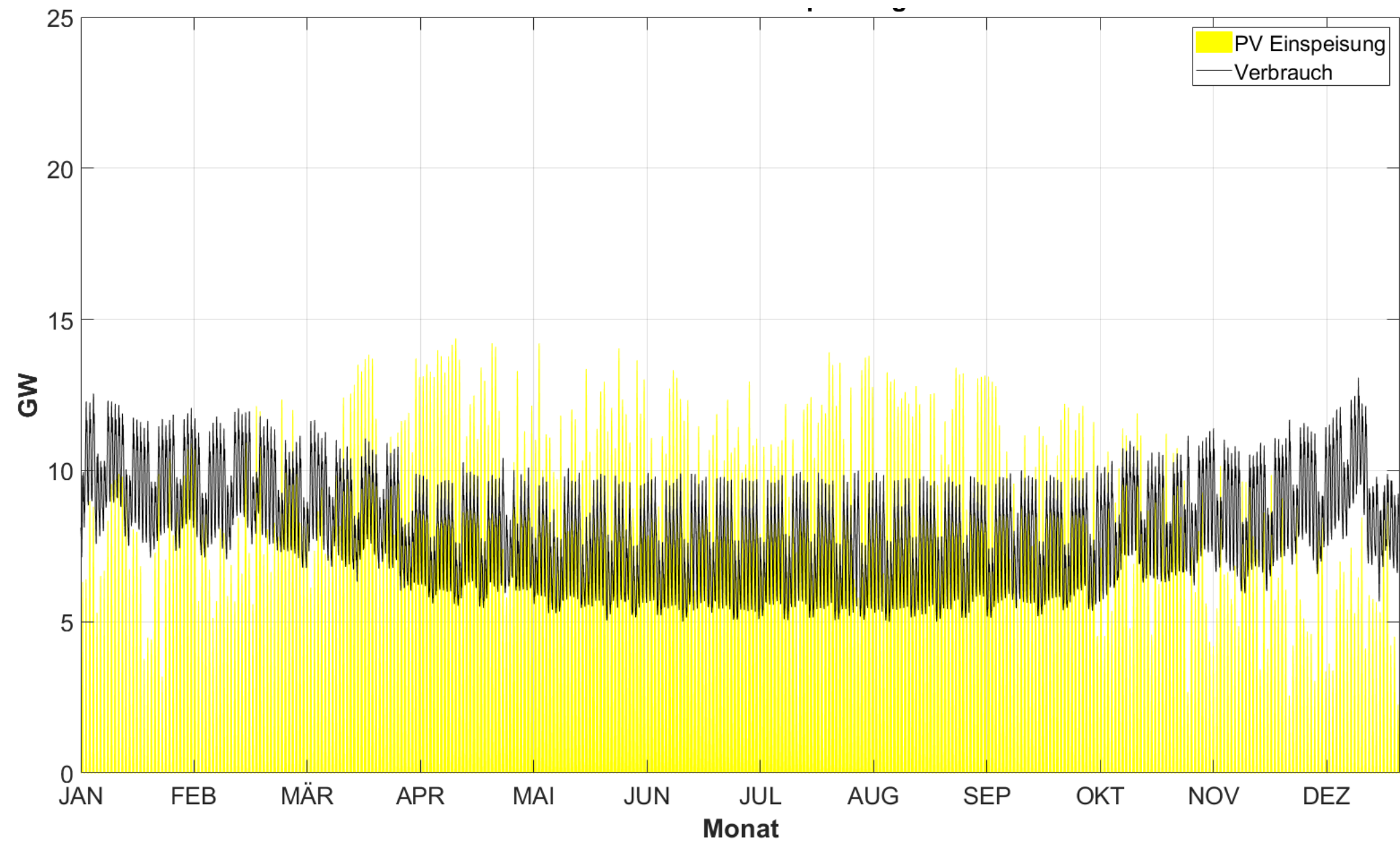
Observability

The relevant system variables are measured or estimated in or around real-time

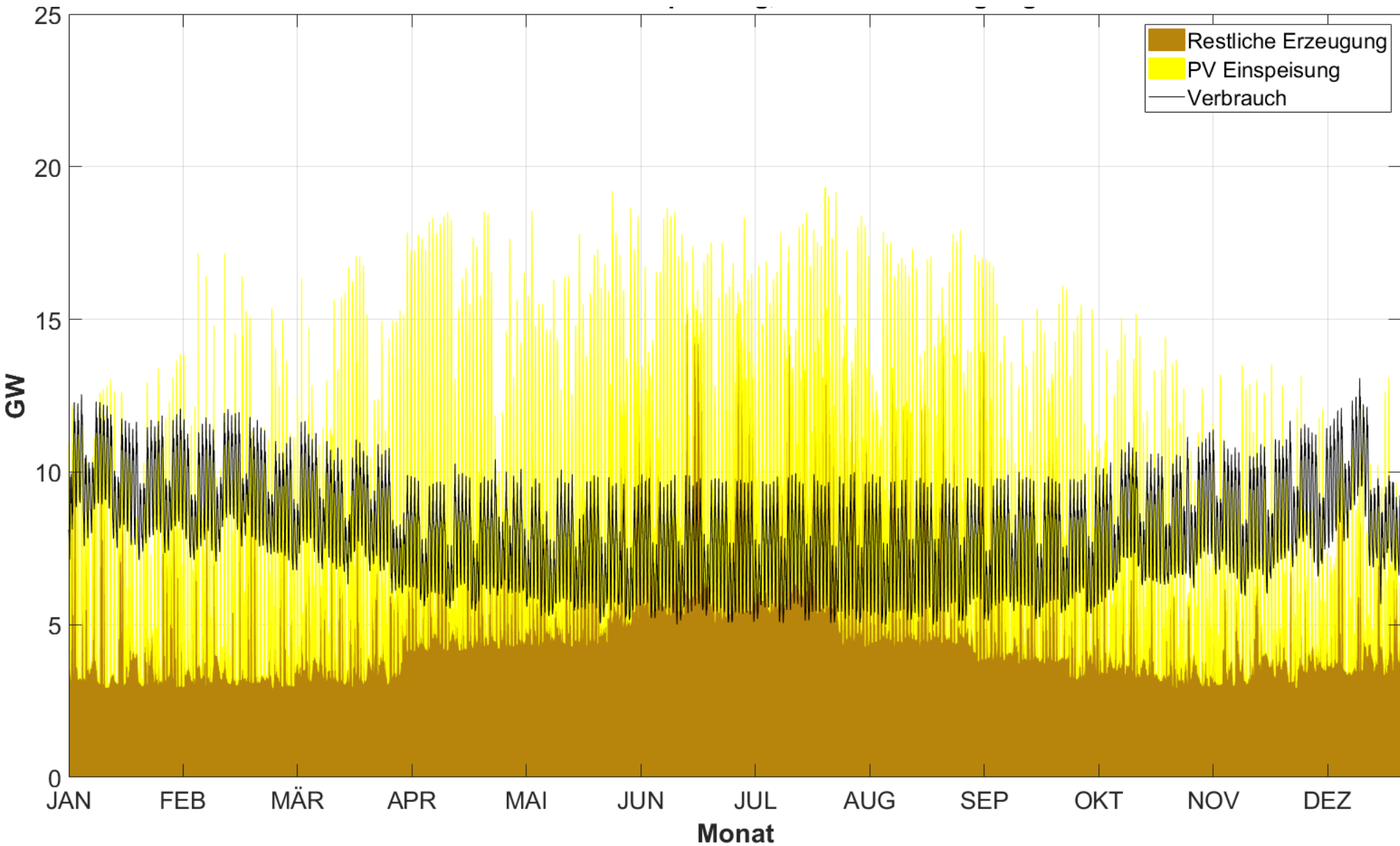
Power peaks do not belong in the power grid



Reference 2040: Hourly PV feed-in and consumption

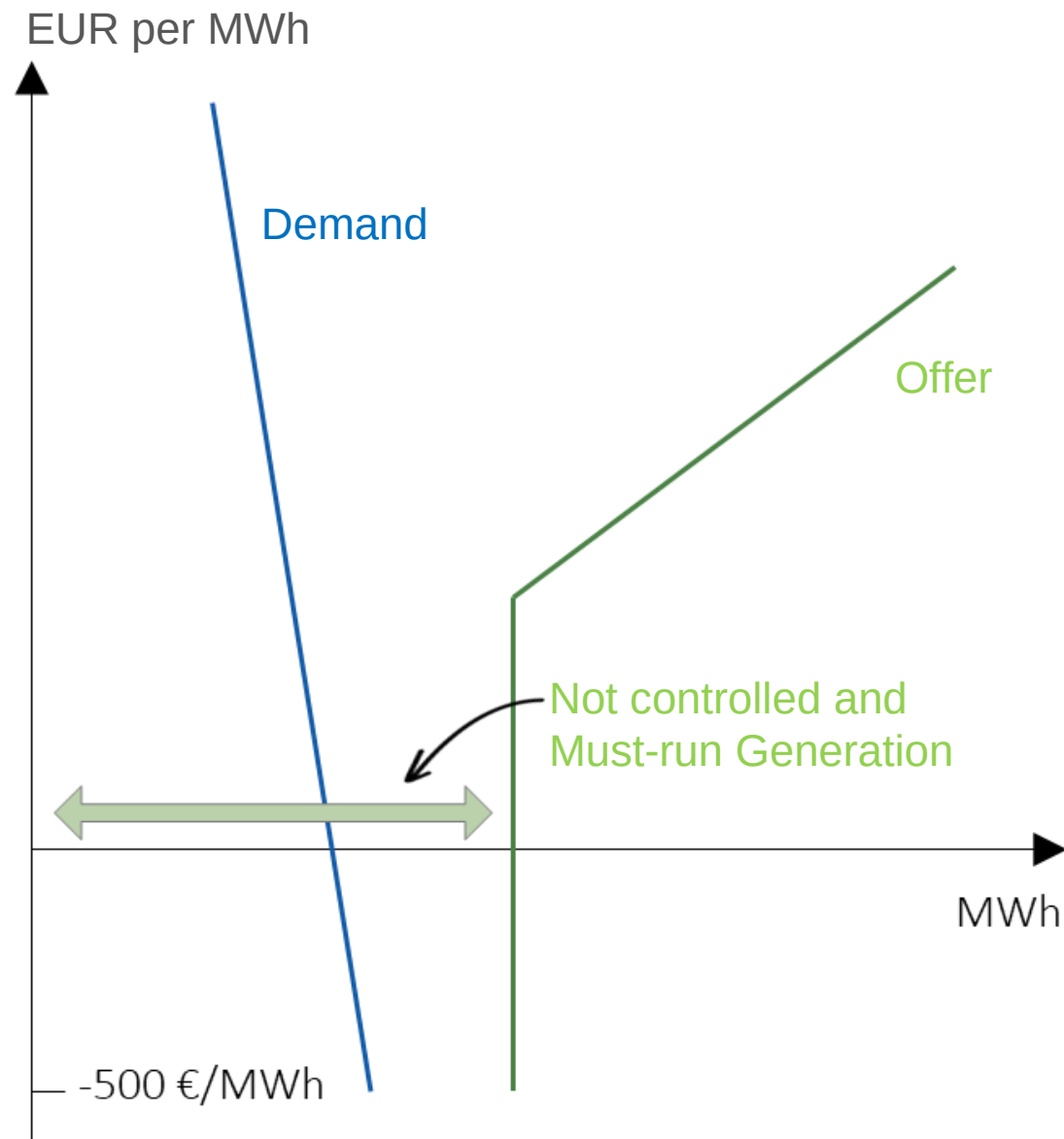


Reference 2040: Hourly PV feed-in, remaining generation and consumption



Lack of market clearing leads to use of control energy by Swissgrid

Source:
Lion Hirt, Geschäftsführer von
Neon Neue Energieökonomik, Berlin



Take-aways

1. **Better data quality** and earlier data delivery increases **the quality of the forecast!**

Do we have **automated data export**, including at weekends and on public holidays?

2. **Regularly updating the forecast**, including at weekends and on public holidays, reduces imbalances!

Do we also **update the forecast** at weekends, on public holidays and during intraday?

3. The **peaks in PV production** put a strain on the grid and should therefore **not be fed into the grid!**

Do we set the right **incentives for self-consumption** during peaks with our **feed-in tariffs**?

4. In future, **consumption** must take place **at midday**, not at night (at least in summer months)!

Do our **consumption tariffs** provide the right **incentives for consumption at midday**?

5. Technical installations must be in place to **switch off PV systems!**

Do we have the option of **controlling the PV systems** in our grid?

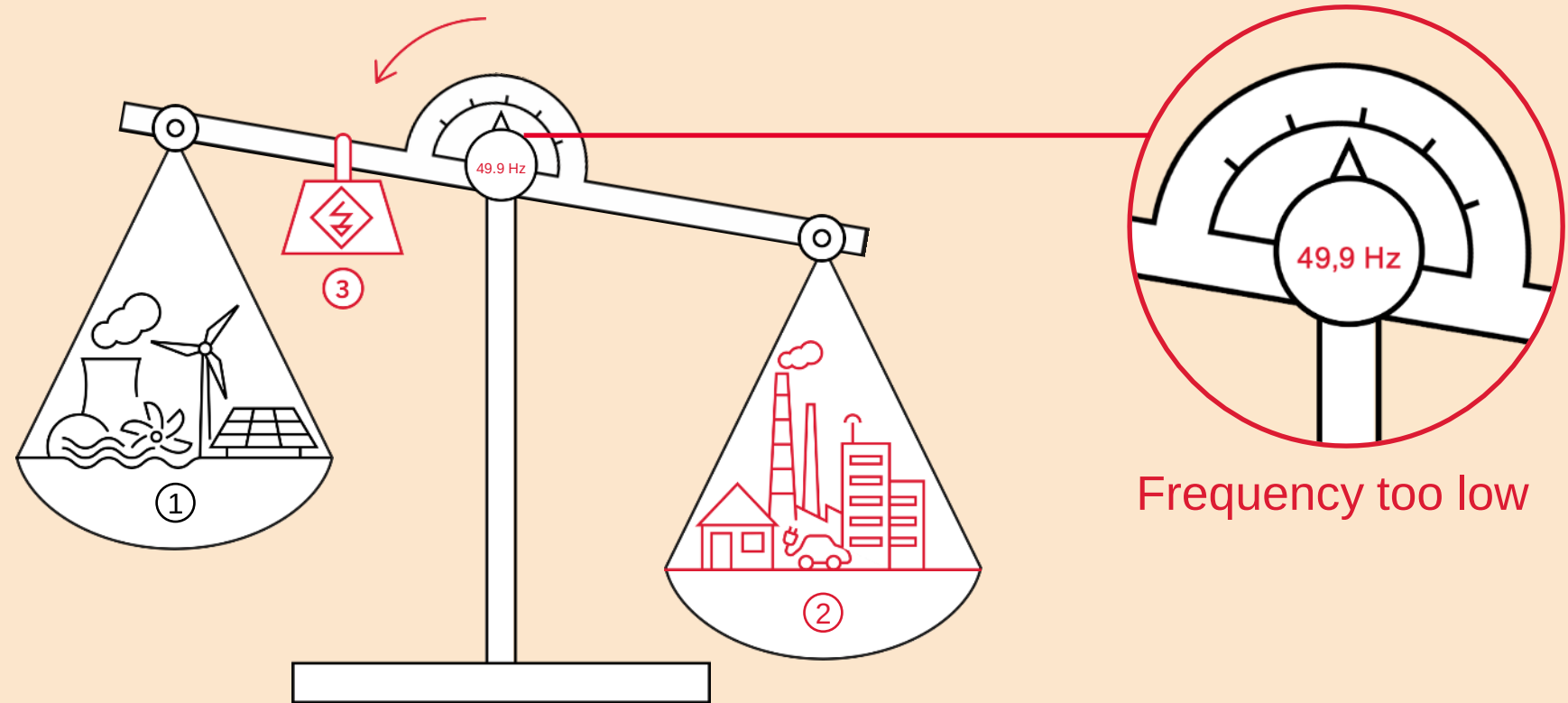
New imbalance price mechanism in Switzerland

Marc Rüede
Head of Capacity Allocation & Market Systems

Thomas Hauri
Principal Market Operations

There is a risk of a further increasing of high imbalances

The amount of electricity fed into the grid must correspond to the amount with-drawn, to keep the grid frequency constant.



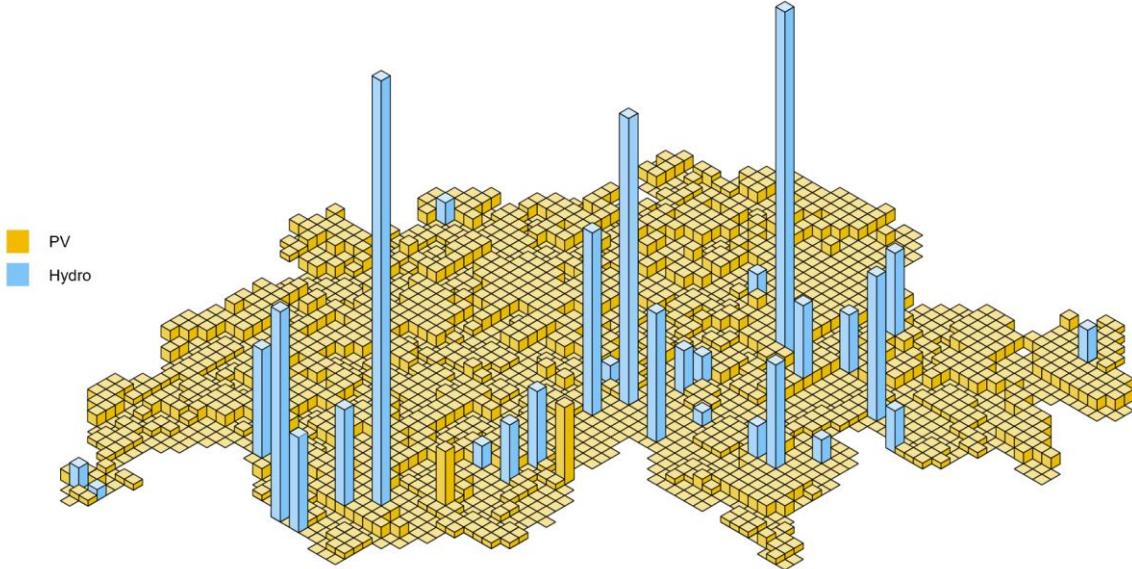
- ① Generators / power plants
- ② Consumers: private households and industry
- ③ Control energy

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



Today's imbalance price mechanism is based on a two-price model

- Today asymmetric two-price imbalance price mechanism
- Incentive effect is aimed solely at ensuring that balance groups balance themselves out
- System penalizes unbalanced balance groups multiple



Balance group	short (deficit)	BGV pays (A + P ₁) * α ₁	A = max (P _{spot} ; P _{sek+} ; P _{ter+})
	long (surplus)	BGV receives (B – P ₁) * α 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

- With increasing volatility in the Swiss electricity system, imbalances will increase and prices will fluctuate more
- To counteract this, balance groups must be incentivized by a new imbalance price mechanism to behave in a way that supports the system

Swissgrid plans to introduce a one-price system

- Swissgrid has analyzed during last months various imbalance price mechanisms with the help of an external service provider
- Swissgrid has been in contact with various European TSOs to understand their mechanisms and learn from their experiences
- Current structural and institutional framework conditions in Switzerland were considered, like...
 - no electricity agreement
 - no comprehensive liberalization of the electricity market
 - high concentration of generation capacity among a small number of players



Proposed new imbalance price mechanism in detail

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

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

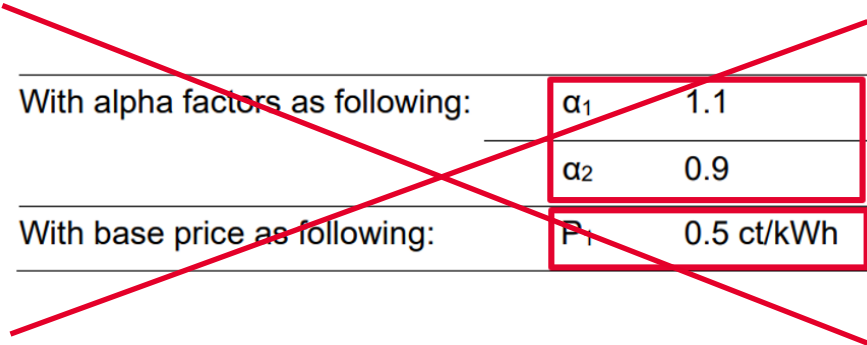
P_{ter} = defined as weighted average price of tertiary control energy (mFRR) activations, only activations in the relevant direction are used for the calculation

*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*

Additional information about proposed new imbalance price mechanism

- Alpha factors and basis price will be deleted
- SwissIX day-ahead spot price is no longer considered, because it does not reflect the near real time value of energy, it will only be considered for quarter hours where no aFRR and mFRR prices are available
- A link to the Swiss intraday price index is currently not possible due to the limited liquidity of this market, big risk of manipulation
- An additional scarcity component will be introduced
- Trade balance groups will be allowed to support the Swiss control area

Note: Swissgrid already publishes on its [website](#) an indicative imbalance price and the total system imbalance with a delay of approx. 30 minutes



With alpha factors as following:	α_1	1.1
	α_2	0.9
With base price as following:	P ₁	0.5 ct/kWh

Imbalance of the control area and activated balancing energy

The following values serve only as an indication of the position of the Swiss control area or the current balancing energy prices and are not legally binding. The data originates from real-time systems and is published in CSV and/or Excel format. The subsequently determined and verified billing data and balancing energy prices may deviate from the figures provided. Any liability of Swissgrid for actions based on the data published here is excluded.

Content



18 October 2024 Control Area Balance (daily) 10:21	CSV 
18 October 2024 Control Area Balance (daily) 10:16	XLSX 
18 October 2024 Control Area Balance 2024 (yearly) 06:48	XLSX 

Introduction of scarcity component for critical control area balance

What is our motivation?

- Strong and predictable incentive for all balance groups to balance Swiss control area in critical situations
- Pricing of emergency measures activated near real time, as no intraday price component is available

What are the benefits of a scarcity component?

Balance groups have an incentive to take preparatory work, like...

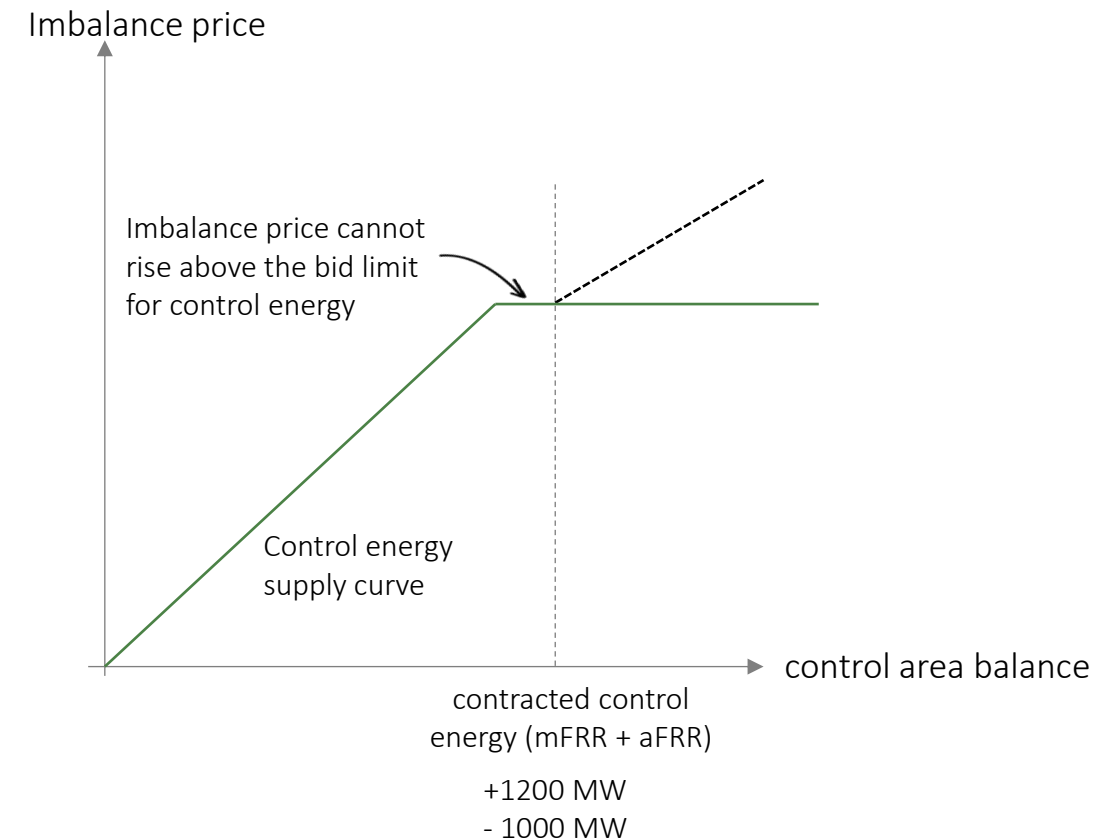
... investing in the option to switch off photovoltaic systems

... having telephone numbers of major customers ready for intervention

How does it work?

- addition to the "normally" calculated imbalance price
- It only applies if the control area balance exceeds 100% of the contracted control energy (values will be published on Swissgrid website)
- It increases by 10 EUR/MWh for each MW of imbalance above this limit

Simplified graphic to visualise scarcity component



Quantitative assessment of proposed new imbalance price mechanism

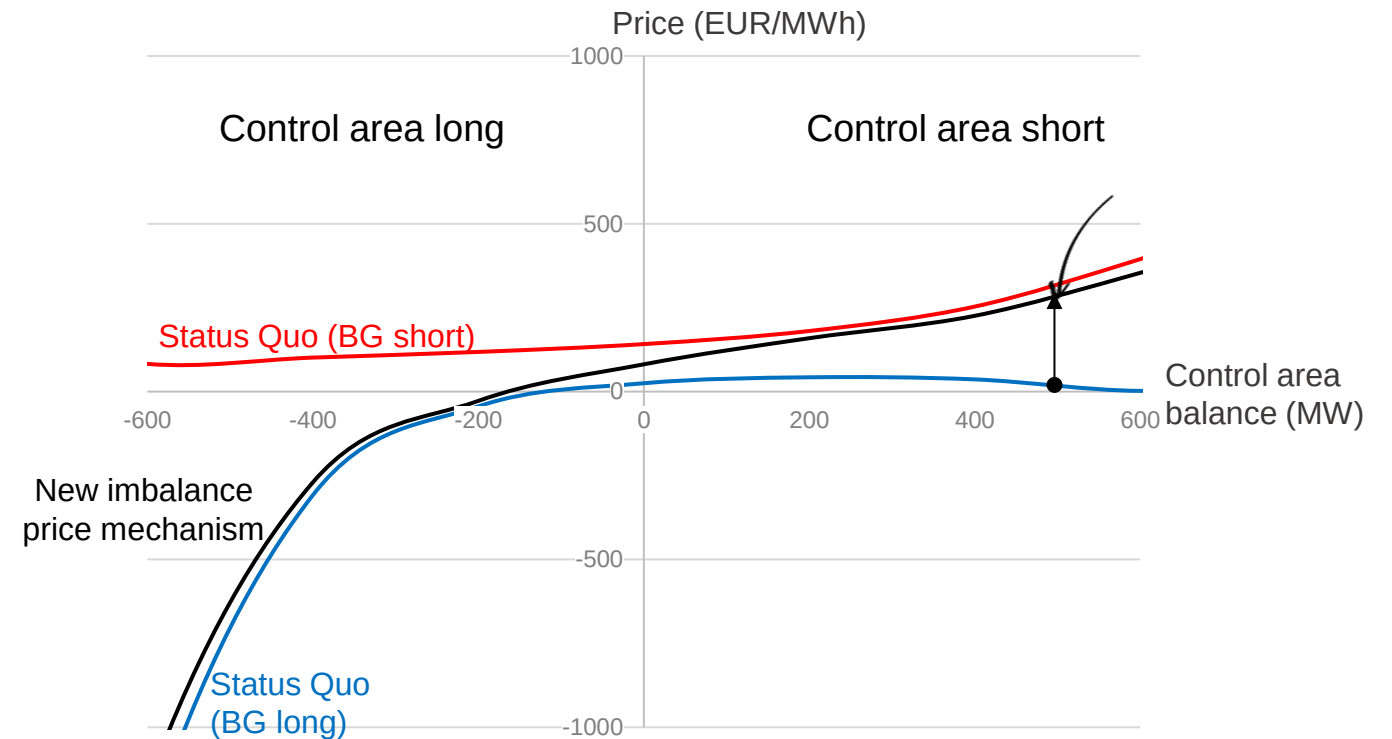
We have made time series available to all balance groups, with calculated prices according to the new algorithm based on previous months.

Additionally, a graphic which tries to visualize average values of these imbalance prices has been created.

Mains findings are:

- Control area-supporting behaviour is much more financially rewarded than today
- Control area-harmful behaviour is penalized less than today (due to elimination of α -factor and base price), but still sufficient incentives to reduce imbalances

Note: extreme price peaks not visible, smoothed out by using of average values



Period June 2023 to June 2024

Proposed adjustment of the current limit concept

Status quo

- Balance groups with metering points may take open positions in the amount of their maximum production
- Trading balance groups may take open positions depending on the collateral deposited

Proposal

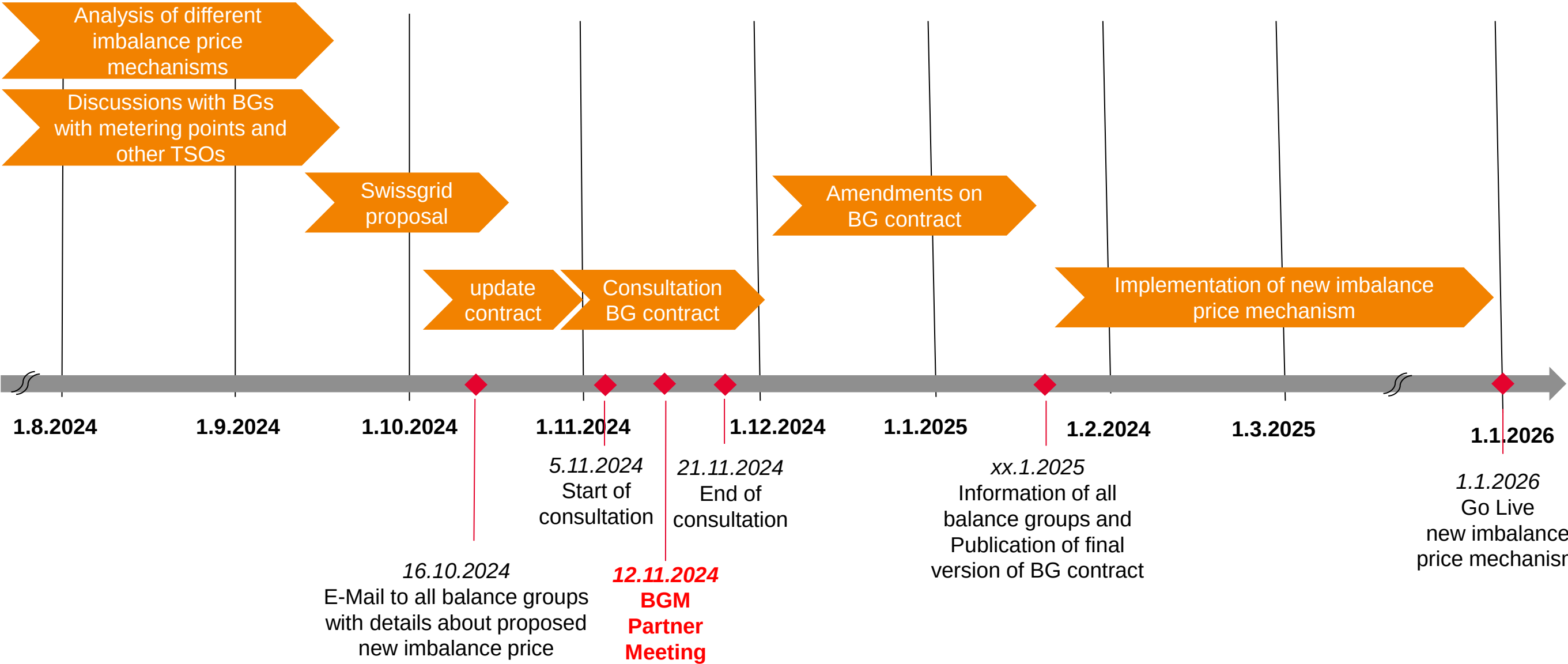
- Balance groups with metering points may take open positions in the amount of their maximum production, same as today
- Trading balance groups may take open positions in real time for limit sets 5-7, depending on the collateral deposited
- Control area-supporting is still permitted for the first four limit sets due to the low level of deposited collaterals and the therefore resulting risk for Swissgrid

Limit 1: DA bis D-2h [MW] (long/short)	Limit 2: D-2h bis COT ID [MW] (long/short)	Limite : COT ID und PS [MW] (long/short)	Collateral [EUR]
10	10	10	100 000
25	10	10	200 000
50	25	10	400 000
100	25	10	550 000
200	50	10	850 000
300	75	10	1 100 000
400	100	10	1 400 000

Limit 1: DA until D-2h [MW] (long/short)	Limit 2: D-2h until COT ID [MW] (long/short)	Limite : COT ID und PS [MW] (long/short)	Collateral [EUR]
10	10	10 *	100 000
25	10	10 *	200 000
50	25	10 *	400 000
100	25	10 *	550 000
200	50	20	850 000
300	75	25	1 100 000
400	100	30	1 400 000

* This limit set may not be used to contribute to actively balance the Swiss control area; there is an obligation to ensure a zero power balance. The reason for this is the insufficient collateral deposited for these limit sets, which represents too high a risk for Swissgrid.

Planning introduction of the proposed imbalance price mechanism



Changes in the framework conditions can affect imbalance price mechanism

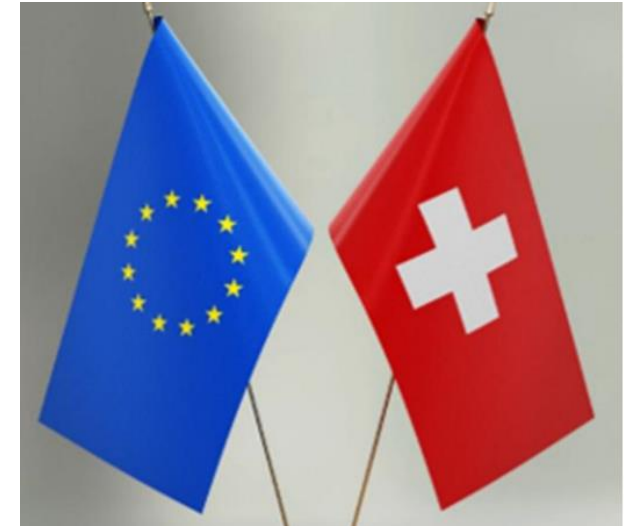
If new framework conditions arise before or after the introduction of the proposed new imbalance price mechanism, for example...

- signing of electricity agreement or
- accession to the cross-border balancing energy co-operations

Swissgrid may amend the contract at any time in compliance with the deadlines specified in the Balance Group Contract.

After a signed electricity agreement, imbalance price mechanism can...

- change from weighted average costs to marginal costs for secondary and tertiary control energy
- include Swiss intraday price in the formula



Summary of main advantages of the proposed change to a one-price system

Not only 20 ancillary services provider.....

also additional about 100 balance groups can perform an active balancing to help to stabilize the Swiss control area

Post Scheduling is not lucrative anymore, increasing Intraday trading expected

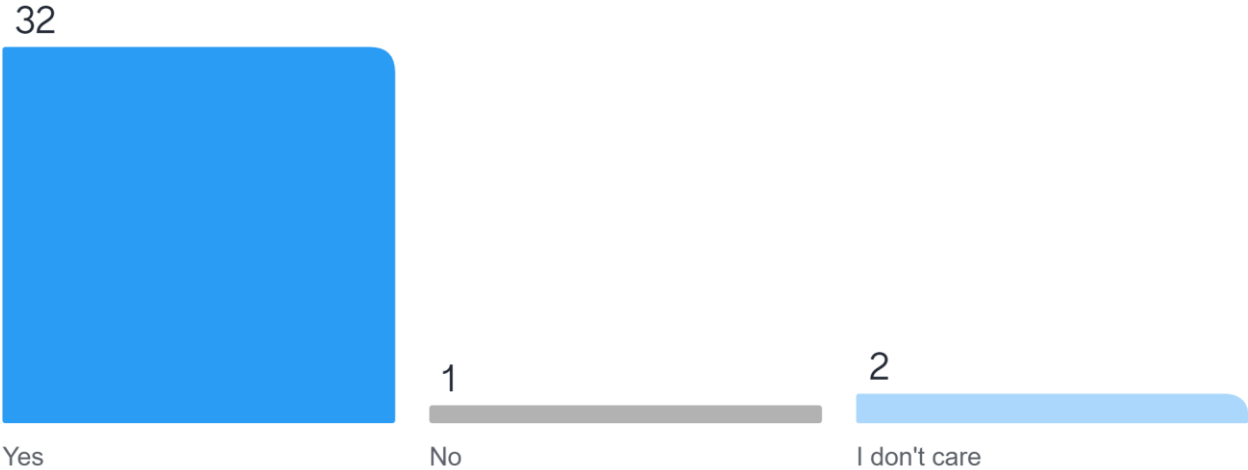
More detailed information about the proposed new imbalance price mechanism or the ongoing consultation will be provided during the breakout session in the afternoon

We are very much looking forward to interesting discussions with you there!

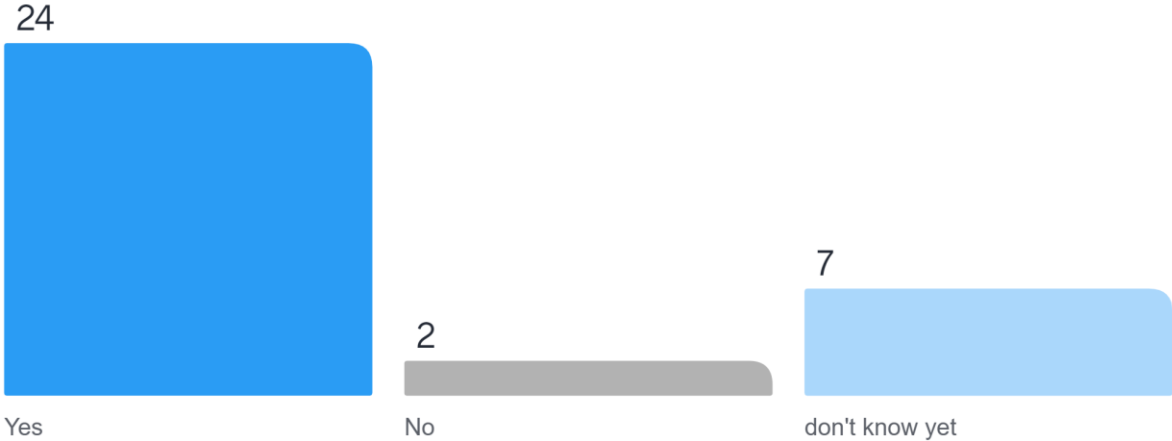


Survey of meeting participants

Do you support the switch to the one-price system?



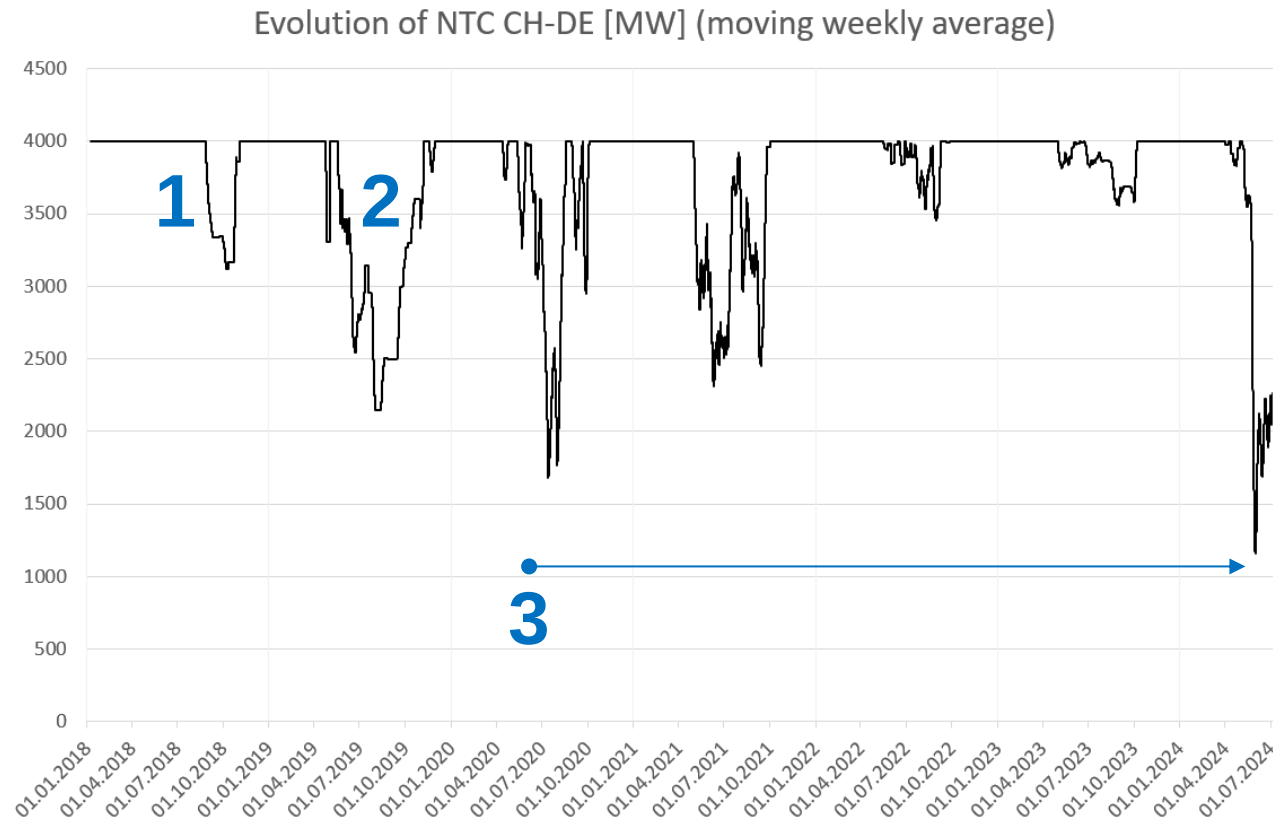
Could you imagine helping to balance the Swiss control area?



Evaluation of the Swiss Net Transfer Capacity during summer 2024

Julius Schwachheim
Head of Capacity & Congestion Management

RECAP: The NTC CH-DE methodology was developed in order to increase the transparency of the NTC determination



Key driver: change of international flow pattern

- Germany with higher import demand (less conventional, more unstable RES, higher load)
- Higher production in the south, availability of Nuclear in FR

1

- In the past, the **NTC CH-DE was set to 4000 MW**. Only in rare cases, manual ad hoc reductions were done, e.g. like in summer 2018. 4000 MW were rarely utilized, hence no need for daily assessments.

2

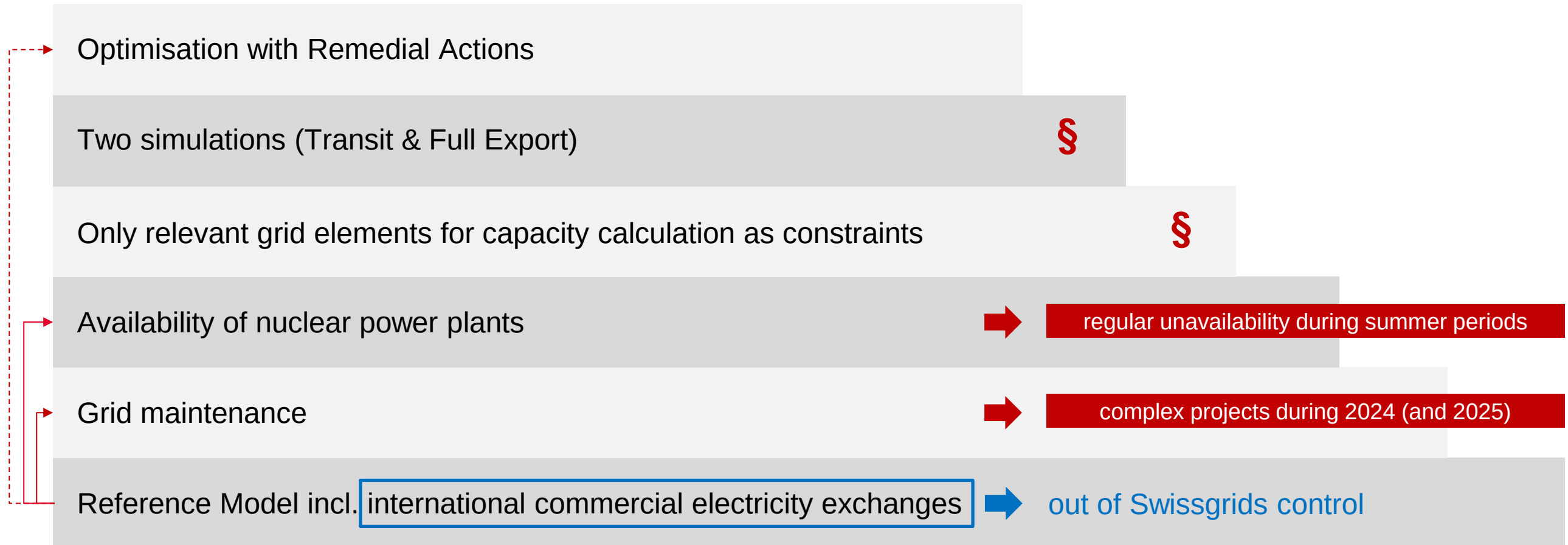
- In summer 2019, it became apparent that 4000 MW are not safe for the grid & frequent deviations were necessary, so that **a lot of market participants requested** more transparency

3

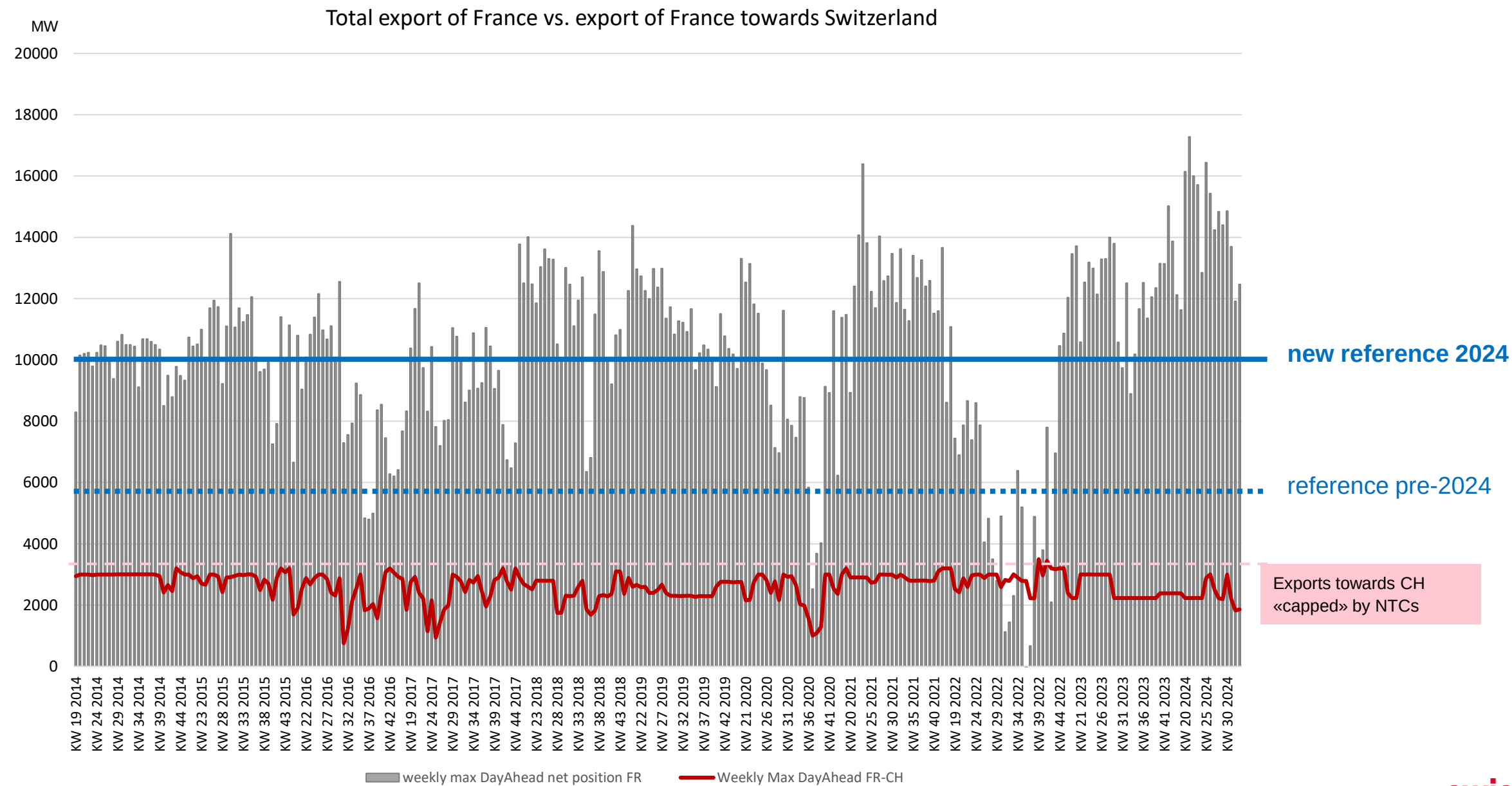
- During winter 2019/20, **Swissgrid developed in collaboration with ElCom a methodology** to determine the NTC CH-DE. This methodology was **consulted with the branche** and published on the Swissgrid website
- Since Summer 2020**, Swissgrid determines the NTC CH-DE during the summer period based on that methodology

The Swissgrid-proposal of the Day-Ahead NTC CH-DE during the summer period is based on a methodology commonly designed with ElCom and consulted with the branche

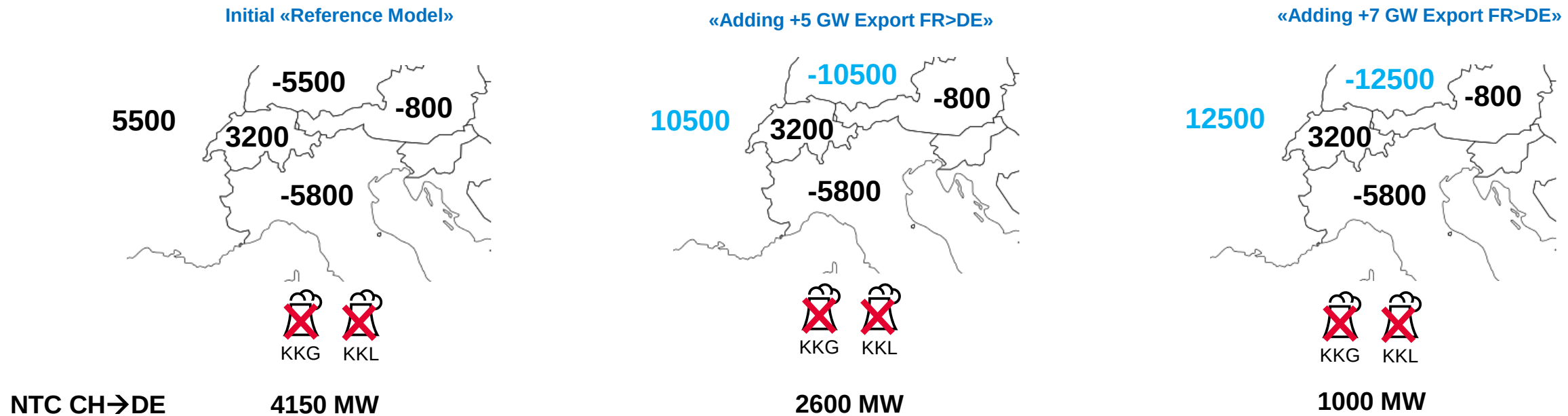
Key ingredients



The maximum scheduled exchange of France has increased year over year in the past 10 years – a reason are the new EU regulations (Flow-Based, 70%minRAM) ...

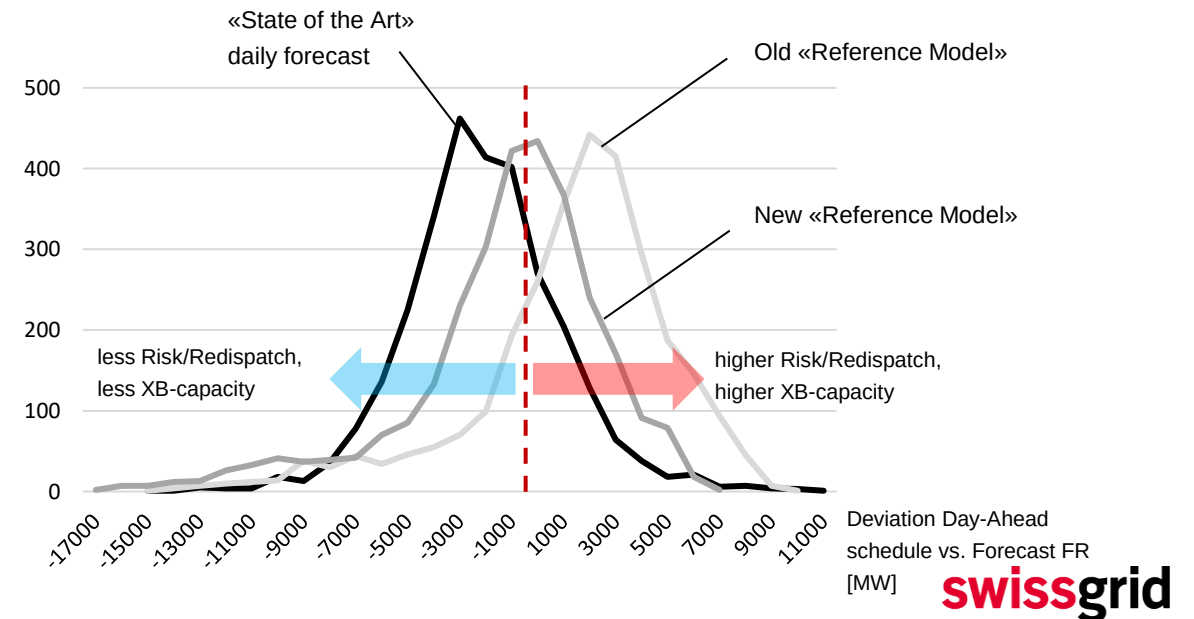


The higher the transit FR→DE, the lower the NTC CH→DE. May 2024, peak hour

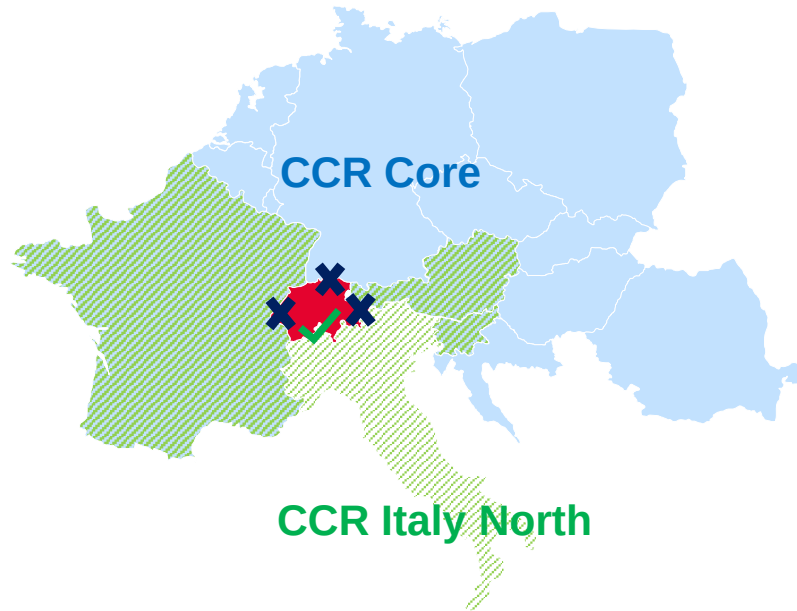


- Swissgrid applies one reference model for peak (off-peak)
- No hourly net position forecast in use
- Even «state-of-the-art» forecasts include severe errors (down the risk-curve)

→ Deviations can cause severe operational risks



... the only true and optimal solution is a coordination with all international capacity calculation processes – preferably with the help of an Electricity Agreement



- Swiss cross-border capacity would be treated equally to EU cross-border capacities
- Full coordination would be in place according to agreed (fair) rules
- Swissgrid would not be in the «reactive» position; capacities would be fairly distributed throughout Europe
- Hence, increasing grid security and strengthening security of supply
- Full transparency for market participants

Solution for CH integration in Core still in the approval process ... (4 years!)

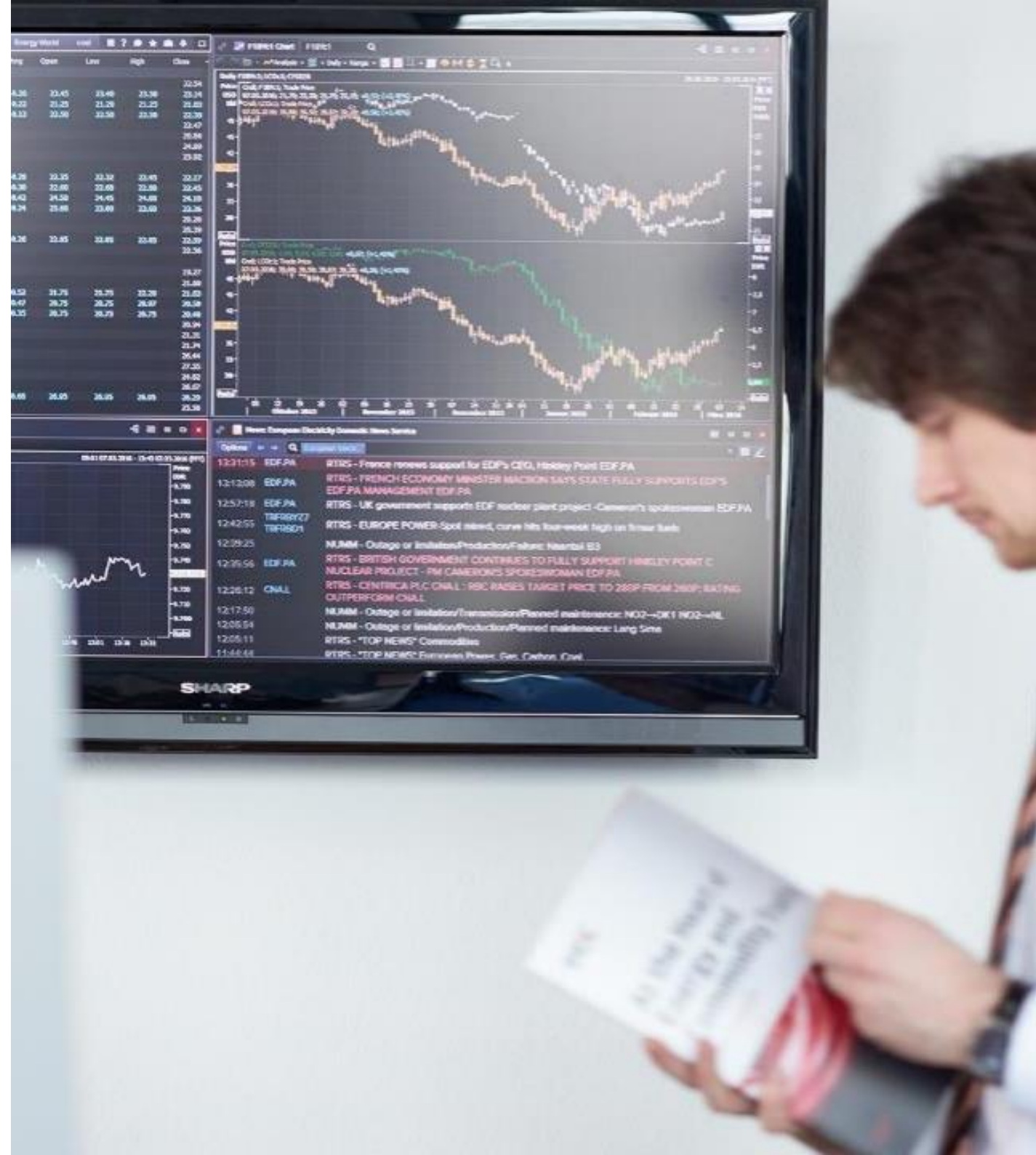
... timeline? Merger of Core & Italy North?



Electricity Agreement for **legal certainty** and **full integration!**

Swissgrid – Balance Group Meeting – latest update from EPEX SPOT

12 November 2024



- 01** General overview of traded volumes in 2023 – current volumes up to October 2024
- 02** Focus on 15 MTU SIDC and SDAC – 15 MTU Swissix
- 03** Q&A

01

General overview of traded volumes in 2023

Current volumes up to September 2024

Dynamic market growth & trends: overview

717 TWh

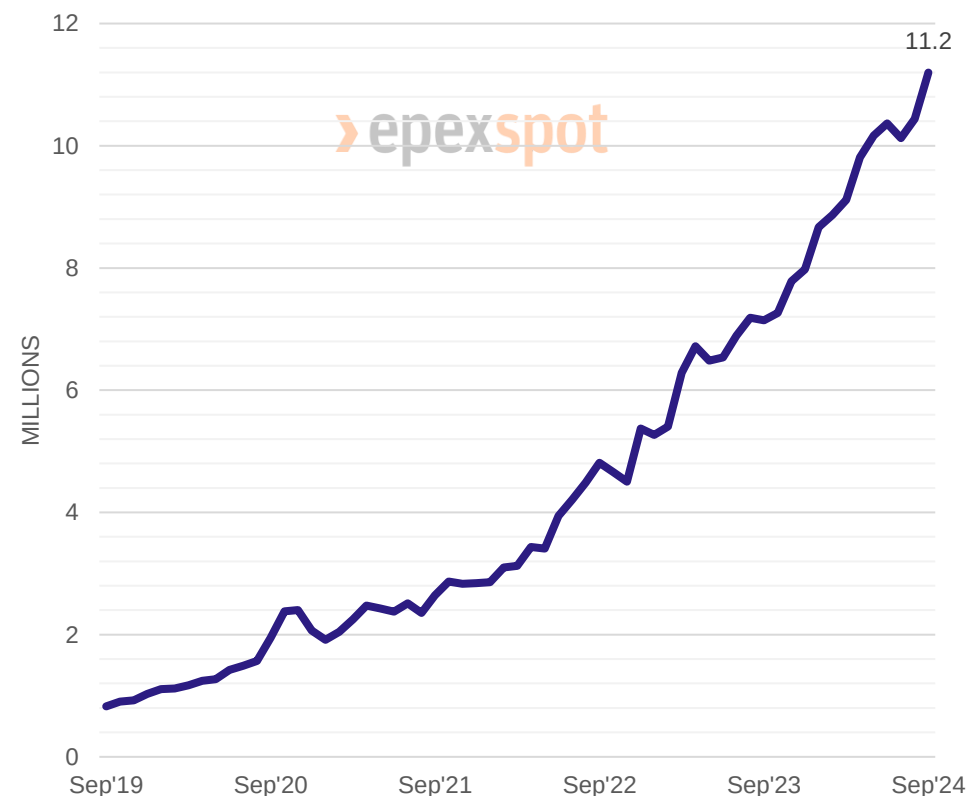
traded in 2023
on all spot markets
(Day-Ahead + Intraday)

**Welcomed 46
new trading members in 2024**
(60 in 2023)

—
Trading companies / Utilities /
TSOs / Aggregators /
Commercial consumers

Proven technical
performance
adapted to new market behaviour

DAILY AVERAGE NUMBER OF SUBMITTED ORDERS IN M7



Largest Intraday market in Europe
with

175 TWh

traded in 2023

134 TWh in 2022

—
+31% Y2Y (2022-2023)

8.8 TWh

Traded GOs on our
Pan-European auction in 2
years

A growing community of
70 GOs market parties

2023 Traded Volumes

717 TWh

Traded on all markets in 2023

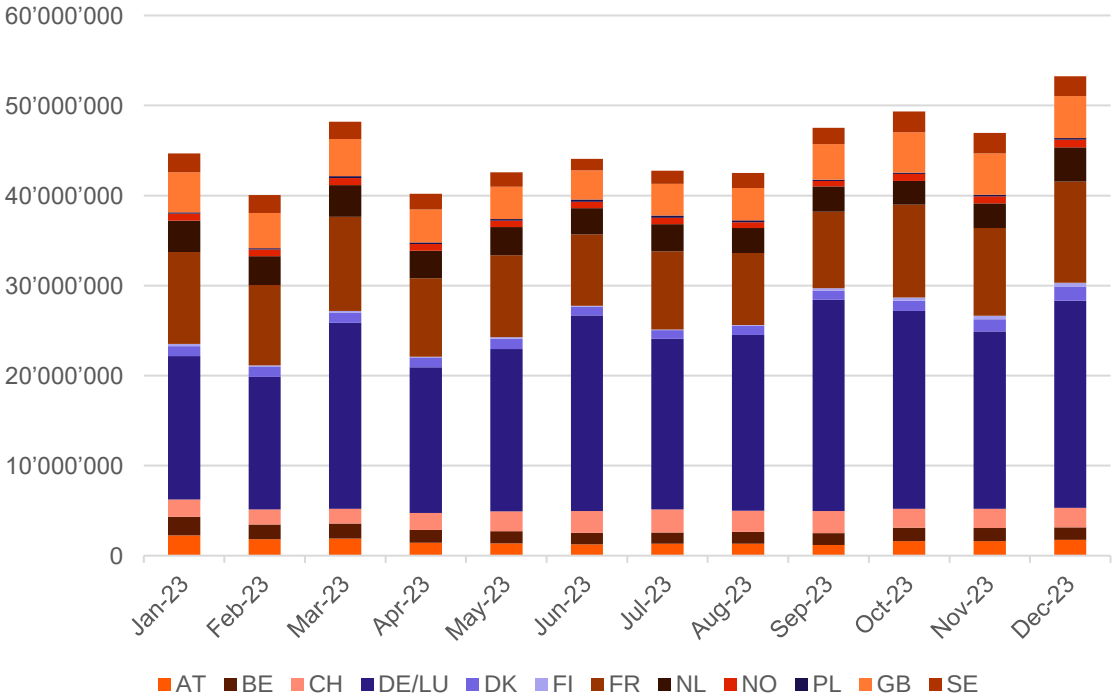
542 TWh

Traded on Day-Ahead markets in 2023

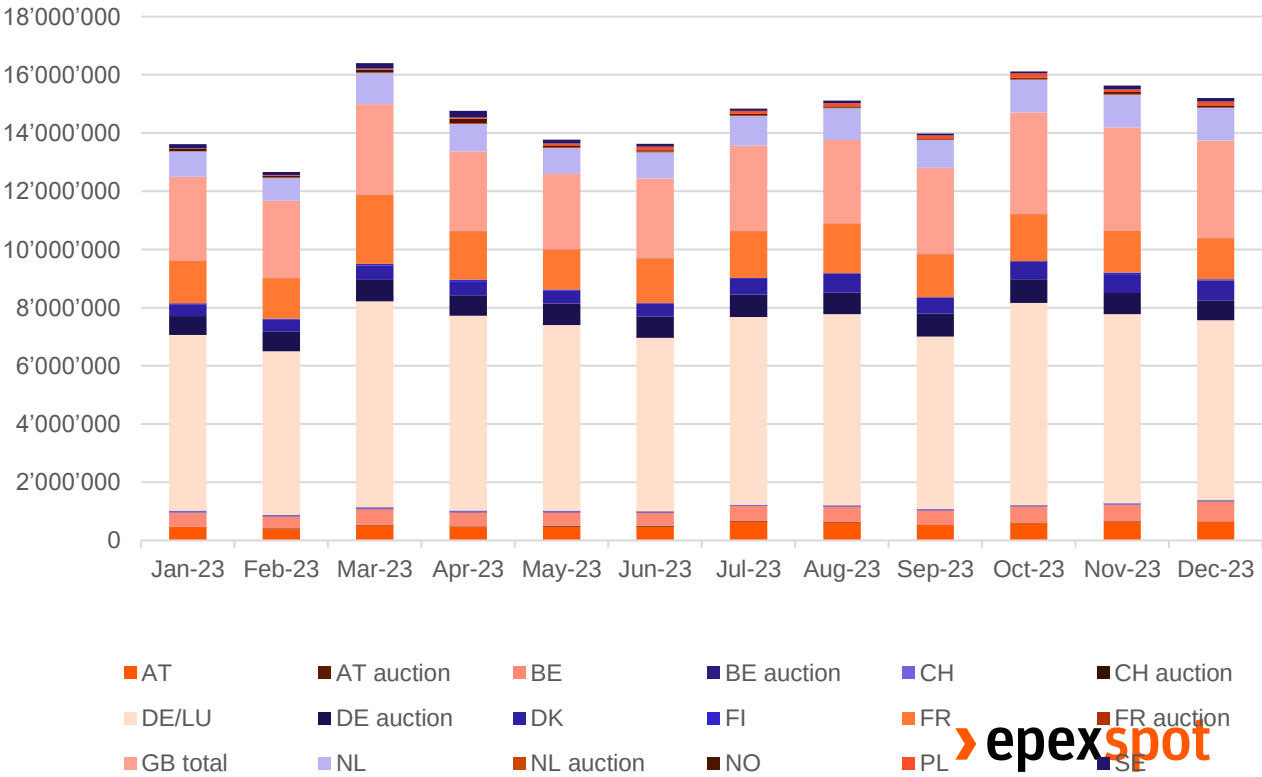
175 TWh

Traded on Intraday continuous & auction markets in 2023

DA Auction volumes 2023

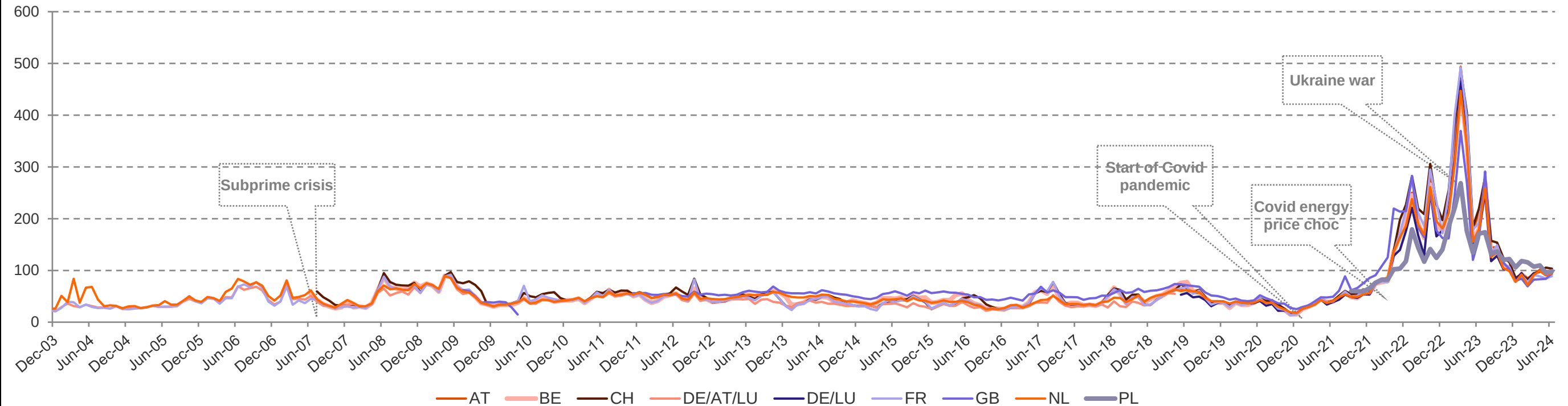


ID Continuous + auction volumes 2023



Robust & secure market operations for Day-Ahead auctions

Source: EPEX SPOT – DAM Baseload Prices



Market	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
AT (Phelix AT)									59.92	40.06	33.14	106.85	261.40	102.14
DE/AT/LU (Phelix)	44.49	51.12	42.60	37.78	32.76	31.63	28.98	34.19	41.73	-	-	-	-	-
DE/LU (Phelix DE)									52.60	37.67	30.47	96.85	235.45	95.18
FR	47.50	48.89	46.94	43.24	34.63	38.48	36.75	44.97	50.20	39.45	32.20	109.17	275.88	96.86
CH (Swissix)	51.02	56.18	49.52	44.73	36.79	40.30	37.88	46.00	52.22	40.92	34.00	114.94	281.65	107.47
NL	45.38	52.03	48.00	51.95	41.18	40.05	32.24	39.31	52.53	41.20	32.24	102.96	241.92	95.82
BE	46.30	49.37	46.98	47.45	40.79	44.68	36.61	44.58	55.27	39.35	31.88	104.12	244.53	97.27
GB (in £)	-	47.18	44.51	49.68	42.02	40.43	40.43	45.32	57.44	42.85	35.26	117.84	205.66	

Market review 2023

DE/LU: 310.4 TWh

Day-Ahead: 234.0 TWh
Intraday: 76.4 TWh
Share in consumption: 67%



FR: 130.7 TWh

Day-Ahead: 111.7 TWh
Intraday: 19.0 TWh
Share in consumption: 31%



GB: 68 TWh

Day-Ahead: 39.4 TWh
Intraday: 28.6 TWh
Share in consumption: N/A

NL: 49 TWh

Day-Ahead: 37.0 TWh
Intraday: 12.0 TWh
Share in consumption: 45%



AT: 25.3 TWh

Day-Ahead: 18.9 TWh
Intraday: 6.4 TWh
Share in consumption: 44%



CH: 26 TWh

Day-Ahead: 25.4 TWh
Intraday: 0.6 TWh
Share in consumption: 43%



BE: 23.8 TWh

Day-Ahead: 17.7 TWh
Intraday: 6.1 TWh
Share in consumption: 30%



Nordic countries: 56.4 TWh

Day-Ahead: 47.4 TWh
Intraday: 9.0 TWh
Share in consumption: 15%

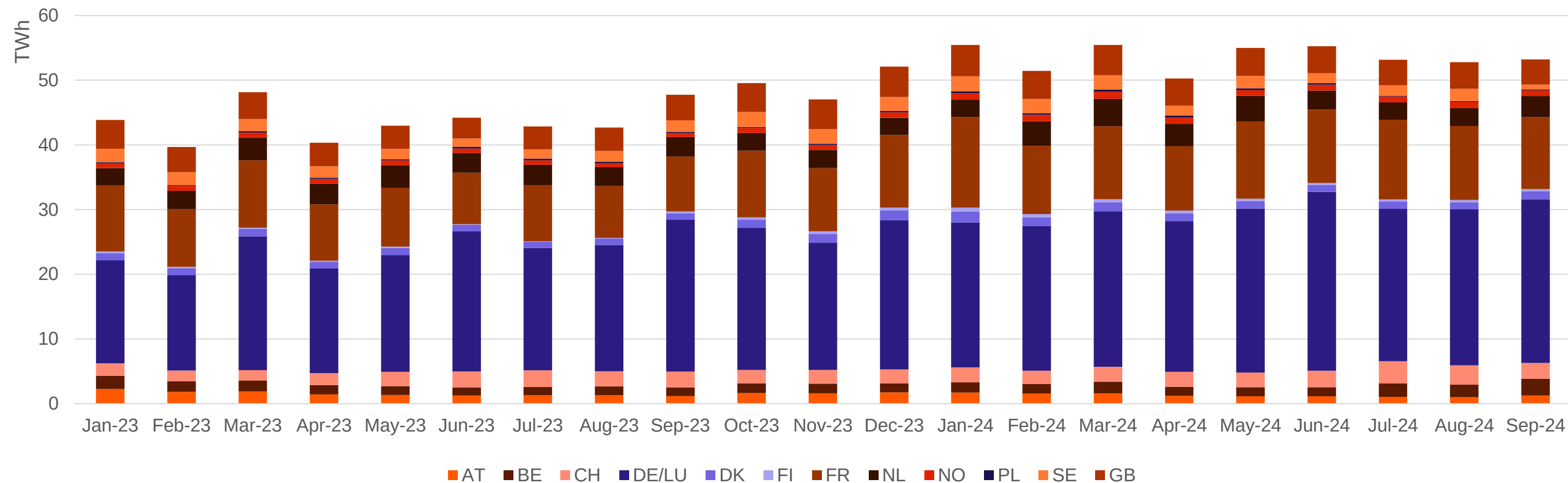


PL: 3.2 TWh

Day-Ahead: 2.2 TWh
Intraday: 1.0 TWh
Share in consumption: 2%



Day-Ahead markets: more than 480 TWh traded in YTD 2024



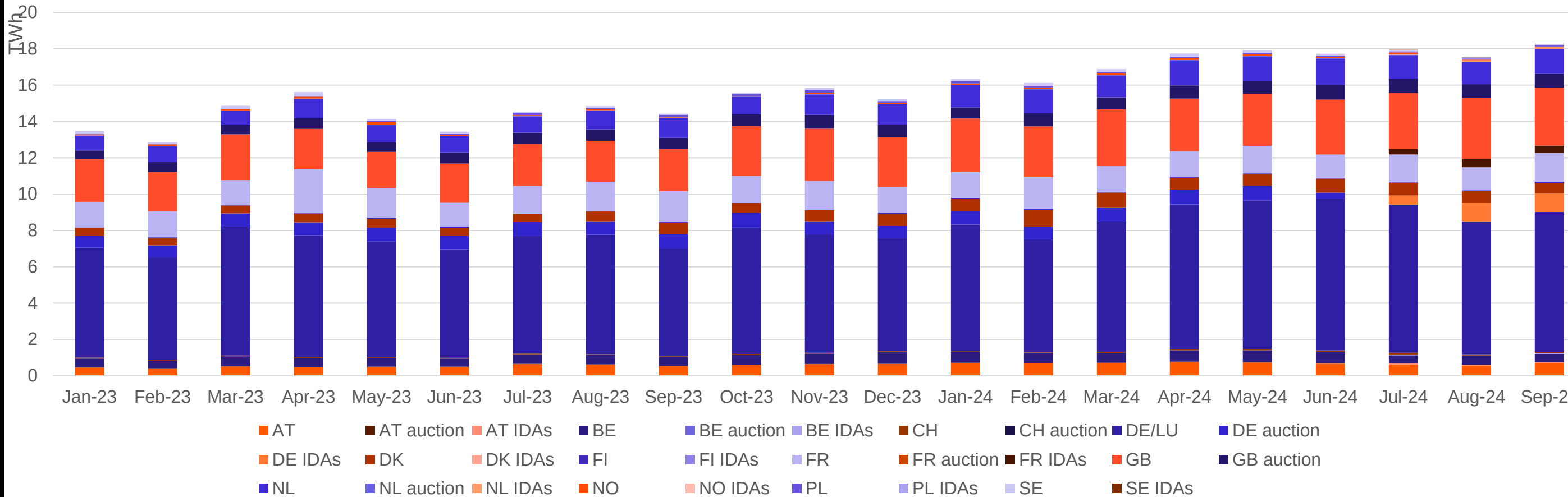
Day-Ahead markets are interconnected via Single Day-Ahead Coupling (except for CH and GB)

A rapid growth for several markets in 2024 vs 2023

- + 166% for Finland
- + 37% for Poland
- **+ 34%** for Germany

YTD: **+23%**
vs
YoY 2023

Intraday liquidity: more than 120 TWh traded in YTD 2024



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

- **AT Continuous volumes increased by 43% vs YoY 2023**
- DK Continuous volumes increased by 59% vs YoY 2023
- NL Continuous volumes increased by 41% vs YoY 2023

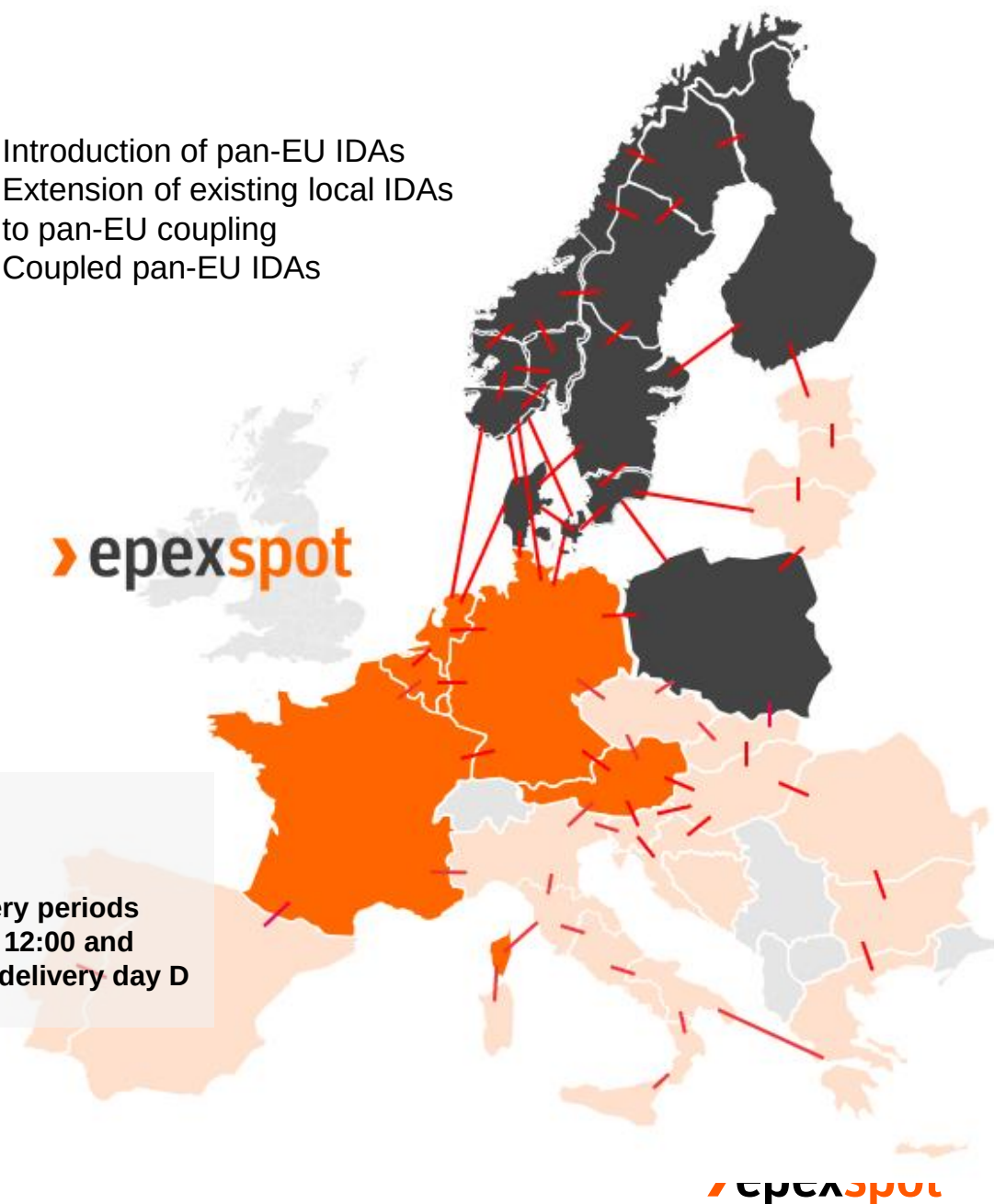
YTD: +23%
vs
YoY 2023

Pan-EU IDAs has extended EPEX SPOT historical IDAs offering

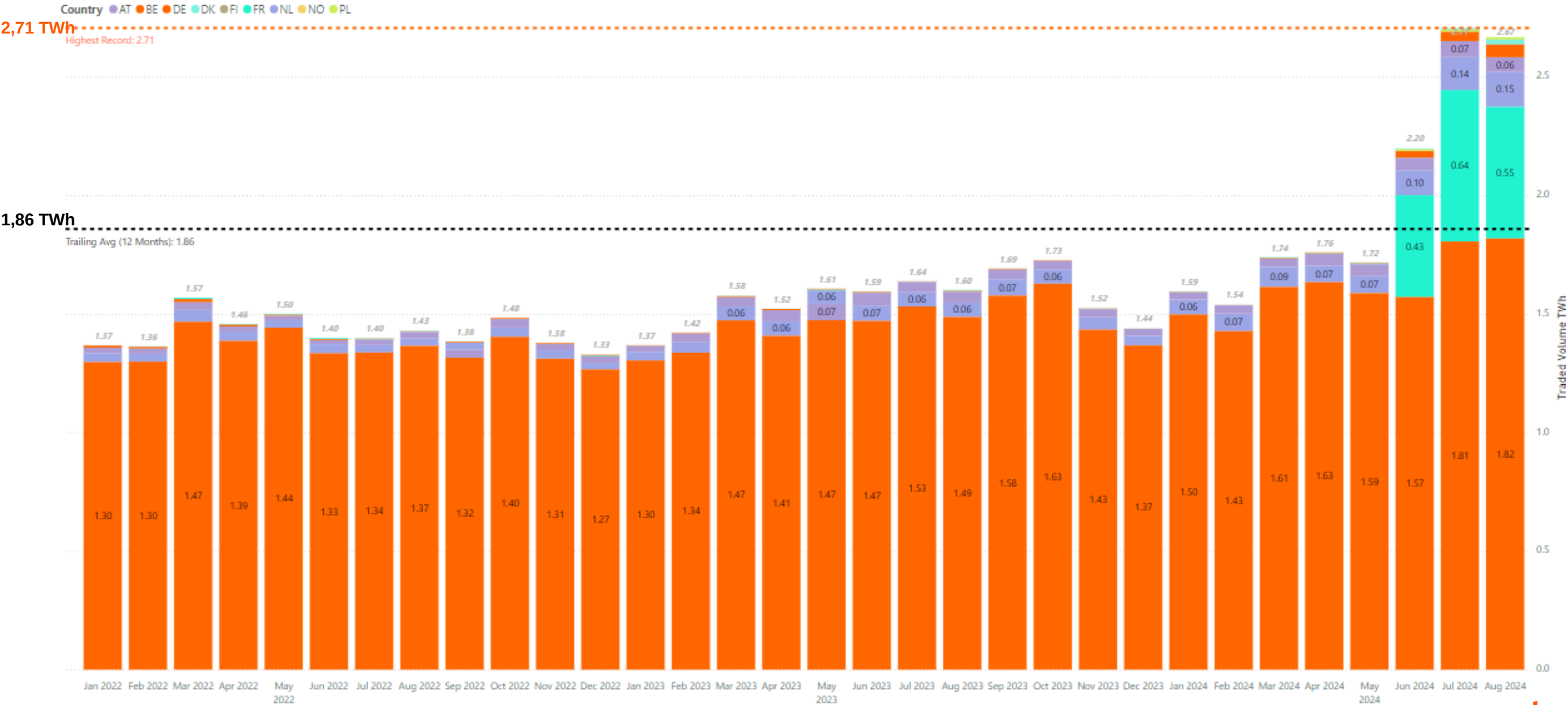
› Since 13 June 2024, the Intraday Auction offering of EPEX SPOT has evolved:

- Former local Intraday Auctions in **AT, BE, DE, FR, NL** have been **converted into 3 coupled Intraday Auctions** in each bidding zone
- **3 coupled Intraday Auctions** have been introduced in all **Nordic (DK, FI, NO, SE)** and **Polish (PL)** bidding zones

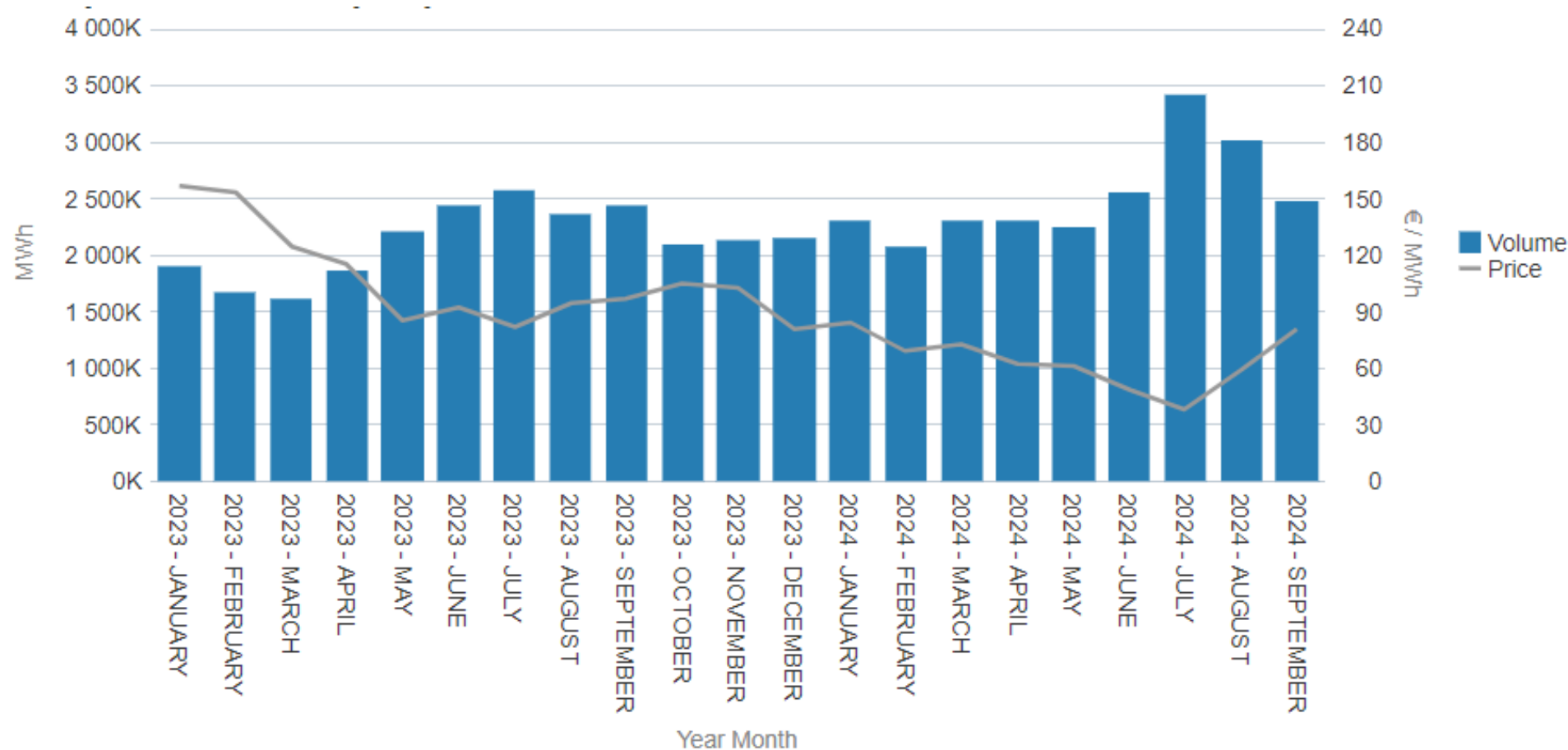
- Introduction of pan-EU IDAs
- Extension of existing local IDAs to pan-EU coupling
- Coupled pan-EU IDAs



Significant increase of IDAs liquidity driven by the CWE markets



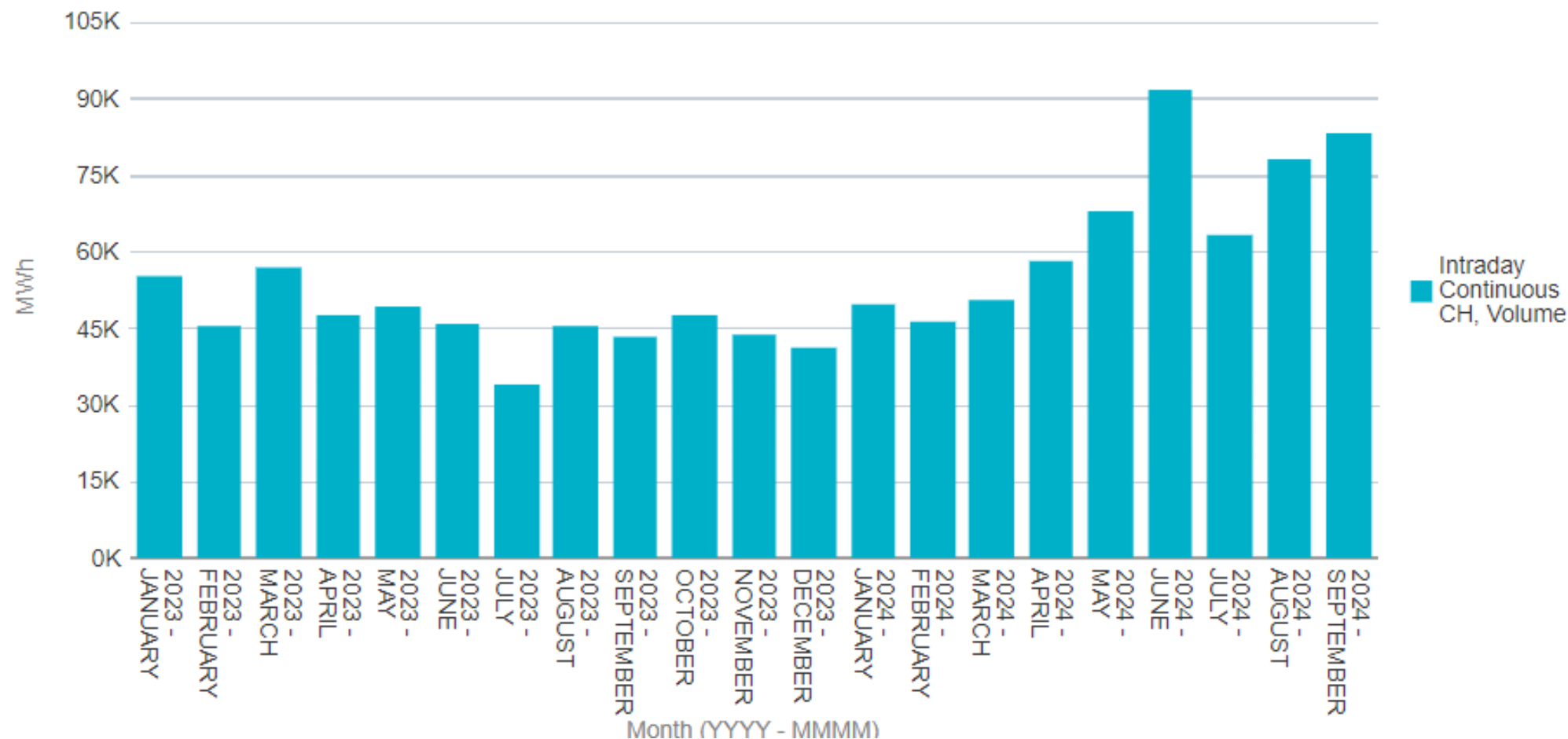
CH Market Volumes – Day-Ahead Auction



Volumes increased on CH Day-Ahead market in 2024

- Over 2,5 TWh traded monthly in June – August 2024
- Swiss Day-Ahead market registered a new monthly record in **July with 3,4 TWh** (vs. 2,6 in 2023)
- Overall **>19,5 TWh** traded on CH Day-Ahead market in 2024 YTD

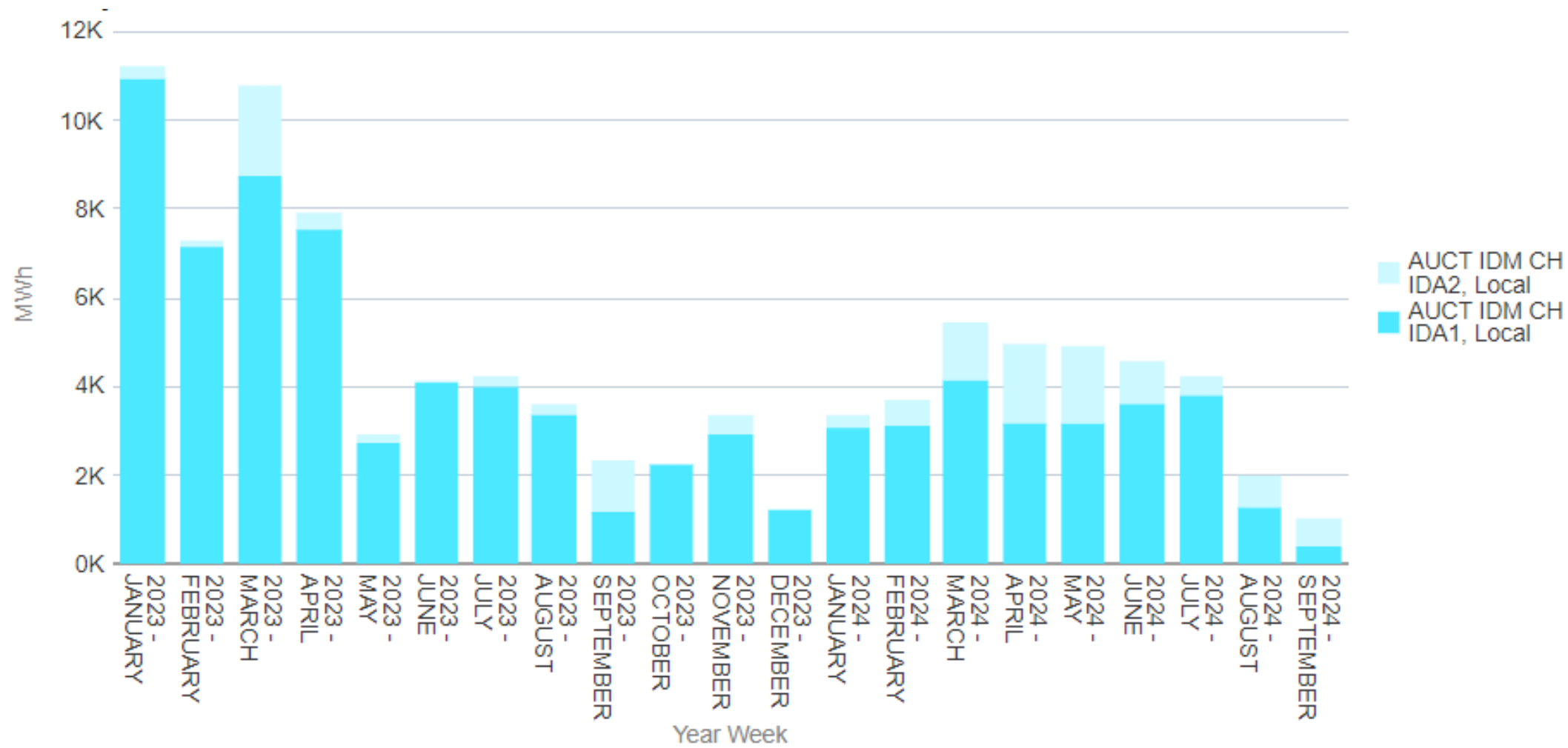
CH Market Volumes – Intraday Continuous



Volumes increased on CH Intraday Continuous Market in 2024

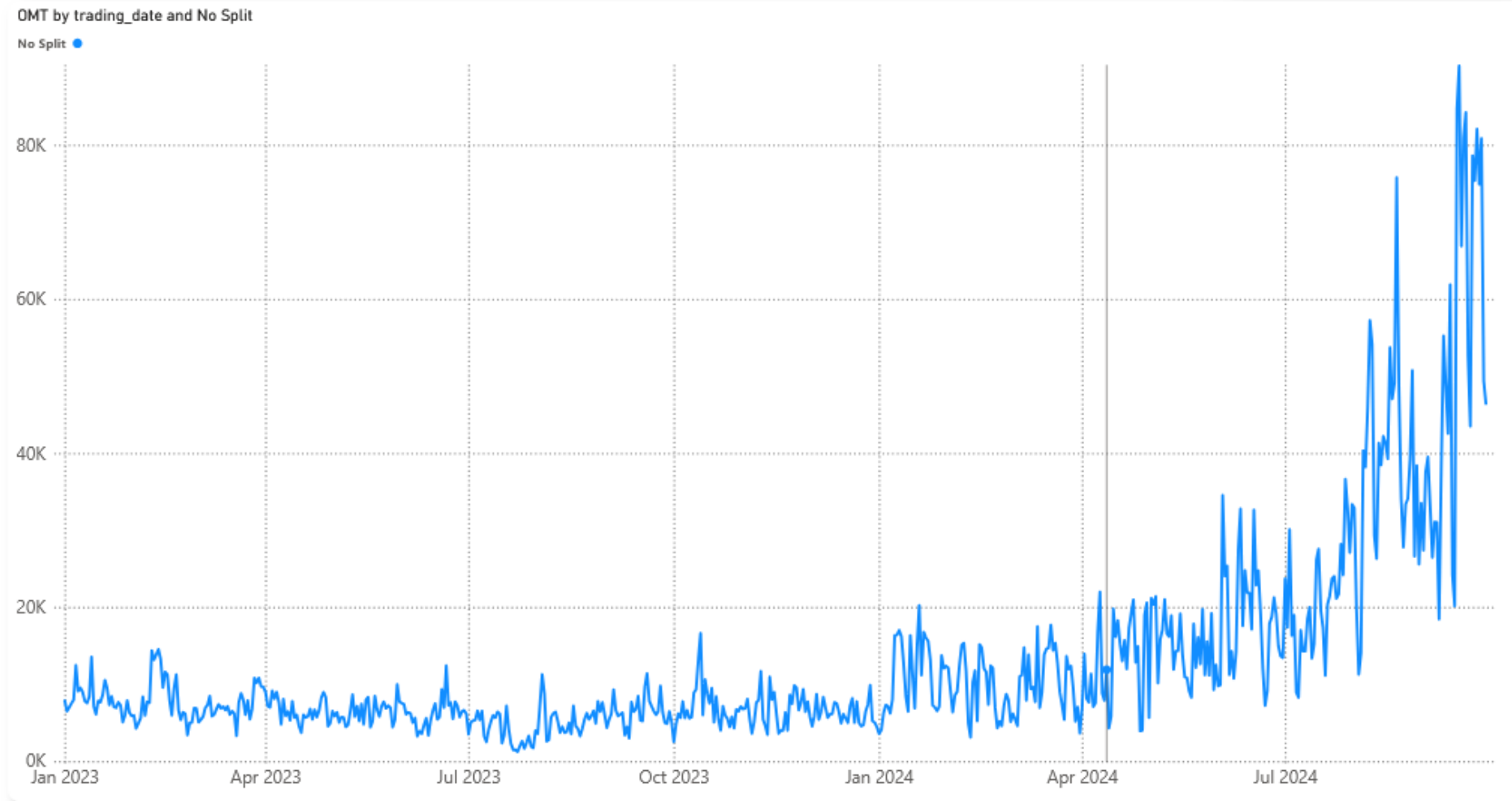
- Highest volumes in June, with 92 GWh traded
- Overall increasing volumes with > 495 GWh traded on CH Intraday Continuous market in 2024 YTD

CH Market Volumes – Intraday Auction



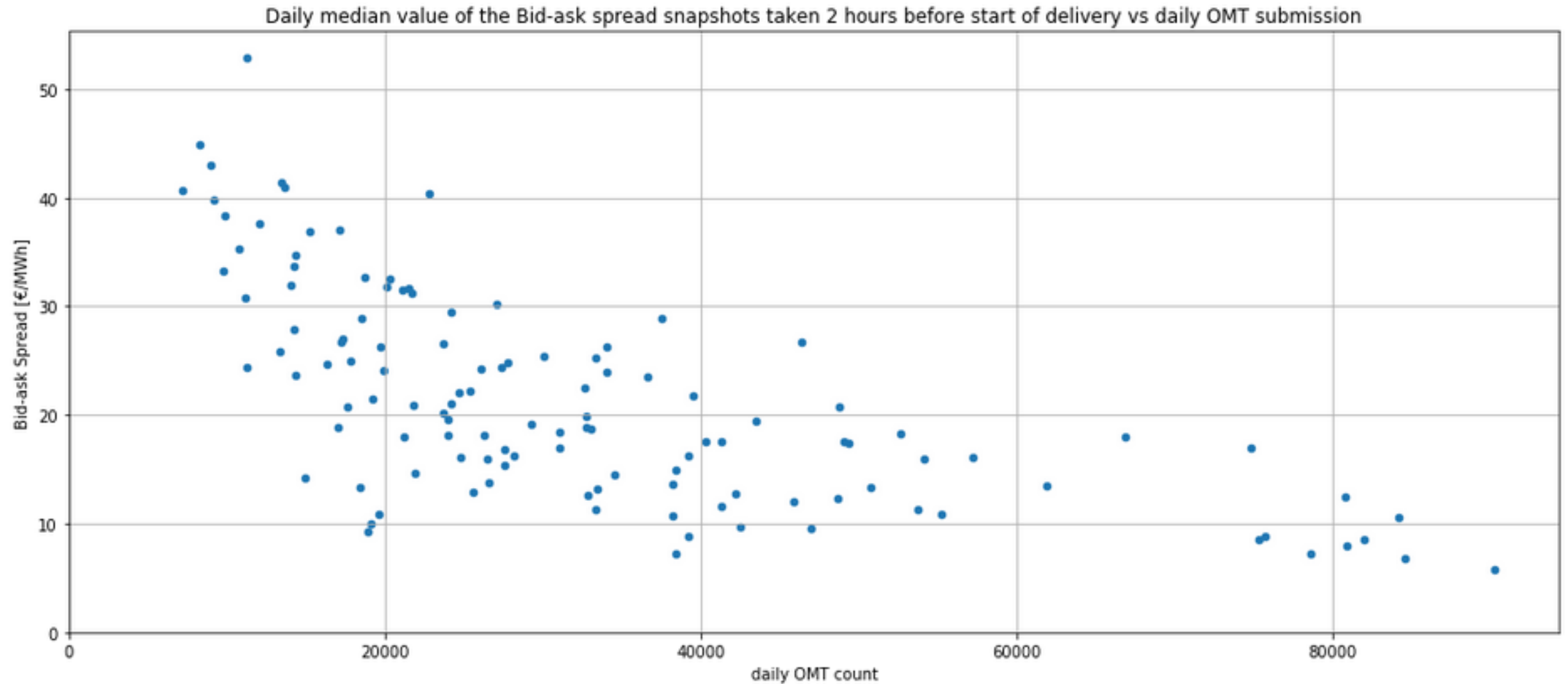
Volumes increased on CH Intraday Continuous Market in 2024

Focus on Swiss Intraday Continuous (IDC) Market: Order Management Transaction (OMT) submitted in IDC

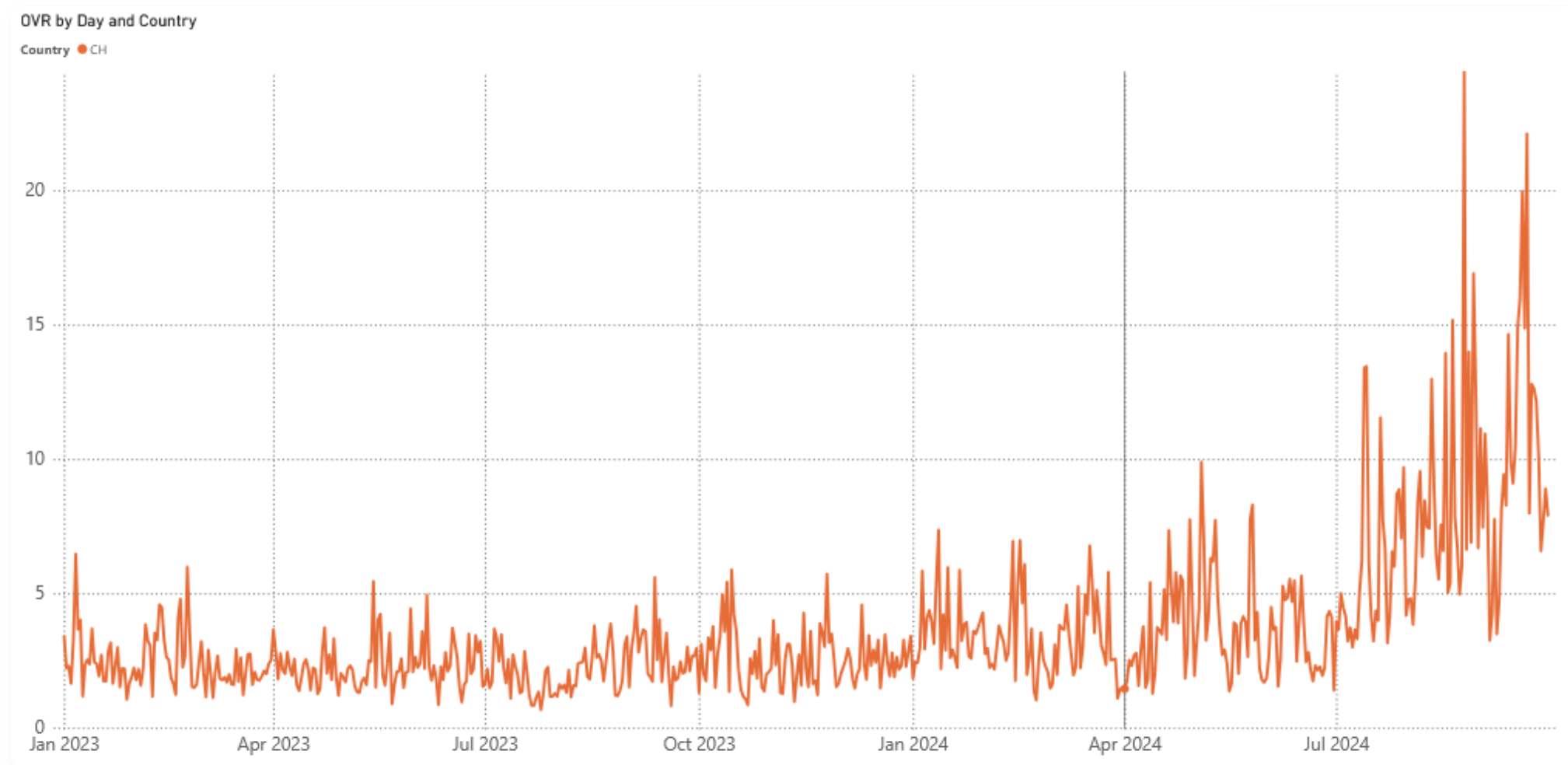


- Increasing activity on IDC in Switzerland during the last months

Focus on Swiss IDC: A surge in activity that translates into lower bid-ask spreads

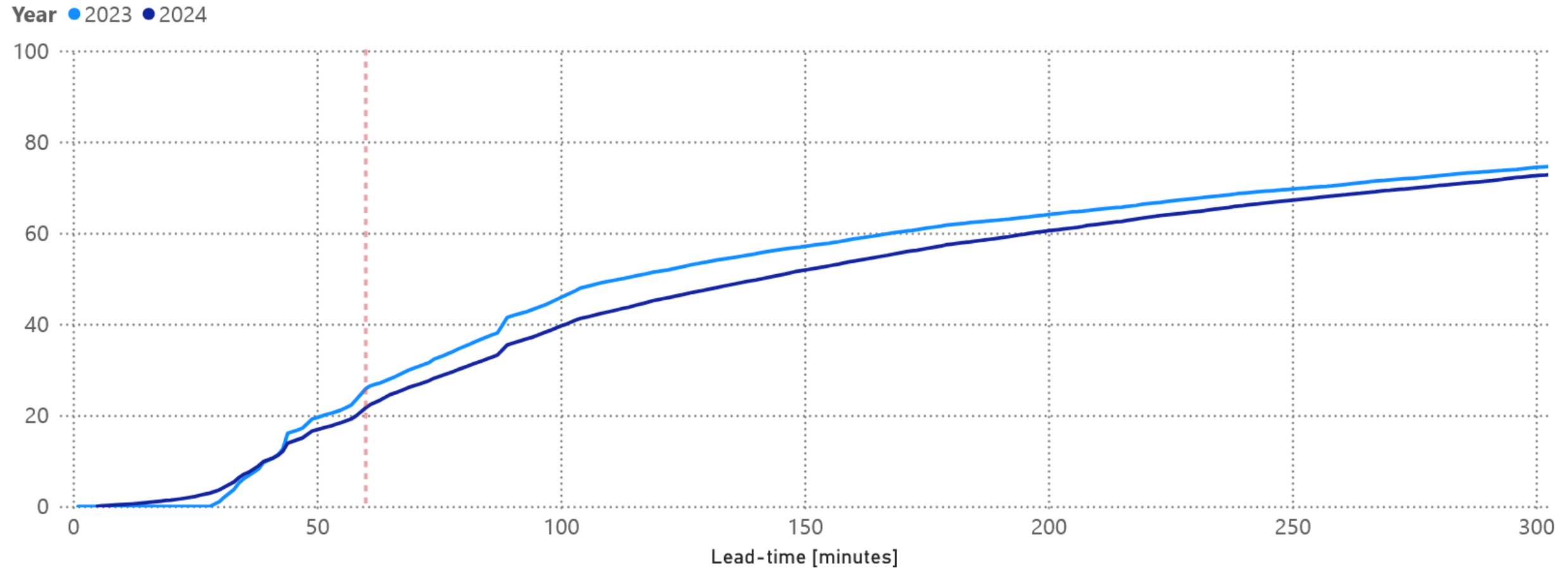


Focus on Swiss IDC: OMT to Volume ratio (OVR) IDC CH



- **Recent Trend in OVR Ratio : increasing number of orders required to reach a trade**
- **Potential opportunities for Market Participants to explore optimization**

Focus on Swiss Intraday Market: Cumulative traded volumes vs lead time to delivery - IDC CH



- The share of the traded volumes in the last 30min has been quite stable since go-live of the lead time reduction in Feb 2024, but can fluctuate between 0 and 10-15 on a daily basis

02

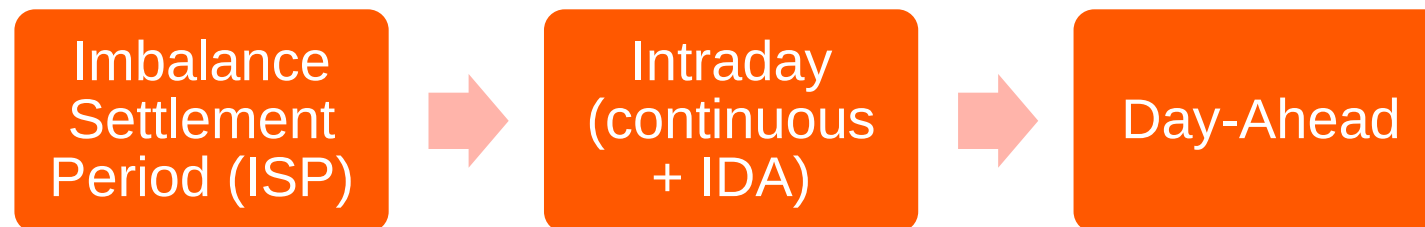
Focus on

15 MTU SIDC & SDAC

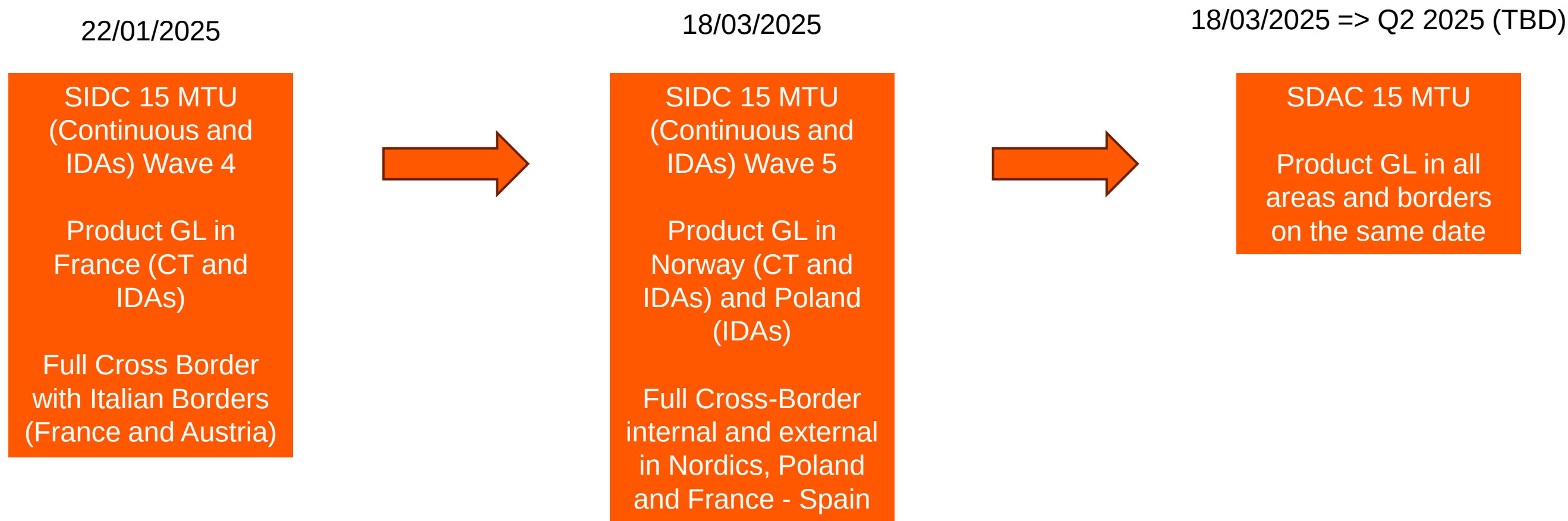
15 MTU Swissix

15' Market Time Unit (MTU) SIDC & SDAC

- The introduction of 15-minute products in SDAC and SIDC is an obligation that stems from the Clean Energy Package.
- **SDAC EPEX SPOT offer** will include:
 - The **simultaneous offering of 15', 30', and 60' orders resolutions**, complemented by a **full Cross-Product-Matching functionality** (cross-border and within Bidding Zones)
 - Publication of **60' prices indexes** on top of 15' clearing prices
 - Publication of **15', 30', 60' aggregated curves and block files**



High Level Go-live Plan 15 MTU SIDC & SDAC: SIDC and SDAC present different timelines



- The current timeline is to be confirmed again for 15-minute products in SDAC by the Market Coupling Steering Committee (MCSC) of November 2024. Go-live is subject to successful testing and member readiness.

15' MTU Swissix

- Most preferable approach of a 15 MTU Day-Ahead introduction in Switzerland would be **sequential**, i.e. after the introduction of 15 MTU introduction in the SDAC region.
- Such sequence would be necessary to ensure best system and market readiness. It would allow a return on experience of the SDAC project and would give additional time to assess in details the potential implementation specificities associated to the 15 MTU implementation in Switzerland and on its interconnections.
- While EPEX SPOT does not have yet a confirmed planning or go-live date, we do not anticipate such a 15 MTU implementation in Switzerland to be effective before end 2025 at the earliest.
- We will further engage with the Swiss market participants to check their needs in terms of market interest, market design and implementation approach.
- We are keeping a close coordination with Swissgrid in that respect, and in particular on the capacity allocation aspects, as we have done so far.

Interplay 15 MTU SDAC – 60 MTU Swissix during interim period

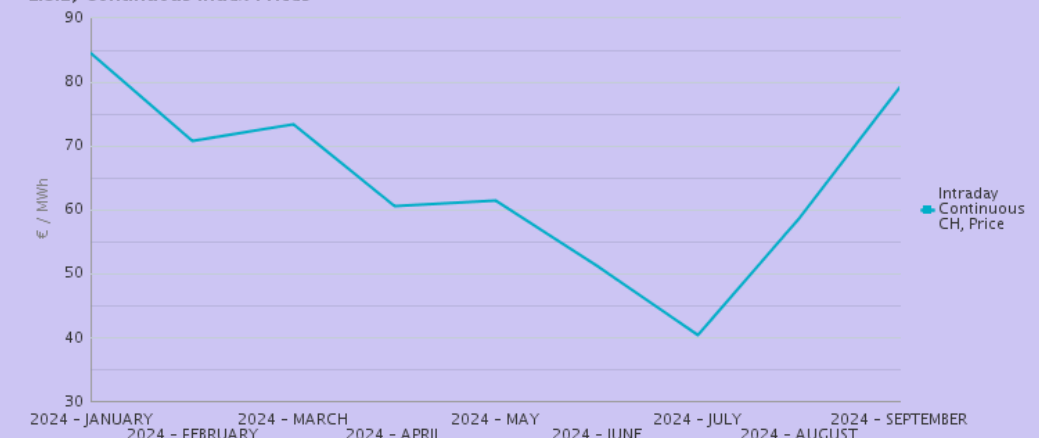
15 min MTU in SDAC

- The market clearing price with 15-minute resolution will be available in the trading system and the market data files with a precision of two decimals.
- This price corresponds to the price used for settlement.
- EPEX SPOT will offer a 60-minute price index to support trading participants' and market data clients' business needs.

60 min MTU SWISSIX

- At SDAC launch, the local CH market area will remain a 60-min delivery zone.
- Consequently, SWISSIX will not be impacted by the launch of 15 Min MTU in SDAC.

1.3.2) Continuous Index Prices



Updates on cross border capacity allocation

Benito Barberio
Senior Spec. Balance Group & Sched. Services

15 minutes market time unit: Status at Swissgrid, JAO and Neighbouring TSOs

- In spring 2024, Swissgrid submitted the specifications and enquiry to JAO regarding the introduction of 15` capacity products at all Swiss borders in explicit Day Ahead auctions
- JAO is currently working on a solution, specifically with its system supplier and Swissgrid expects feedback with the corresponding timeline by the end of November 2024
- Swissgrid has taken up the issue with all neighbouring TSOs and the tenor is that they will all first wait for the introduction of 15-minutes products in SDAC and SIDC before taking the next step with Swissgrid



Status yearly capacity auctions 2025 and 2026 on CH borders

Border FR > CH and CH > FR for 2025

1. Auction: September 2024 > product Y-2025
CH > FR 50 MW
FR > CH 185 MW
2. Auction: December 2024 > product Y-2025
CH > FR 50 MW (expected but not yet definitive)
FR > CH 185 MW (expected but not yet definitive)

Border FR > CH and CH > FR for 2026

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

Nothing will change at all other Swiss borders. This means there will be only an annual auction for the year 2025, which will take place between November and December 2024.



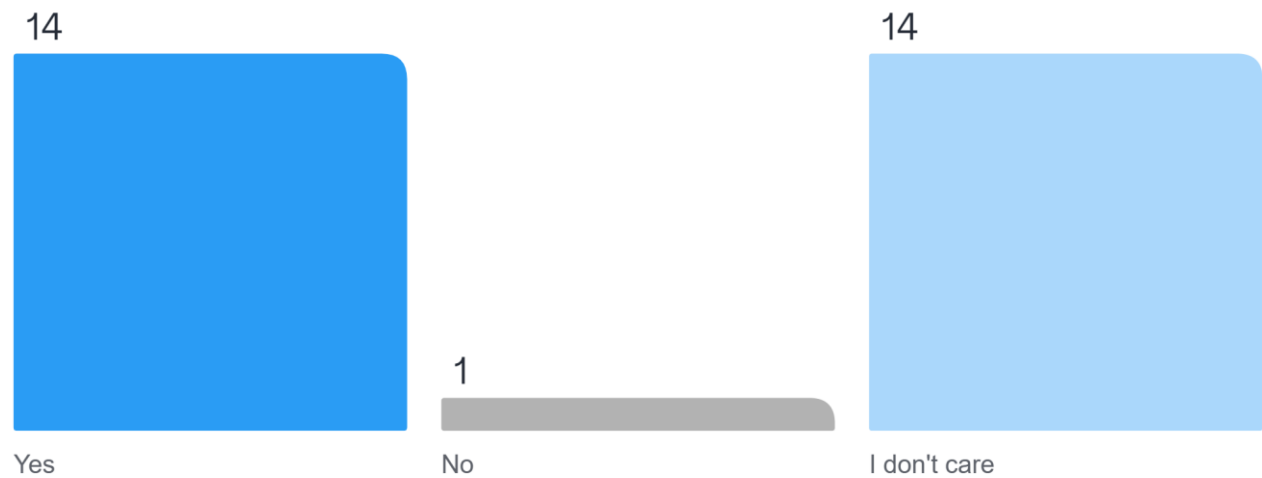
Continuous Intraday allocation on CH-IT border

- Terna must give priority to mandatory Projects still in progress (like 15' MTU, new Italian Dispatching Regulation or new Terna scheduling tool)
- For this reason, work on continuous Intraday allocation project has currently been set on hold
- **An updated schedule of the whole project will be delivered by Swissgrid and Terna in Q2 2025**

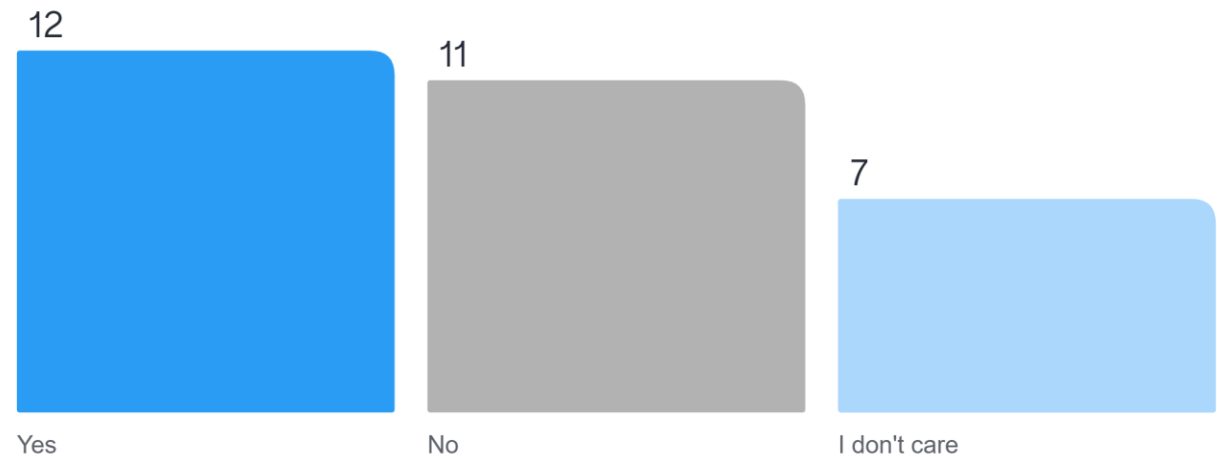


Survey of meeting participants

Do you prefer to introduce yearly auctions two years in advance also on other CH borders?



Do you prefer to introduce 5-minute resolution for CH internal intraday nominations?



Breakout Sessions

New imbalance price mechanism: Opportunity to discuss detailed questions about the envisaged concept

Marc Rüede
Head of Capacity Allocation & Market Systems

Thomas Hauri
Principal Market Operations

Marko Pranjic
Head of Energy Data & Settlement Team

New proposed Imbalance price mechanism in detail

	Balance group short	Balance group long	Price formula
Under-covered control area (short)	Balance group pays: A	Balance group receives: A	$A = \max (P_{\text{sec}+}; P_{\text{ter}+})$
Over-covered control area (long)	Balance group pays: B	Balance group receives: B	$B = \min (P_{\text{sec-}}; P_{\text{ter-}})$
P_{sec} = defined as the weighted average price of the secondary control energy (aFRR), only be used if activated in the relevant direction P_{ter} = defined as the weighted average price of the tertiary control energy (mFRR), only be used if activated in the relevant direction <i>Note: If A or B results in a negative price, the direction of the payment type also changes from pays to receives, consequentially there is only an added value if there is a major imbalance</i>			

Wording taken from updated Appendix 1 General BG Regulations Chapter 7.1

Examples of the new proposed imbalance price

	Energy (MWh)	Imbalanced	Price (EURO/MWh)	Amount (Euro)	Payment
Control Area	-100	Long			
SRE+	-10		50	-500	SG2SDV
SRE-	30		10	300	SDV2SG
TRE-	80		20	1600	SDV2SG
BG1	-150	Long	10	-1500	SG2BGV
BG2	50	Short	10	500	BGV2SG

	Energy (MWh)	Imbalanced	Price (EURO/MWh)	Amount (Euro)	Payment
Control Area	-100	Long			
SRE+	-10		50	-500	SG2SDV
SRE-	30		-10	-300	SG2SDV
TRE-	80		-20	-1600	SG2SDV
BG1	-150	Long	-20	3000	BGV2SG
BG2	50	Short	-20	-1000	SG2BGV

	Energy (MWh)	Imbalanced	Price (EURO/MWh)	Amount (Euro)	Payment
Control Area	100	Short			
SRE-	10		-50	-500	SG2SDV
SRE+	-30		10	-300	SG2SDV
TRE+	-80		20	-1600	SG2SDV
BG1	-50	Long	20	-1000	SG2BGV
BG2	150	Short	20	3000	BGV2SG

	Energy (MWh)	Imbalanced	Price (EURO/MWh)	Amount (Euro)	Payment
Control Area	100	Short			
SRE-	10		-50	-500	SG2SDV
SRE+	-30		-10	300	SDV2SG
TRE+	-80		-20	1600	SDV2SG
BG1	-50	Long	-10	500	BGV2SG
BG2	150	Short	-10	-1500	SG2BGV

	Energy (MWh)	Imbalanced	Price (EURO/MWh)	Amount (Euro)	Payment
Control Area	100	Short			
SRE-	10		-50	-500	SG2SDV
SRE+	-30		-10	300	SDV2SG
TRE+	-80		20	-1600	SG2SDV
BG1	-50	Long	20	-1000	SG2BGV
BG2	150	Short	20	3000	BGV2SG

	Energy (MWh)	Imbalanced	Price (EURO/MWh)	Amount (Euro)	Payment
Control Area	-100	Long			
SRE+	-110		50	-5500	SG2SDV
SRE-	30		10	300	SDV2SG
TRE-	180		-20	-3600	SG2SDV
BG1	-150	Long	-20	3000	BGV2SG
BG2	50	Short	-20	-1000	SG2BGV

Quantitative assessment of the new proposed imbalance price mechanism

The graphic tries to visualize average values of new resulting imbalance prices

Example 1: Control area with 100 MW slightly short

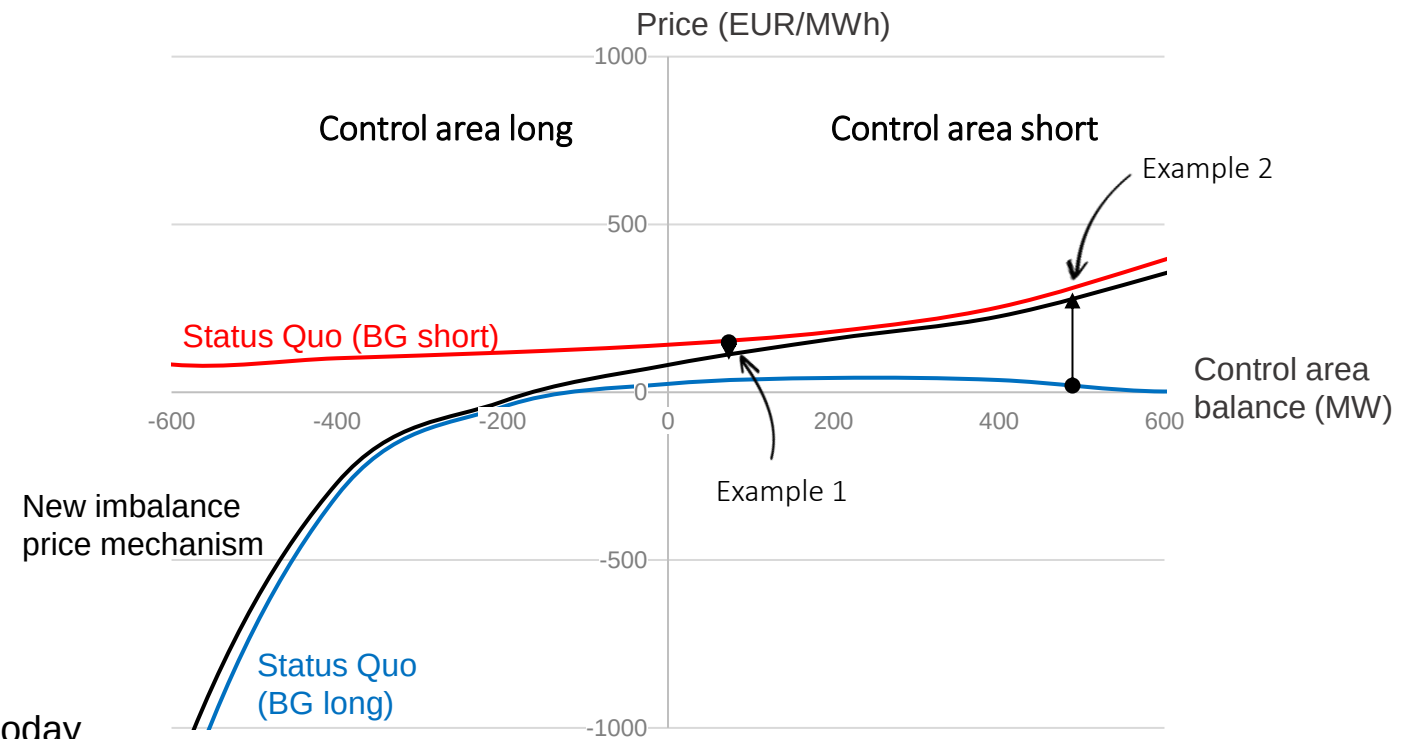
- BG short pays in status quo 170 €, with new mechanism only 140 €
- BG long receives in status quo 60 €, with new mechanism 140 €

Example 2: Control area with 500 MW heavily short

- BG long receives in status quo 40 €, with new mechanism 270 €
- BG short pays in status quo 300 €, with new mechanism 270 €

Strong imbalance price with high imbalances

- Control area-supporting behavior much more financially rewarded than today
- Control area-harmful behavior penalized less than today (due to elimination of α -factor and base price), but still sufficient incentives to reduce this



Period June 2023 to June 2024
Extreme price peaks not visible, smoothed out by average values

Time series with resulting imbalance prices from June 2023 to June 2024

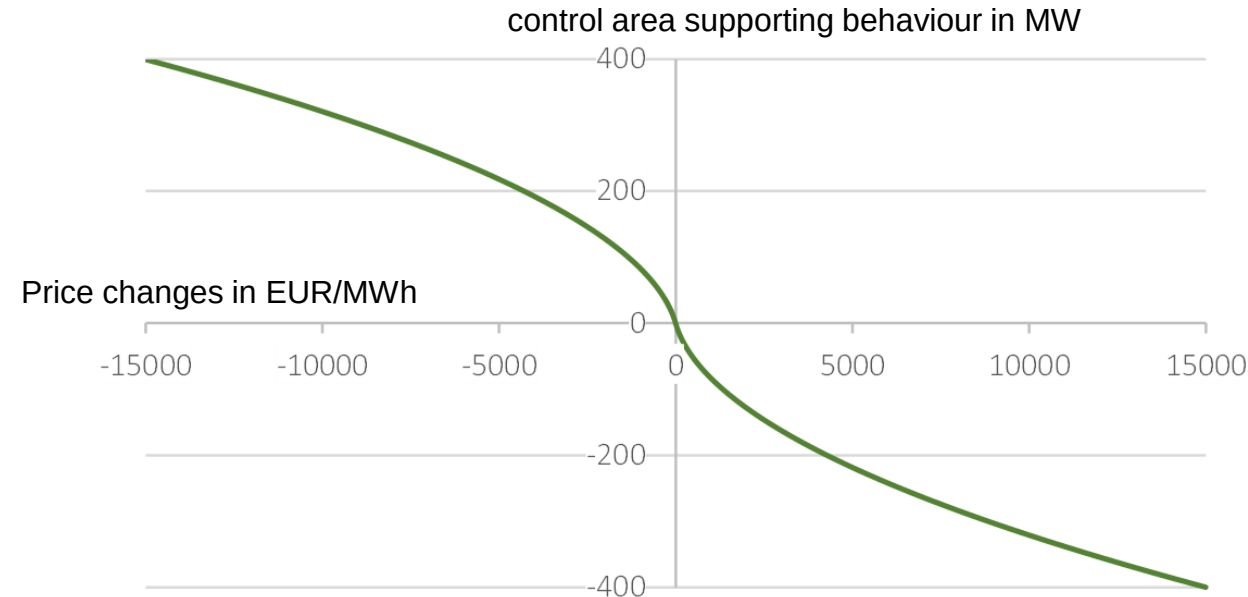
- Csv file with time series of the resulting imbalance prices of the proposed new mechanism were made available to all balance groups by e-mail
- In this time series an estimated control area supporting behavior of the balance groups has been considered, details can be found on the next slide
- New price mechanism for simultaneous balancing and redispatch activations in Integrated Market already considered for all hours in this time series, details will be explained later during the day

Are these time series helpful for you?

Timestamp	new imbalance price with expected contribution of the balance groups (EUR/MWh)
01.06.2023 00:00	125.66
01.06.2023 00:15	132.18
01.06.2023 00:30	127.49
01.06.2023 00:45	32.73
01.06.2023 01:00	169.11
01.06.2023 01:15	131.85
01.06.2023 01:30	111.2

Details on the expected control area supporting behavior

- external service provider estimates the change in the control area balance as a function of the price change in the form of a root function, which they have calibrated using plausible reference points
- if the balancing energy price increases by 5`000 EUR/MWh, the control area balance is expected to decrease by around 200 MW
- as a result, the calls in the secondary and tertiary control energy merit order list change accordingly



Publication of imbalance price and total system imbalance

- Control area-supporting behavior is more effective the more and the earlier data is published
- Swissgrid publishes today on its website an indicative imbalance price and the total system imbalance with a delay of approx. 30 minutes and on Entso-E Transparency Platform the following data:
 - Accepted Offers and Activated Balancing Reserves
 - Anonymised Balancing energy bids
 - Prices of Activated Balancing Energy
- Swissgrid aims to shorten this 30 minutes
- Swissgrid is analyzing how data can be published more user-friendly
- Swissgrid analyses websites of other TSOs for this purpose

Imbalance of the control area and activated balancing energy

The following values serve only as an indication of the position of the Swiss control area or the current balancing energy prices and are not legally binding. The data originates from real-time systems and is published in CSV and/or Excel format. The subsequently determined and verified billing data and balancing energy prices may deviate from the figures provided. Any liability of Swissgrid for actions based on the data published here is excluded.

Content

18 October 2024 Control Area Balance (daily) 10:21	CSV
18 October 2024 Control Area Balance (daily) 10:16	XLSX
18 October 2024 Control Area Balance 2024 (yearly) 06:48	XLSX

OpenDataElia

Search for a dataset

22 datasets

Sort datasets Most popular first

Modified Popular A-Z

Active filters Clear all

Theme Balancing

Publisher Customers, Market and System

Keyword Imbalance prices

Keyword Near real-time

Filters

Find a dataset...

Themes

Balancing 22

Power generation 2

Granularity

1 minute 12

15 minutes 9

1 month 1

Imbalance prices per minute (Near real-time)

The 1 min imbalance prices are published as fast as possible and give an indication for the final imbalance price of the ISP (imbalance settlement period which is 15min). This report contains data for the current hour and is refreshed every minute. Notice that in this report we only provide non-validated data. This dataset contains data from 22/05/2024 (MARI local go-live) on.

Publisher Customers, Market and System

License Elia Open Data Licence

Theme Balancing

Market Imbalance prices Near real-time EU Reg. No 534/2013

Table Analyze Export API

System imbalance forecast next quarter hour (near real-time)

The report contains a forecast of the average quarter-hourly system imbalance in the next quarter hour as well as an estimated probability distribution of the average quarter-hourly system imbalance in the next quarter hour. The data reflects Elia's own forecasts of the system imbalance. It must be noted that these forecasts can have a significant error margin, are not binding for Elia and are ...

Publisher Customers, Market and System

License Elia Open Data Licence

Theme Balancing

Market Imbalance prices Near real-time

Table Analyze Export API Forecasted SI vs current SI

Current system imbalance (Historical data - up to 22/05/2024)

Instantaneous system imbalance and net regulation volume (and its components) in Elia's control area. All published values are non-validated values and can only be used for information purposes. This dataset contains data until 21/05/2024 (before

Publisher Customers, Market and System

License Elia Open Data Licence

Theme Balancing

Market Imbalance prices Near real-time

Table Analyze Export API

Rte

View data published by RTE

All categories

Generation

Consumption

Market

Exchanges

Network

Home View data published by RTE

FRANCE SPOT ELECTRICITY EXCHANGE

3 september 2024

BALANCE RESPONSIBLE PARTY SYSTEM

Access data related to the BRP system:

- Reconstitution of PDS flows
- List of BRPs
- Imbalance settlement prices
- Balancing-imbalances account monthly balance

TREND

IMBALANCE FRANCE

353.2 MWh

ISP

-5.21 €/MWh

ISP

-4.33 €/MWh

BEMP

-6.66 €/MWh

Proposed adjustment of the current limit concept

- Control area-supporting behavior of all balance groups is favored
- Balance groups with metering data may take open positions in real time in the amount of their maximum production
- Trading balance groups may take open positions in real time until end of post scheduling depending on the deposited collateral (20 MW - 30 MW)
- Deviations will still be penalized in any case
- Control area-supporting is permitted for the first four limit sets due to the low level of deposited collateral and the high risk for Swissgrid
- According to the existing BG contract Swissgrid is authorized to carry out an interim settlement in the event of a significant imbalance, that will possibly happen in contrast to today

Does this make sense for you, or would you have liked to have more flexibility?

Limit 1: DA until D-2h [MW] (long/short)	Limit 2: D-2h until COT ID [MW] (long/short)	Limite : COT ID and PS [MW] (long/short)	Collateral [EUR]
10	10	10 *	100 000
25	10	10 *	200 000
50	25	10 *	400 000
100	25	10 *	550 000
200	50	20	850 000
300	75	25	1 100 000
400	100	30	1 400 000

* This limit set may not be used to contribute to actively balance the Swiss control area; there is an obligation to ensure a zero power balance. The reason for this is the insufficient collateral deposited for these limit sets, which represents too high a risk for Swissgrid.

Details regarding the consultation of the balance group contract

- Swissgrid informed you in October 2024 via e-mail about the consultation on the amendments to the Balance Group Contract and the Appendix 1 «General Balance Group Regulations» of the Balance Group Contract.
- Since Tuesday 5 November until Thursday 21 November 2024 17:00, you can view, edit and comment on the documents via the Swissgrid consultation portal
- First Inputs received until yesterday are the following:
 - Minimum collateral of 850,000 EUR required to participate in active balancing is too high, it would be great to be able to participate already from EUR 400 000, with the Limit 3 of around 15 MW
 - We are a BG with metering points and have limit set with a collateral of EUR 400,000. Can we still actively balance depending on our maximal production?
 - are there any further inputs / questions right now?



Details on the effects determining the Export NTC on the border Switzerland- Germany

Julius Schwachheim
Head of Capacity & Congestion Management

Domenic Senn
Senior Specialist Operational Planning

Overview about the NTC processes on the CH borders

NTC CH→DE

Evolution NTC CH-DE-value

Core points of the NTC CH-DE methodology

NTC situation in May/June 2024

France exchange & load flow situation

Next steps & outlook

Overview about the NTC processes on the CH borders

NTC CH→DE

Evolution NTC CH-DE-value

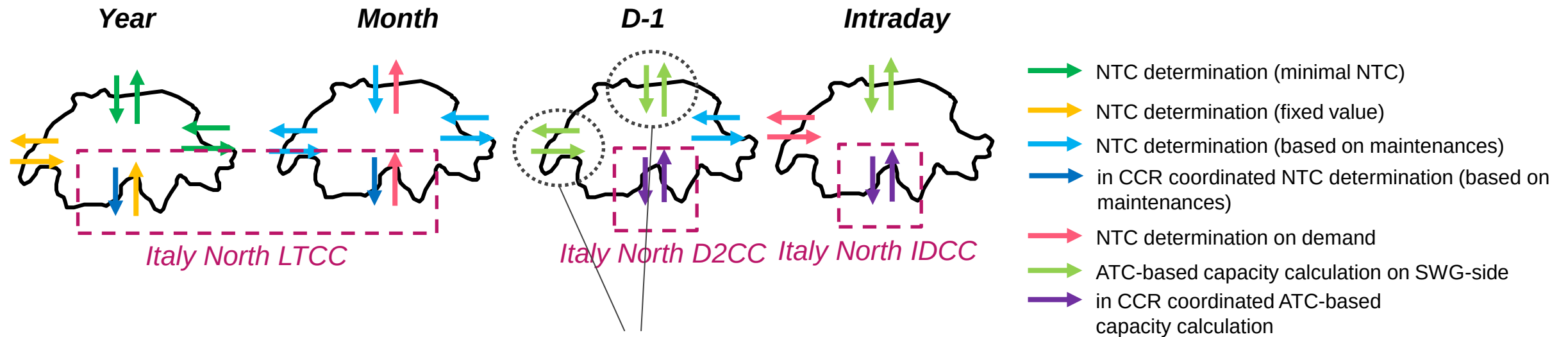
Core points of the NTC CH-DE methodology

NTC situation in May/June 2024

France exchange & load flow situation

Next steps & outlook

The NTC values on the CH-borders are determined based on different methodologies in the different timeframes



Calculation of the Swissgrid-proposal is done internally with a tool developed to serve particularly the methodology defined for export towards Germany.

- **NTC CH→DE** (in summer, based on **methodology defined with EICom**)
- NTC FR→CH
- NTC CH→FR
- NTC ADF→CH (only in Winter)

Overview about the NTC processes on the CH borders

NTC CH→DE

Evolution NTC CH-DE-value

Core points of the NTC CH-DE methodology

NTC situation in May/June 2024

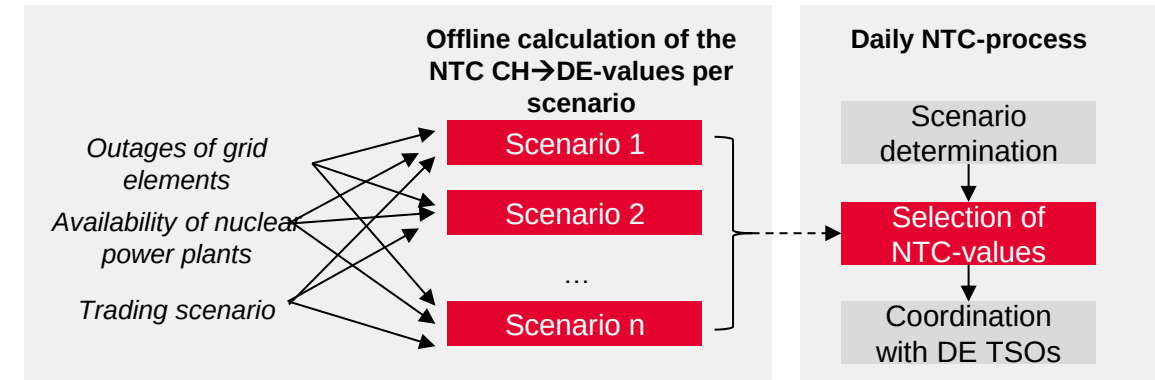
France exchange & load flow situation

Next steps & outlook

The Swissgrid-proposal of the Day-Ahead NTC CH-DE during the summer period is based on a methodology commonly designed with ElCom and consulted with the branche

- **Key points:**

- Based on a **loadflow-based calculation** of different scenarios (see picture on the right)
- Only considering **elements sensitive to an exchange CH→DE** (elements overloaded by local powerplants are discarded)
- A **seasonal european grid model, that is representative* for the summer period** is used.
(*Usually it is selected based on the median net positions of the same previous period (e.g. summer 2024 model was selected based on summer 2023))
- **Two trading scenarios** per scenario are calculated: «Full CH Export» and «Transit» (FR→CH→DE) → Final scenario is selected in D-2 **based on a price forecast**

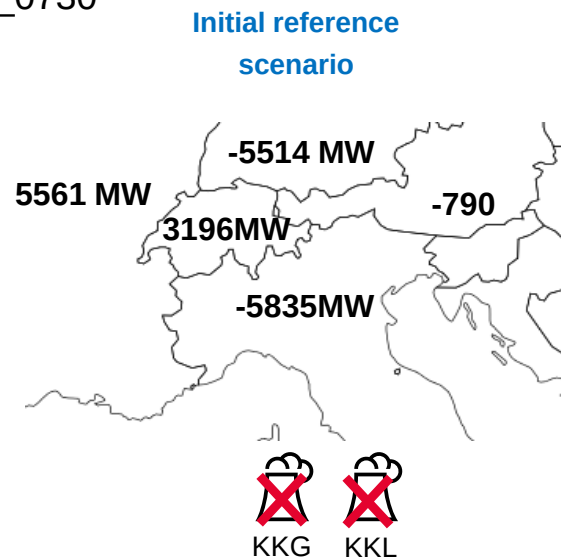


In May and June, the huge french net position caused an overestimation of the NTC CH-DE, leading to a stressed grid situation

- In general, any differences between realtime and the NTC scenario have an impact on the final NTC-value (over- or underestimation)
- The very low NTC-values in May and June were especially caused by
 - **Big deviation of the french net position compared to the scenario considered during the NTC calculation** ← Not covered by the Methodology
 - **Maintenances of KKG and/or KKL** ← Covered by the Methodology
 - **Maintenances of 220kV south-north-transit-elements**

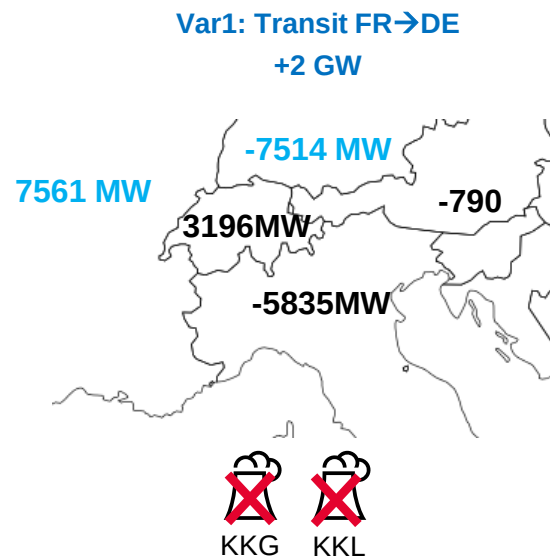
The higher the transit FR→DE, the lower the NTC CH→DE

TS 20240527_0730



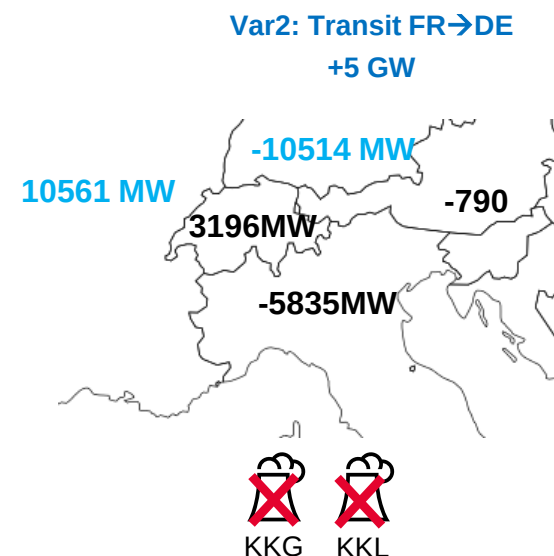
4150 MW

380/220kV Transformation



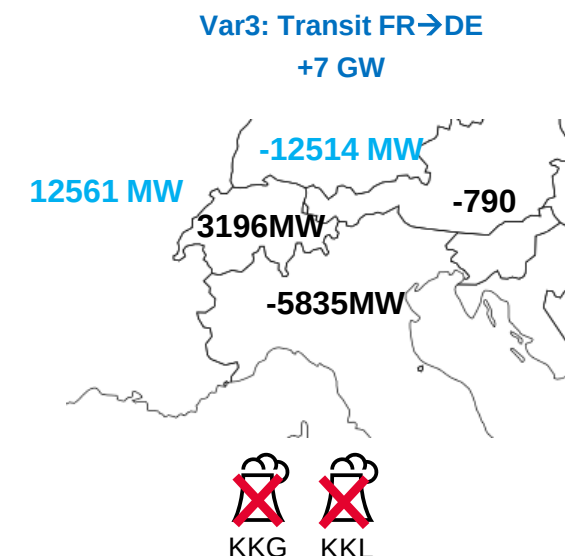
3650 MW

380/220kV Transformation



2600 MW

380/220kV Transformation
Axis between Romandie & «Rest of Switzerland»



1000 MW

Axis between Romandie & «Rest of Switzerland»

NTC CH→DE

Limiting elements

Swissgrid currently has no accurate forecast of the Net Positions of France and Germany in the NTC determination process.

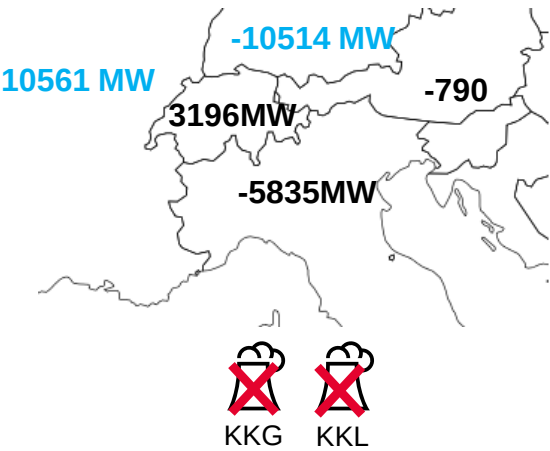
State-of-the-Art forecasts are only available at a too late time of the process



As a short term solution, the **reference scenario has been changed** from the initial to a one located between Var1 and Var2 (75th percentile of FR net positions 2023)

More Swiss nuclear power plant production results in higher NTC CH-DE

TS 20240527_0730



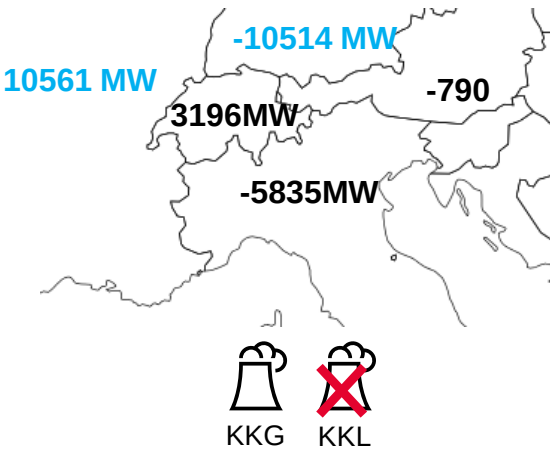
NTC CH→DE

2600 MW

Limiting elements

380/220kV Transformation

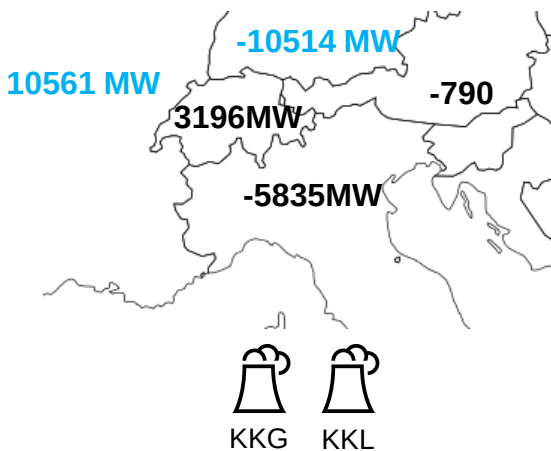
Axis between Romandie & «Rest of Switzerland»



3800 MW

380/220kV Transformation

Axis between Romandie & «Rest of Switzerland»



4700 MW

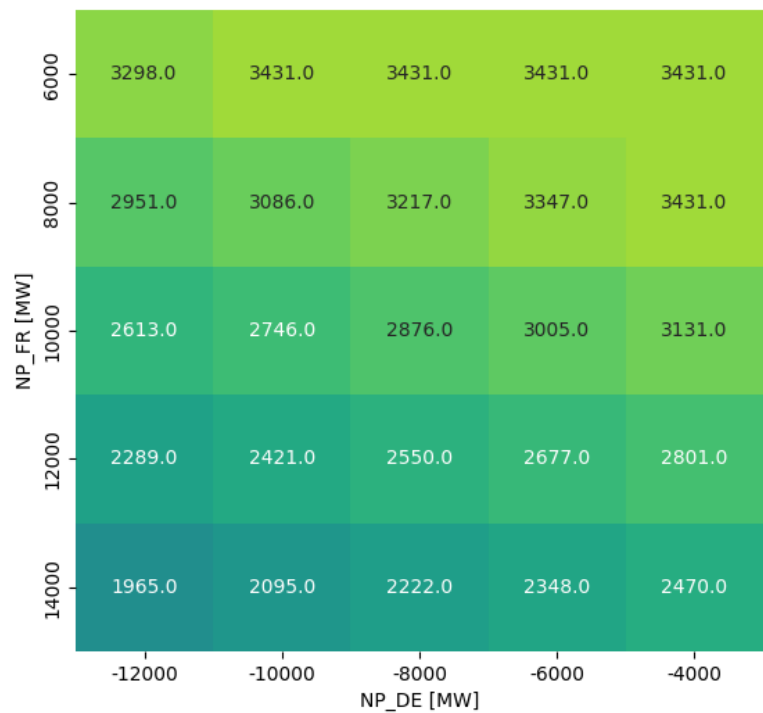
380/220kV Transformation

Axis between Romandie & «Rest of Switzerland»

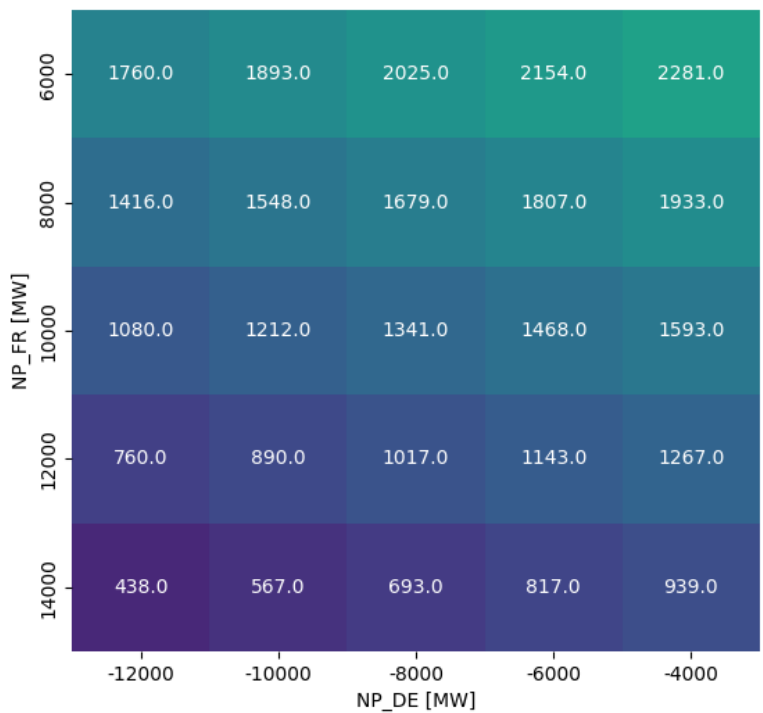
NTC reductions because of maintenances of nuclear power plants are considered by the Methodology

Indicative study 2025

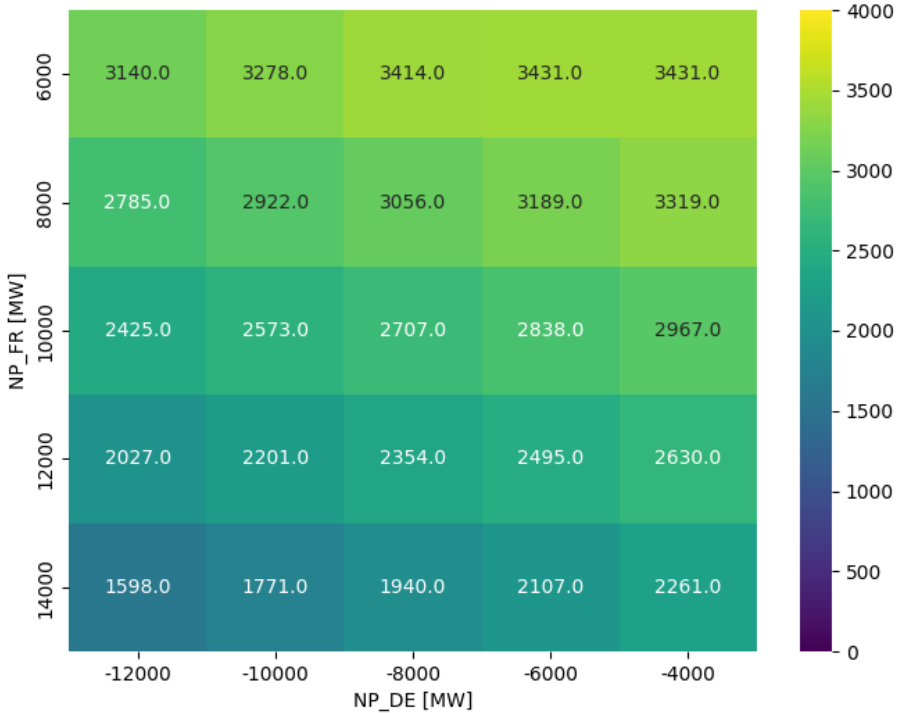
Scenario 1: Full grid and full nuclear power plant availability



Scenario 3: Full grid with one nuclear power plant (KKL) not available



Scenario 13: Outage of 220 kV Chamoson-Mühleberg and 220 kV Chamoson-Gstaad, full nuclear power plant availability



Important: the above studies are only indicative. Due to the automated processing of many timestamps, the optimisation of the grid is limited (e.g. remedial actions). In addition, the reference model and other international exchanges differ. The results are therefore not comparable with the specific timestamps from the previous slides.

Overview about the NTC processes on the CH borders

NTC CH→DE

Evolution NTC CH-DE-value

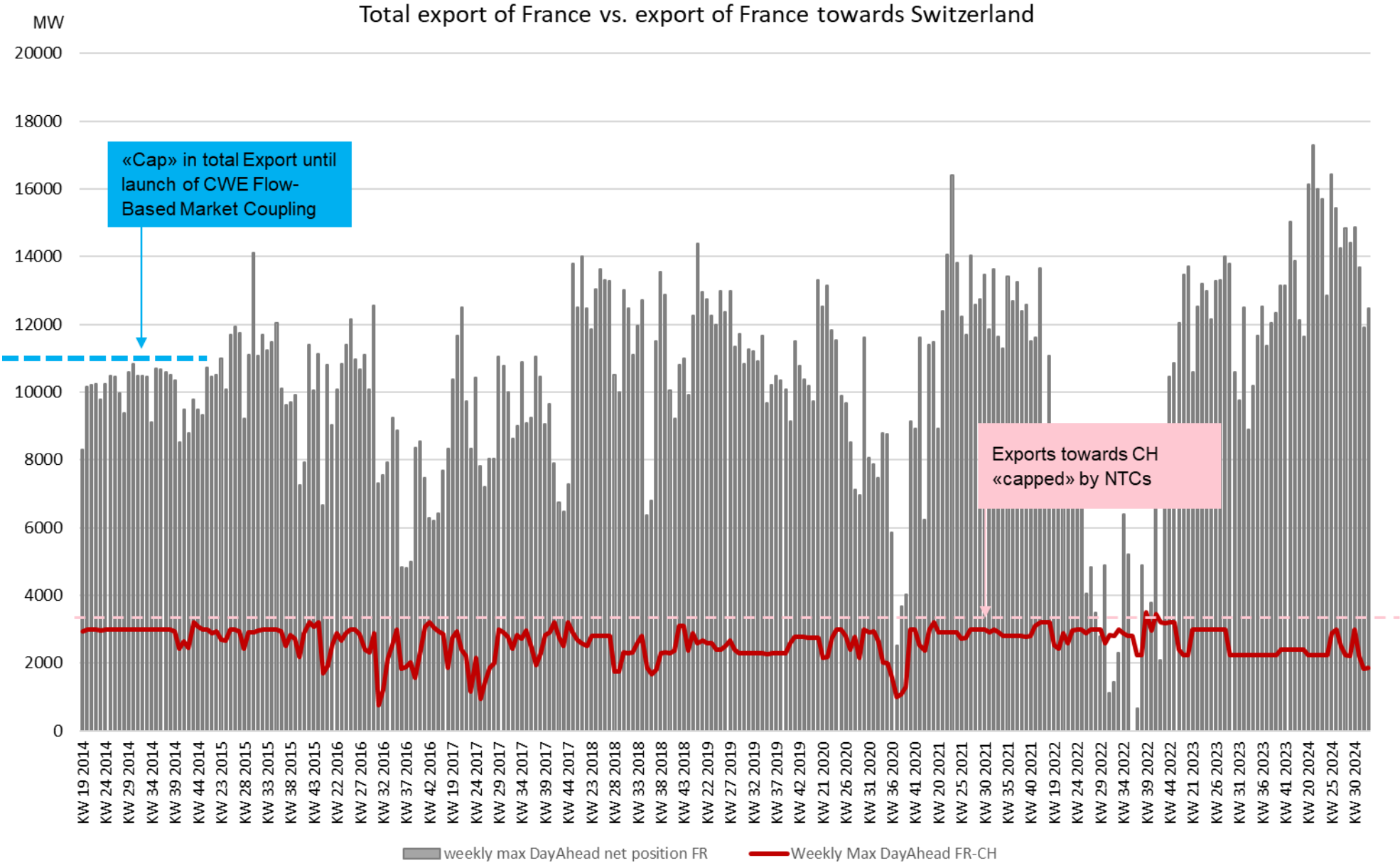
Core points of the NTC CH-DE Methodology

NTC situation in May/ June 2024

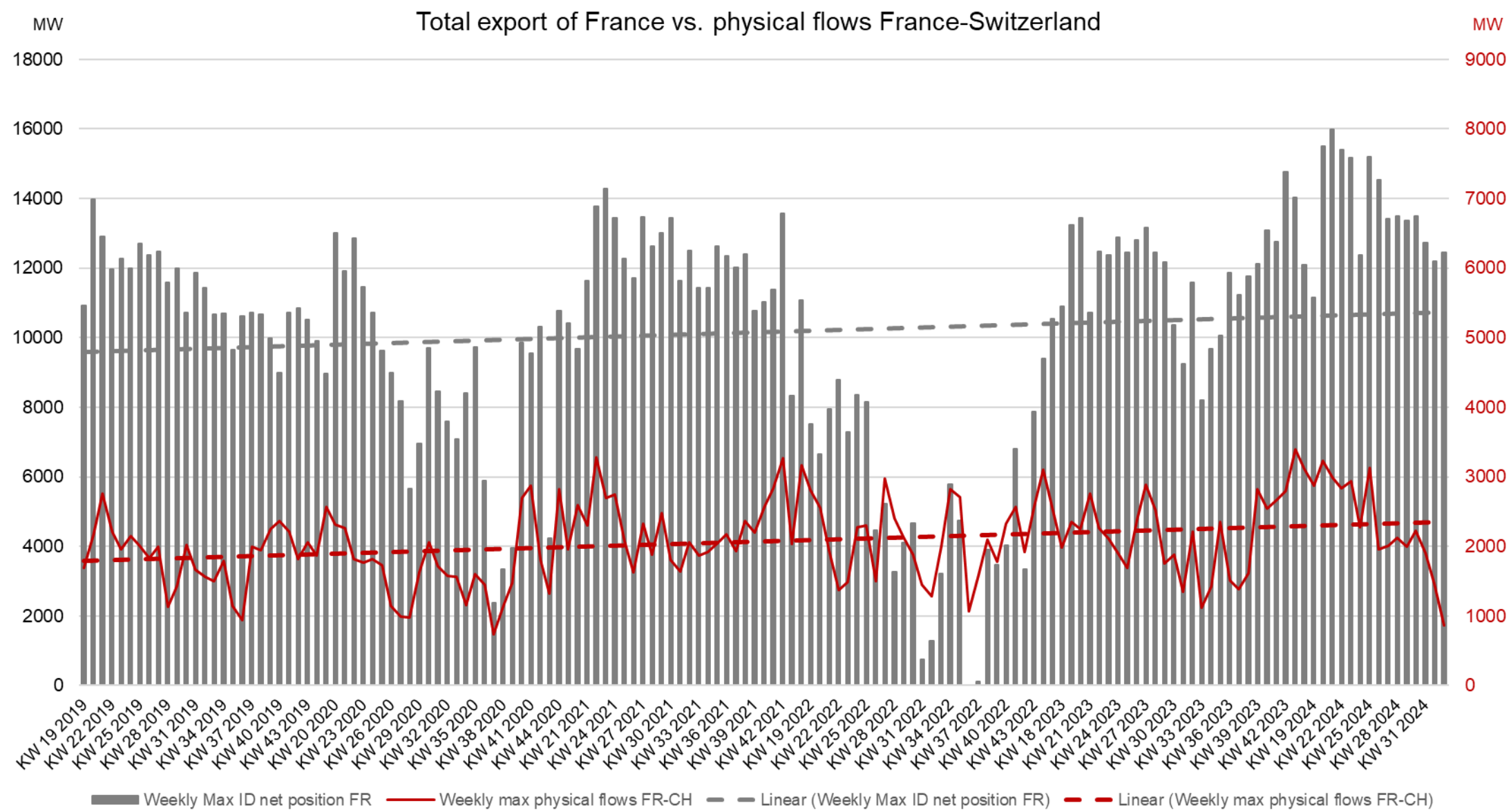
France exchange & load flow situation

Next steps & outlook

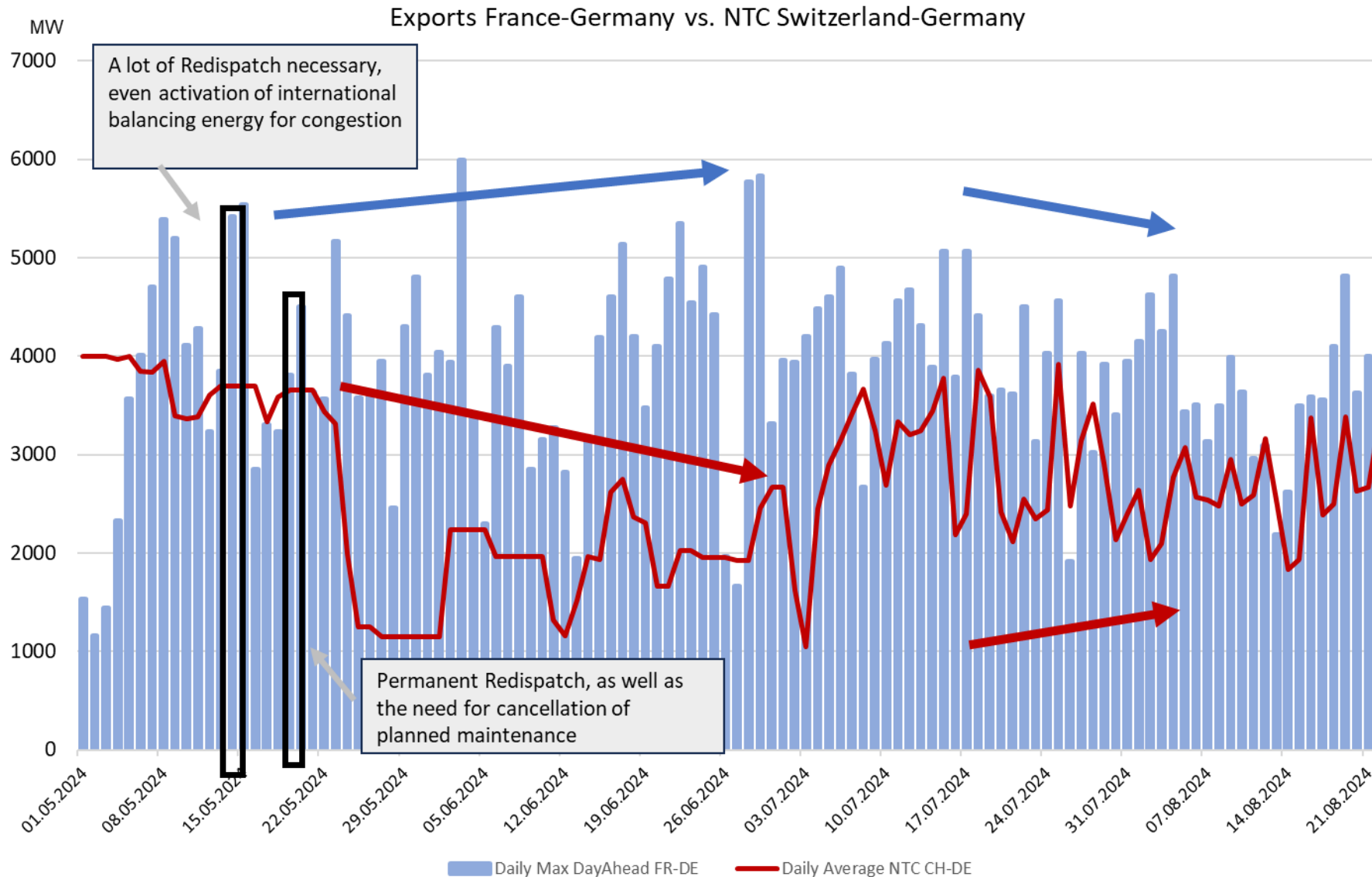
The maximum scheduled exchange of France has increased year over year in the past 10 years – a reason are the new EU regulations (Flow-Based, 70%minRAM) ...



... which leads to increased flows through Switzerland, creating additional bottlenecks within our grid.

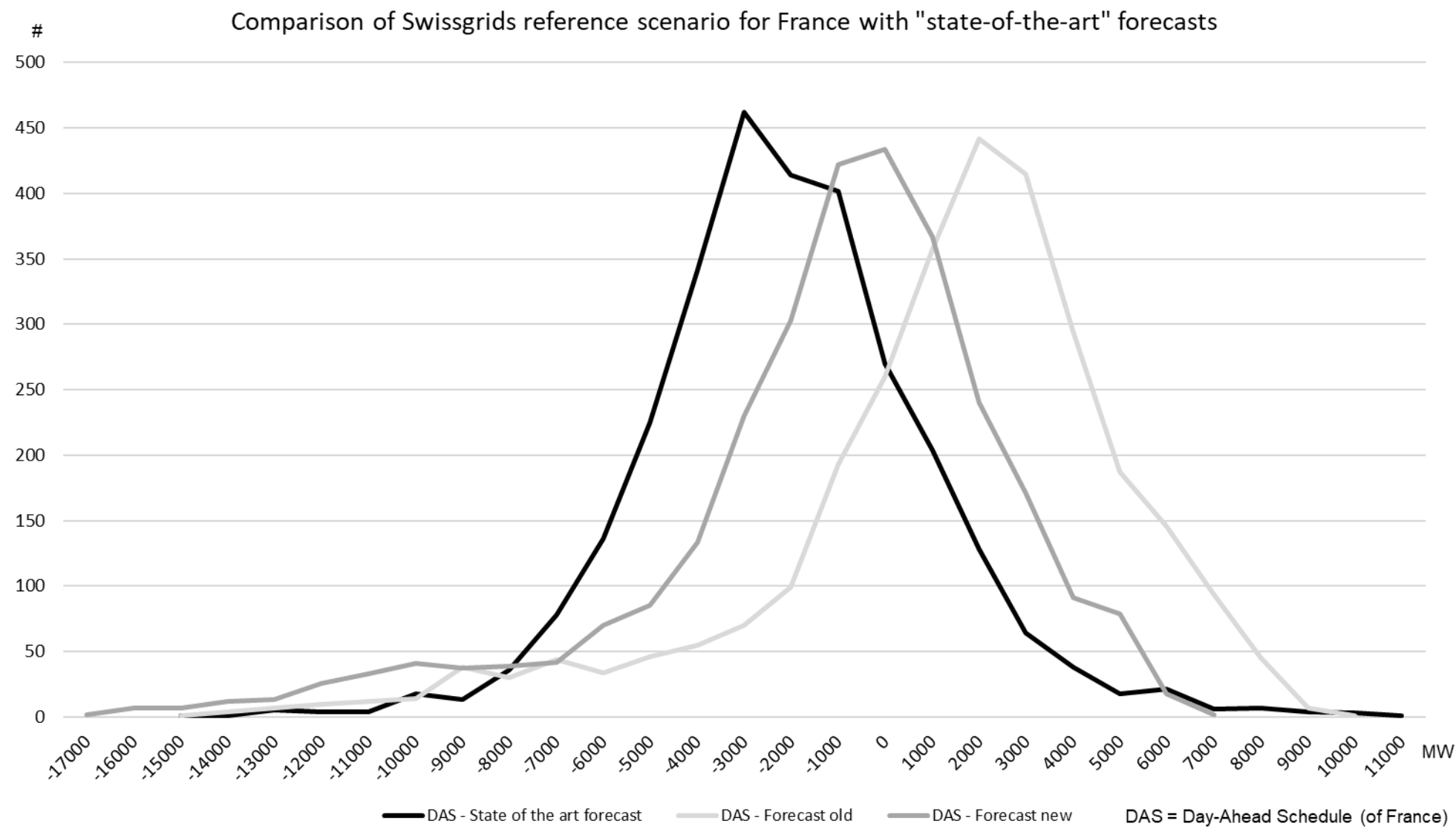


In May, Swissgrid was confronted with almost uncontrollable grid violations, due to the unprecedented export situation of France, combined with outage of nuclears etc.



- In particular, the export towards the “Core region” (Core Flow-Based Market Coupling) peaked during the summer
- Exchanges between France and Germany lead to the most severe flows through Switzerland
- Swissgrid was partly left without any redispatch potential
- After these extremely critical situations, Swissgrid had to reduce the export NTCs by adjusting to the new situation of France
- As maintenances and Nuclears came back, Swissgrid could step-wise increase the NTC again

Even with the latest «state-of-the-art» forecast, severe deviations persist, that Swissgrid needs to manage ...



OPEN DISCUSSION

- **Any particular points participants want to better understand?**

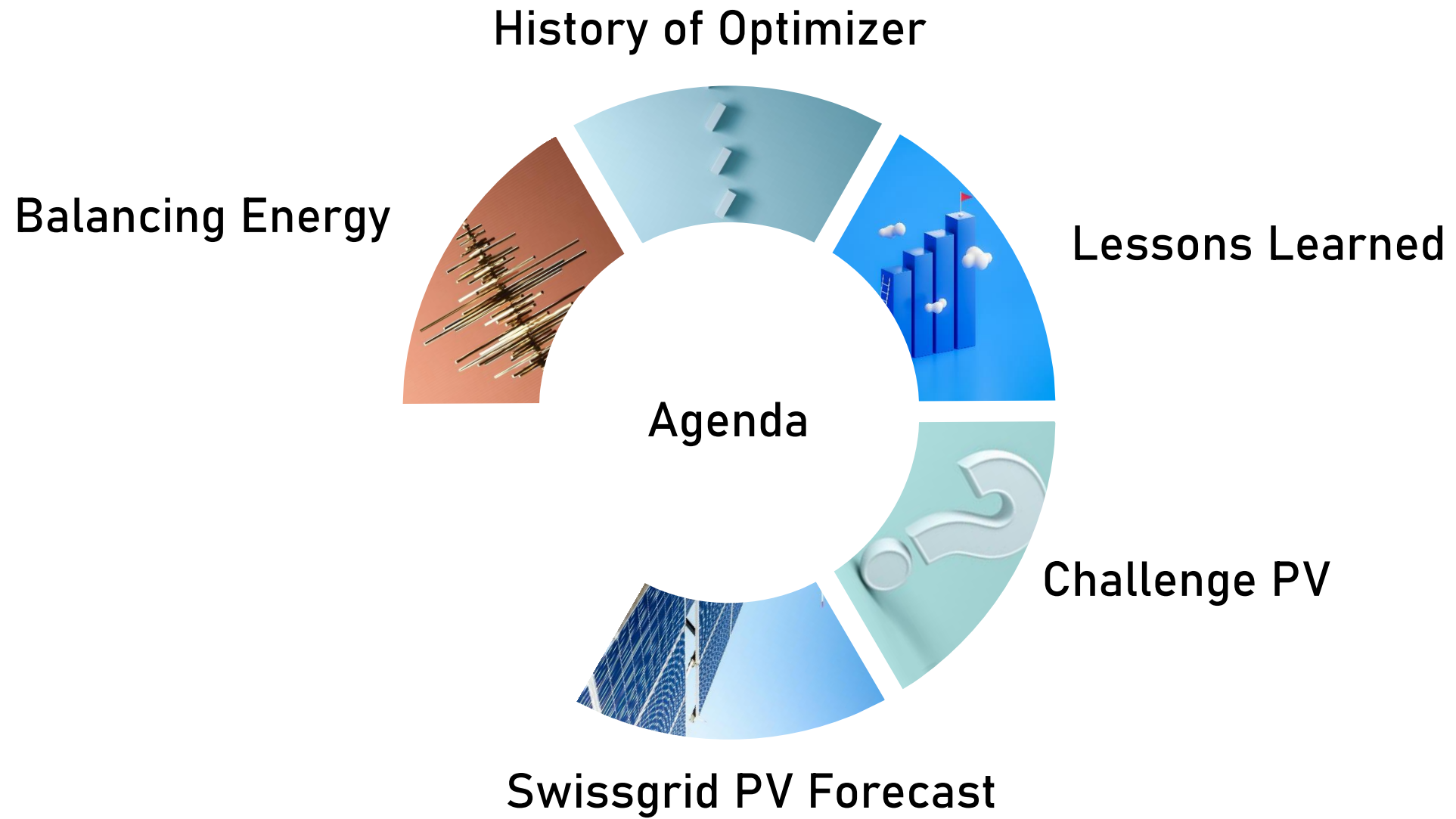
Swissgrid plans to enhance information publication on its website.

- **Is there any specific information participants would like to receive?**

Optimal activation of balancing energy and status of Swissgrid's PV forecast

Jacob Tran
Specialist Product Development

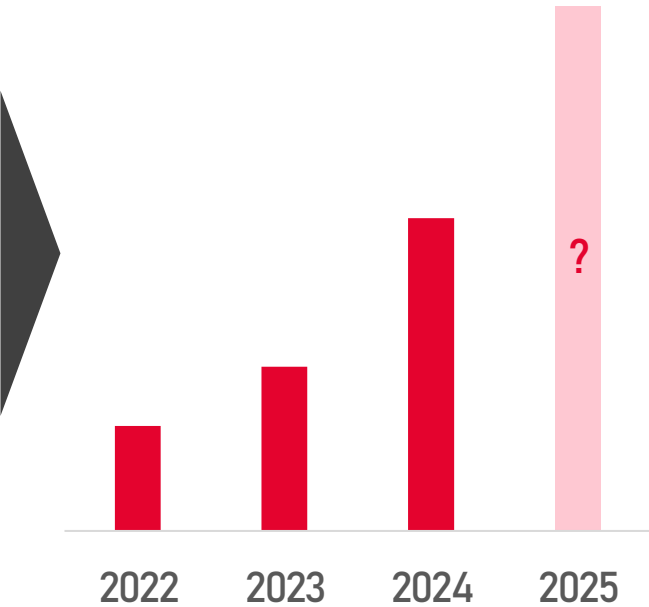
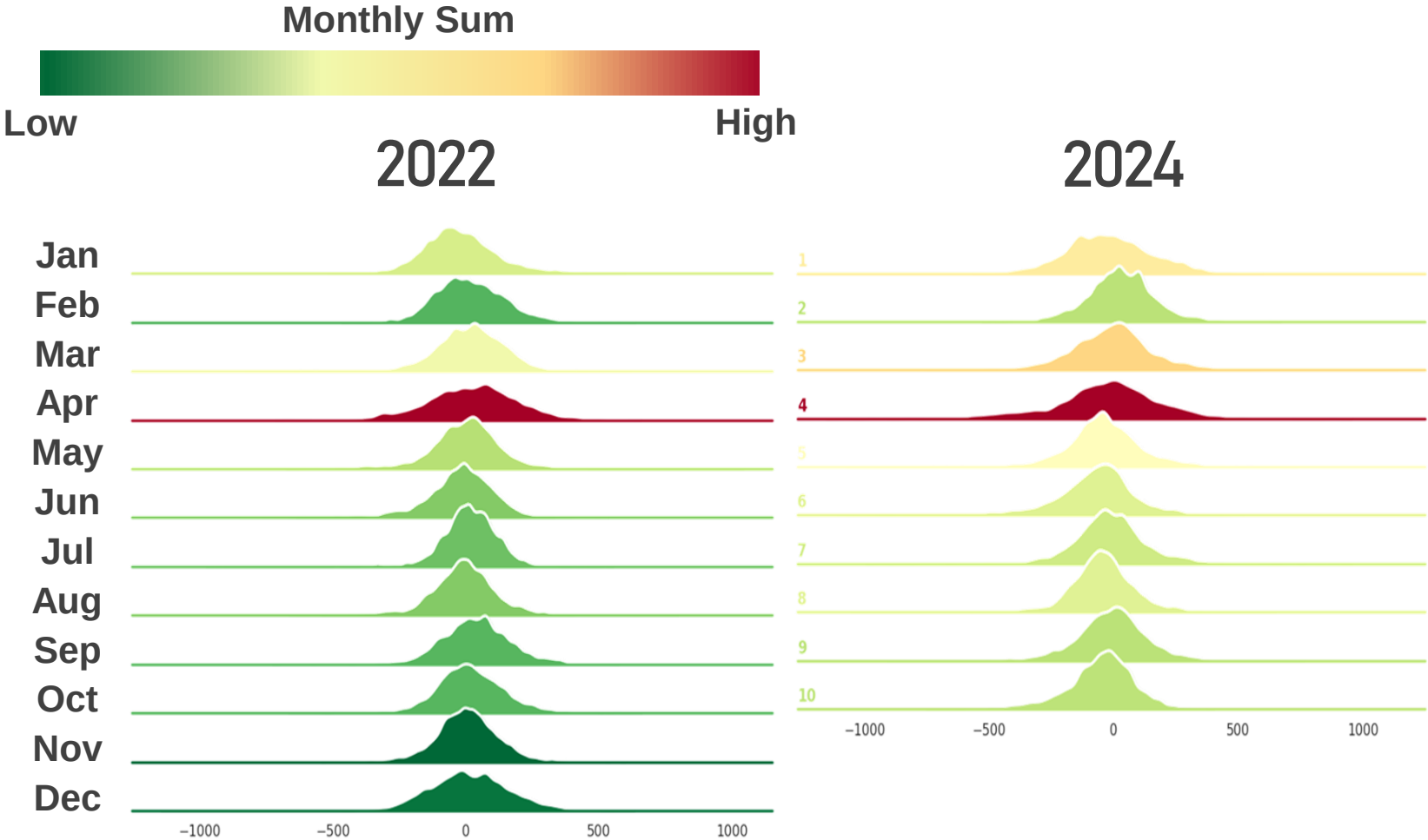
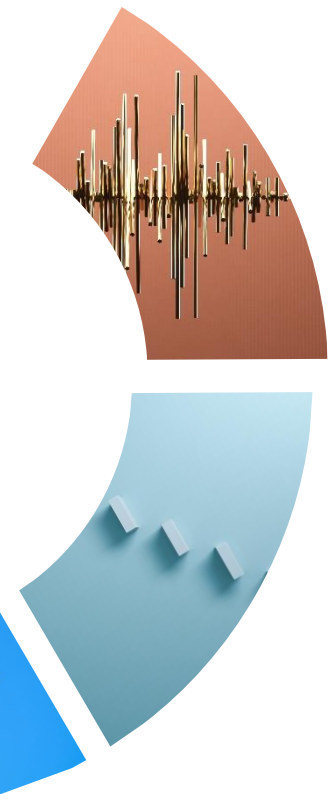
Thomas Lanz
Research & Digitalisation Manager



Balancing Energy – we are facing high increase in volume and cost

Density distribution of Balancing Energy Need

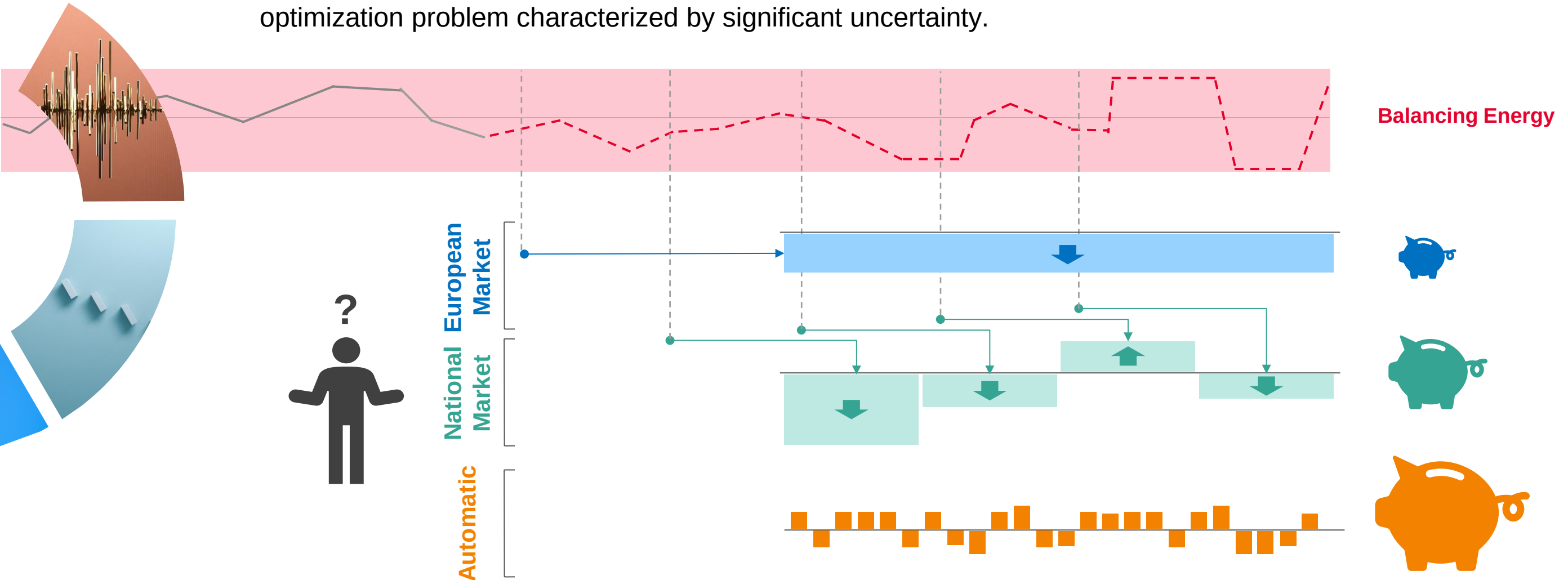
Cost Balancing Energy



Balancing Energy – procurement in system operation

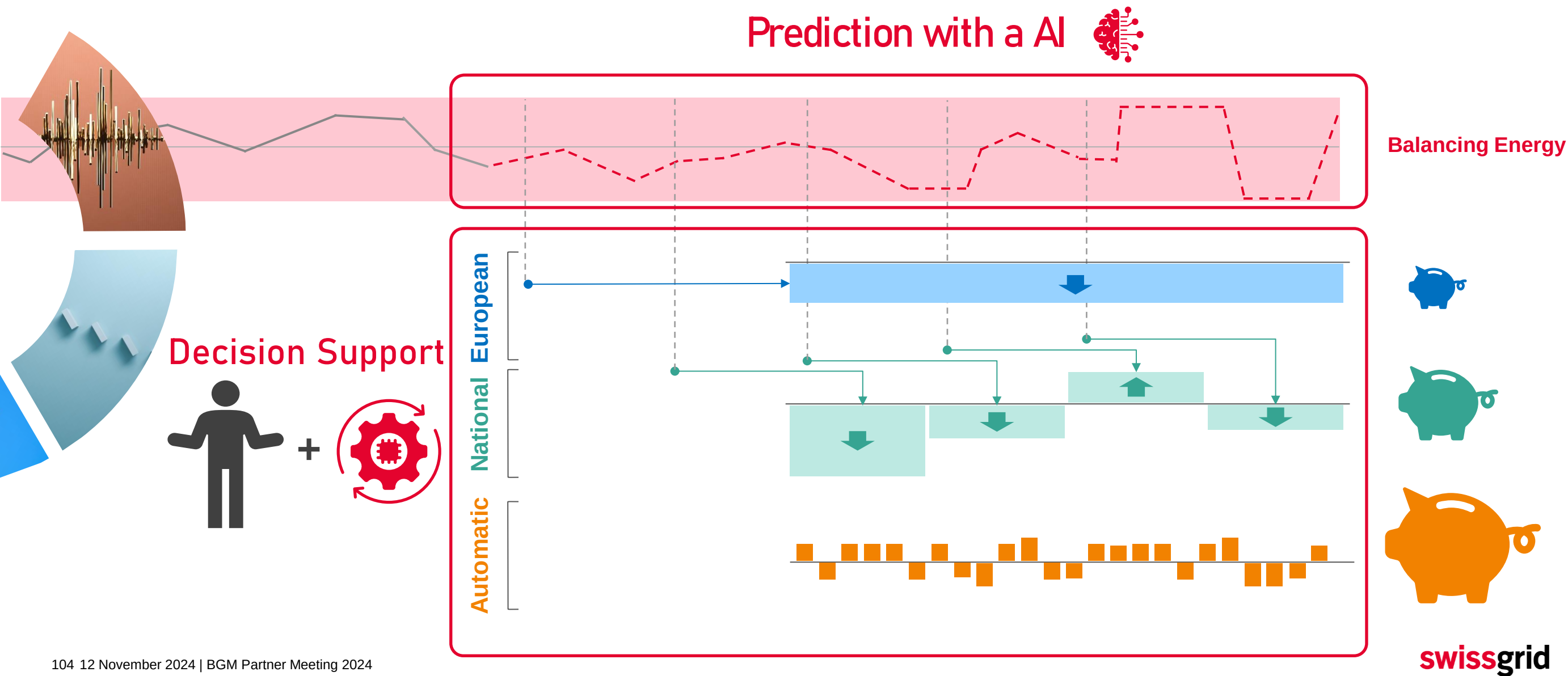
Complexity of this task has increased over the years

- Since 2022, the procurement of balancing energy across multiple markets has posed a complex optimization problem characterized by significant uncertainty.



Balancing Energy – decision support «Optimizer Balancing Energy»

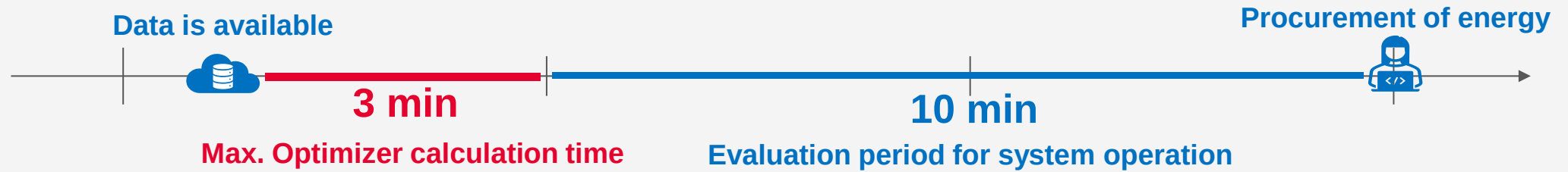
Predicting system imbalance and optimal procurement of balancing energy



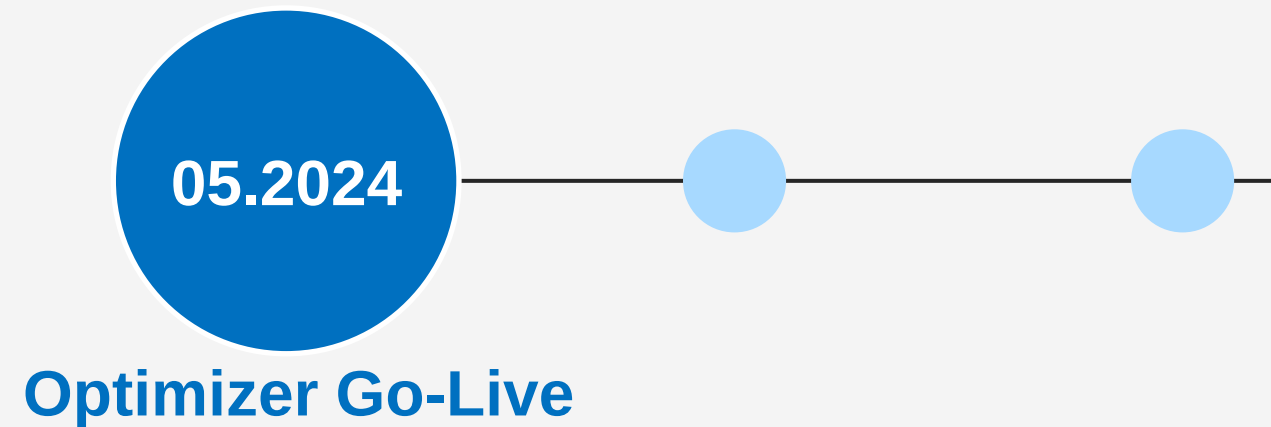
History of Optimizer

The Optimizer has placed high requirements on our IT system!

- First close to real-time software solution outside of the high-security zone @Swissgrid



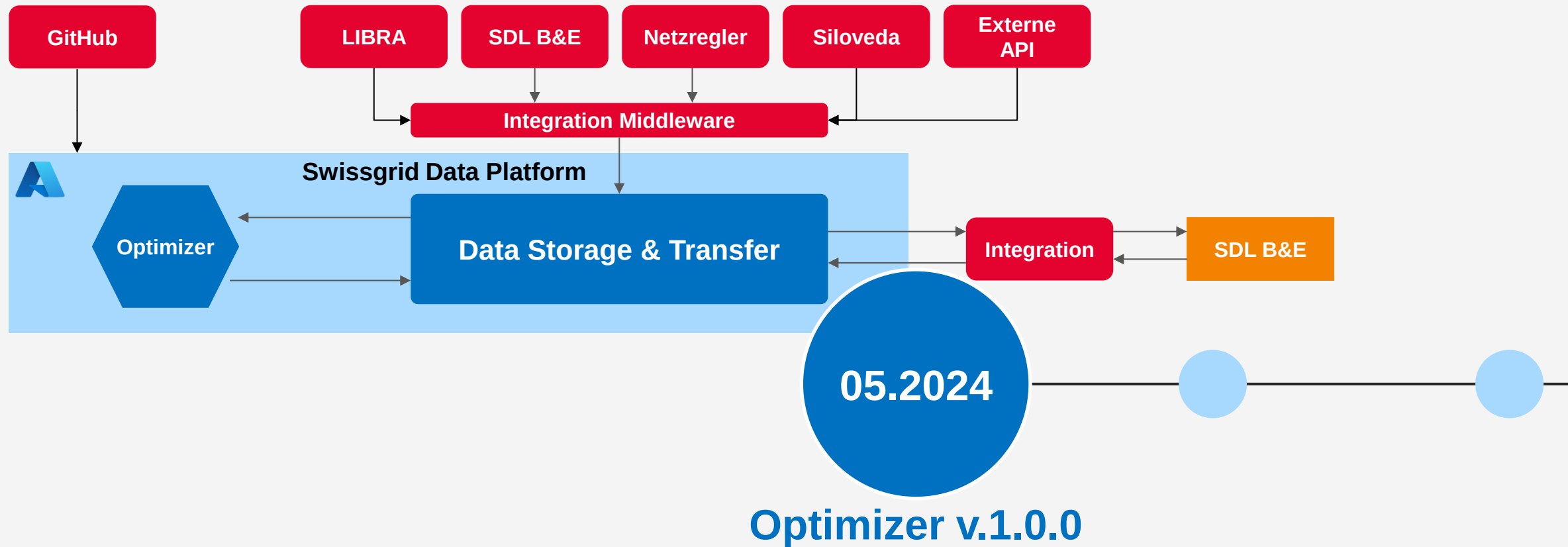
- Requires fast and efficient algorithms but also a reliable and close-to-real-time data integration



History of Optimizer

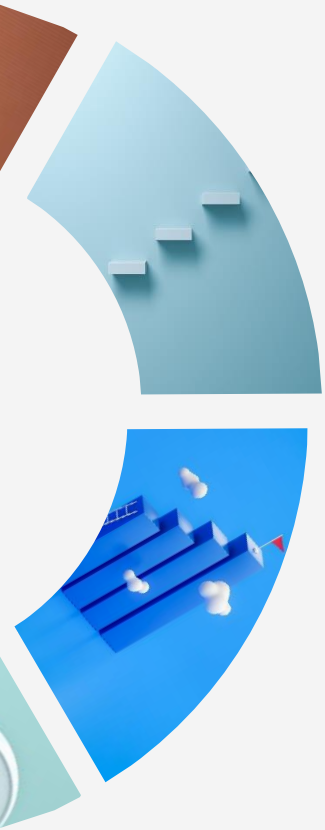
Complex dependencies require change management and time!

- Data integration at Swissgrid were and are not designed for real-time operation
- Implementing this change is complex, with many system dependencies, multiple parties involved, and diverse data sources



History of Optimizer

Shaky Go-Live – Infrastructure was not ready yet!



Forecast
Performance*



+14%

Uptime



27%

Cost Potential*



-

Usage
in Operation



1%

05.2024

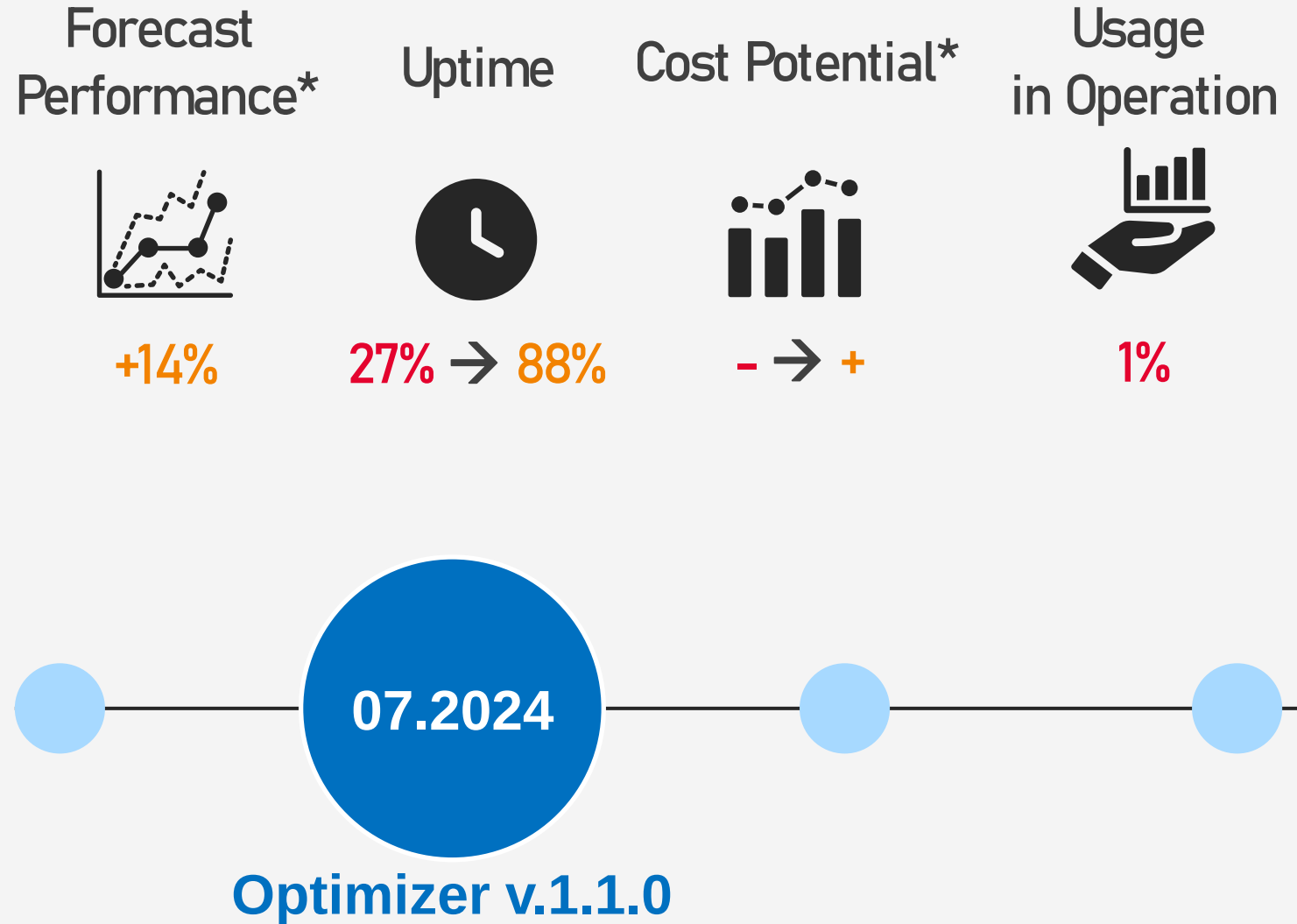
Optimizer v.1.0.0

* In comparison to real activation

History of Optimizer

Robustness and UX as central objective after Go-Live!

- Transforming our databases and data integration processes to enable **real-time data streaming**.
- Implementing comprehensive Continuous Integration and Continuous Deployment (**CI/CD**) practices.
- Enhancing system operation interactions with the Optimizer through **UX reassessment** and improvements.

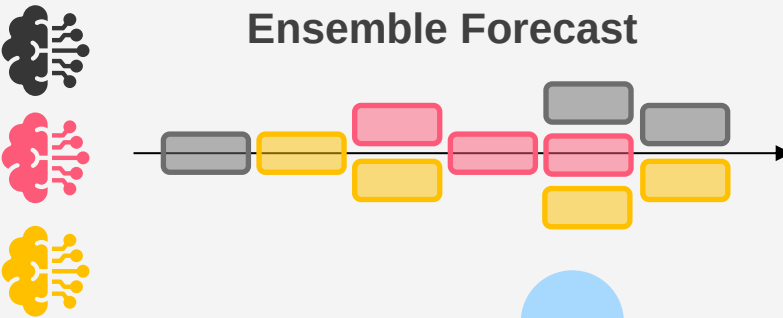
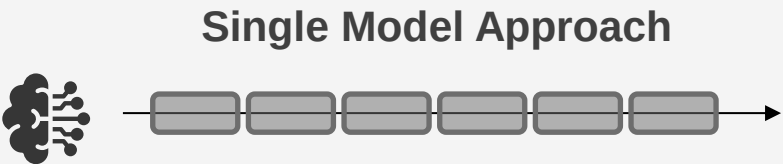


* In comparison to real activation

History of Optimizer

A new AI model has boosted our performance!

- Introducing a multi-model ensemble forecast with a policy maker



Forecast Performance*



+14% → +29%

Uptime



90%

Cost Potential*



+ → +++

Usage in Operation



1% → 15%

08.2024

Optimizer v.1.2.1

* In comparison to real activation

History of Optimizer

Continuous improvement of our AI model and Data Integration

- Architectural changes and enhanced computation enable more **frequent forecasting** and **optimizations**.
- New **feature enhancements** leveraging existing data.

Forecast
Performance*



+29% → +38%

Uptime



90% → 95%

Cost Potential*



+++ → ++++

Usage
in Operation



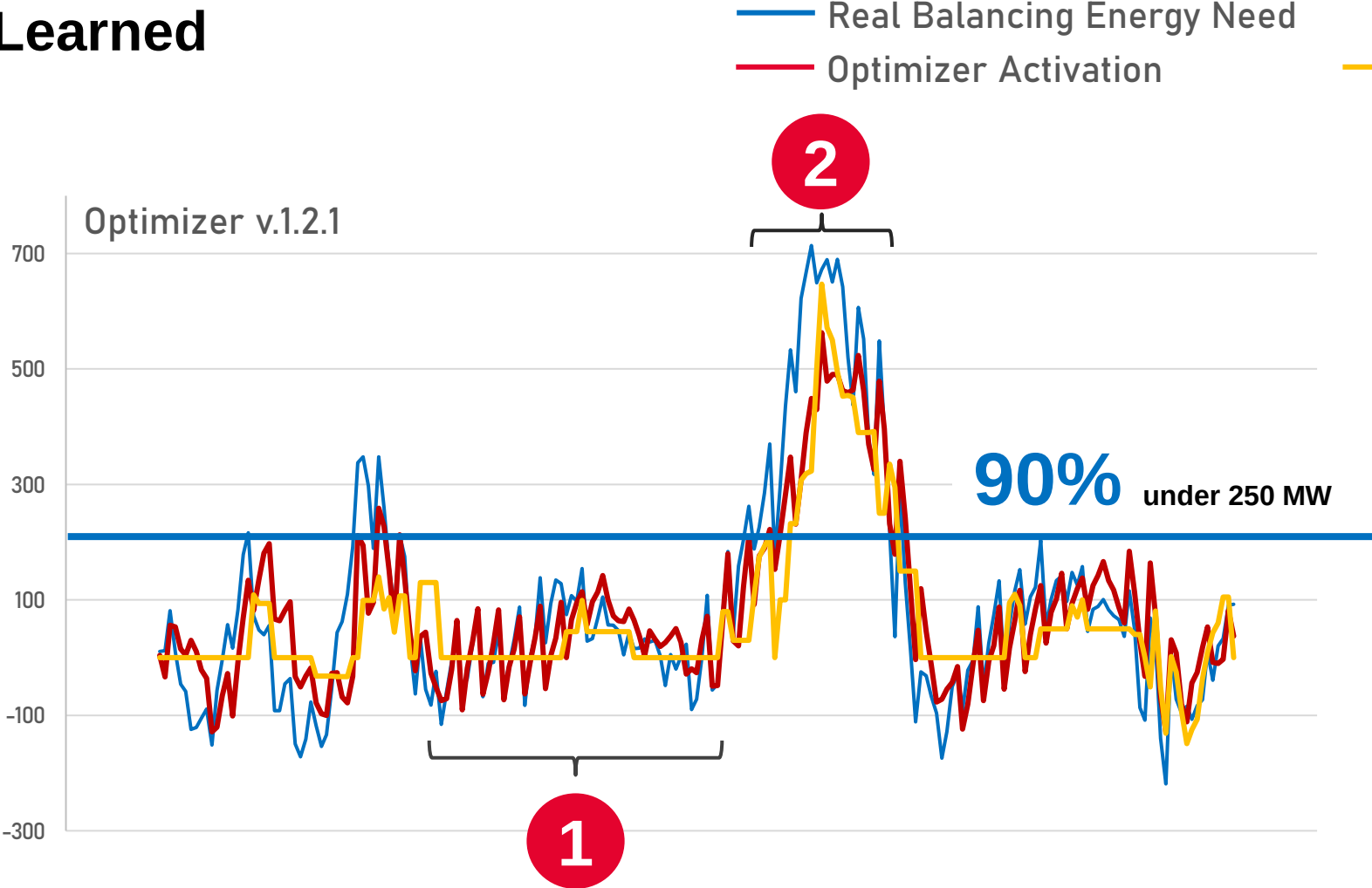
15% → 25%

11.2024

Optimizer v.1.3.0

* In comparison to real activation

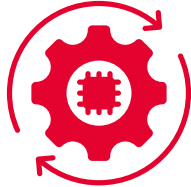
Lessons Learned



- 1
 - Labor-intensive processes
 - Low return of invest but with cumulative effect over time
- 2
 - System operation already achieves accurate peak demand predictions.
 - Efficient interaction between the optimizer and the operator leads to the best results.



90% Autopilot on commerical flights



Optimizer Autopilot

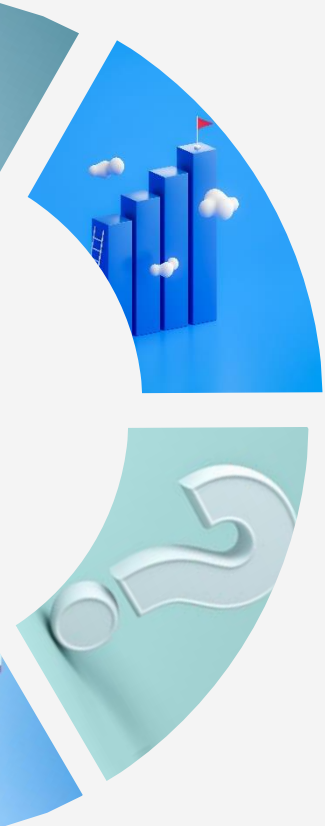
Lessons Learned

Learnings

- ✓ **Human adaption** is the key to success
- ✓ **New features** are great, but **maturity** is better
- ✓ **Operations** take A LOT of time

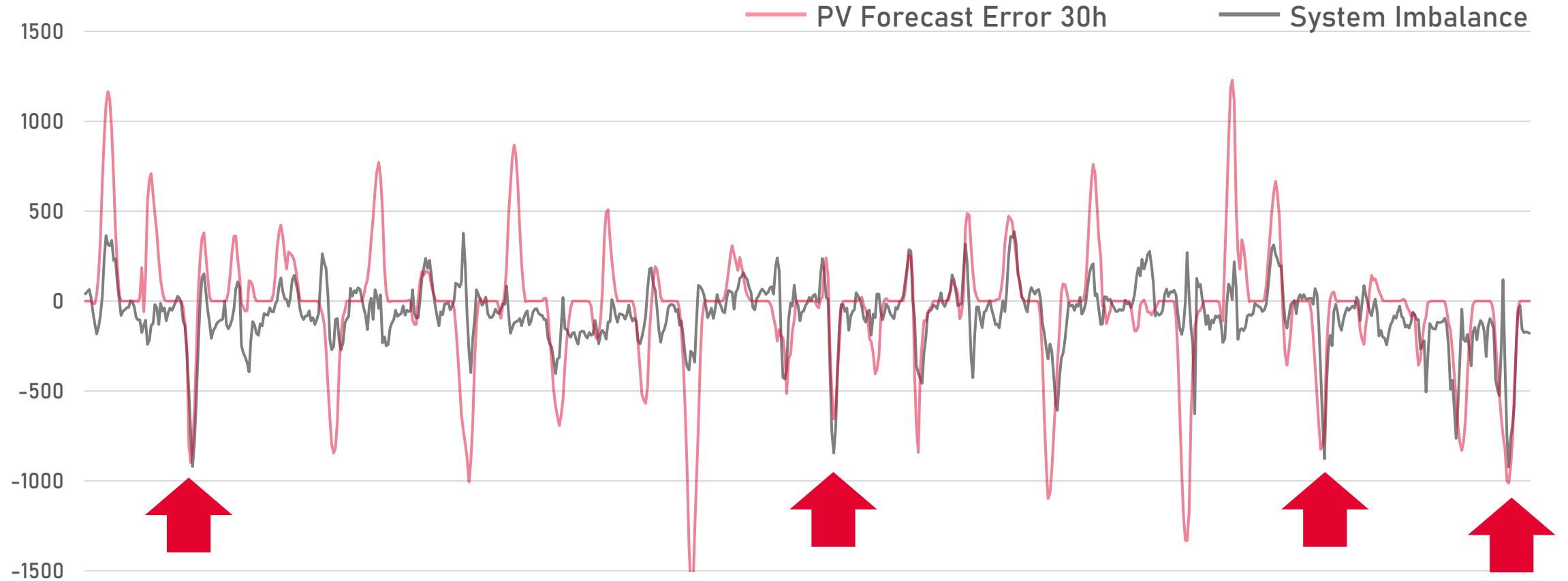
Take Aways

- Prioritize the business case and the end user needs and experience
- Ensure robust processes
- Develop models iteratively to achieve end-to-end result delivery early on



Challenge PV

Some Insights from the analysis of the total system imbalance onbalancing group (BG) behavior

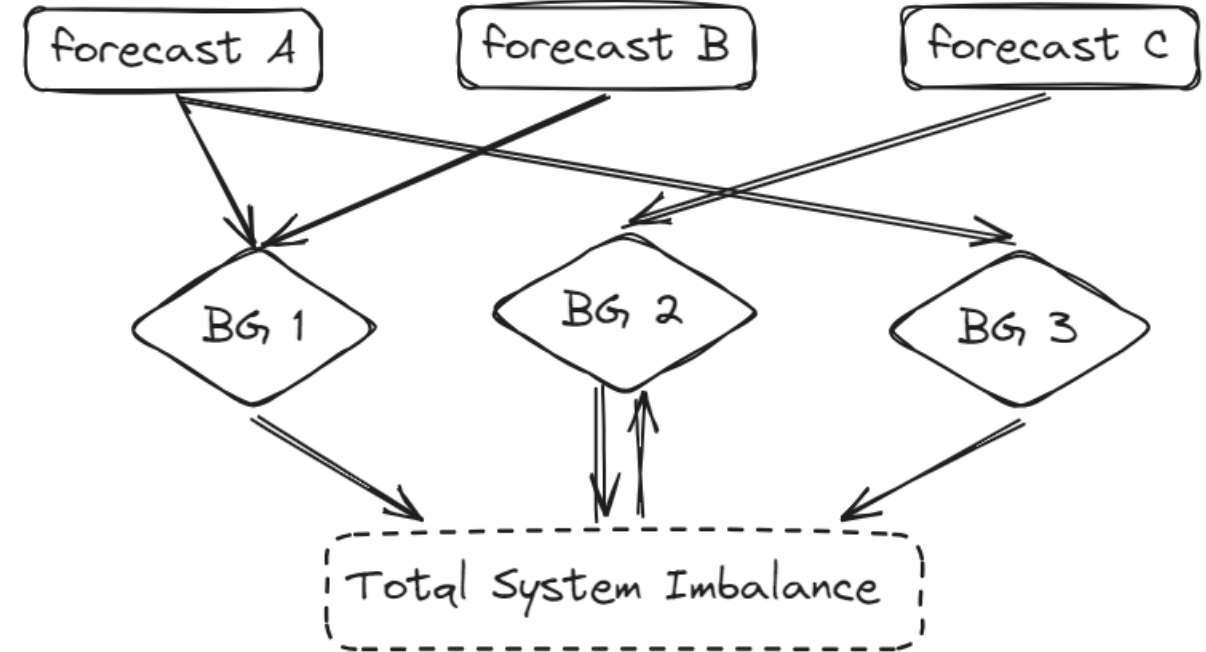
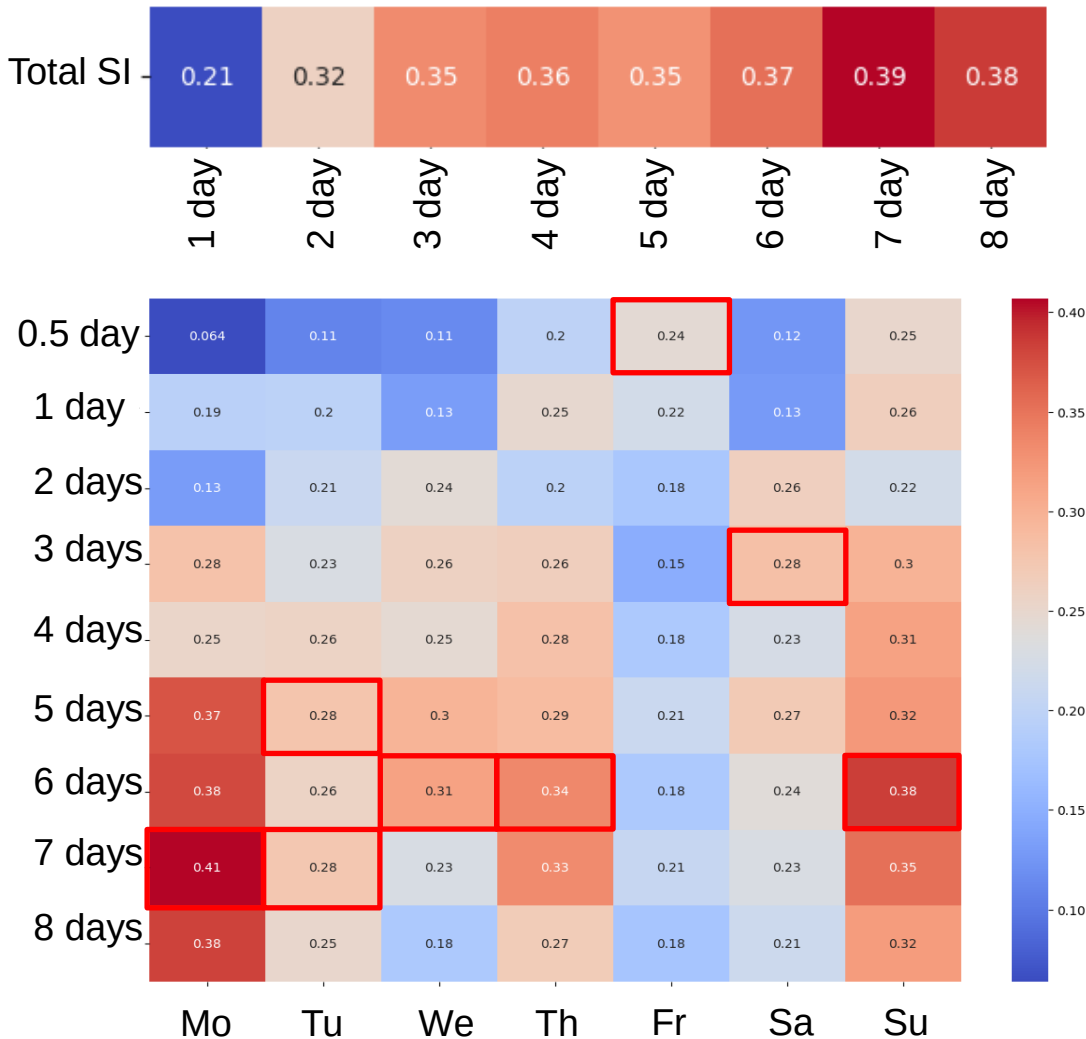


- Sometimes it matches, sometimes it does not...
- When it matches, we experience high balancing energy need

Challenge PV

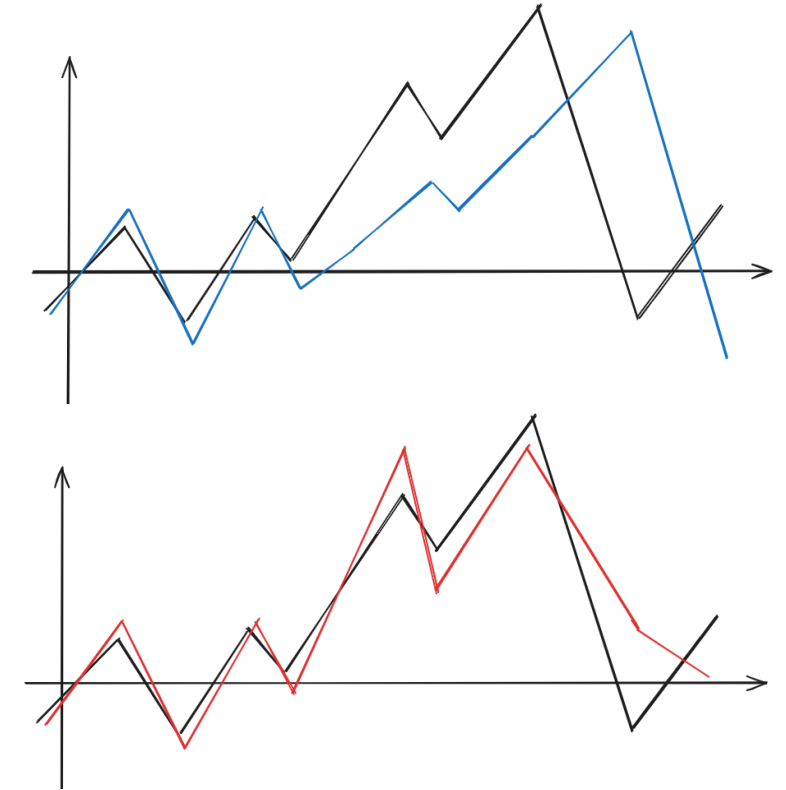
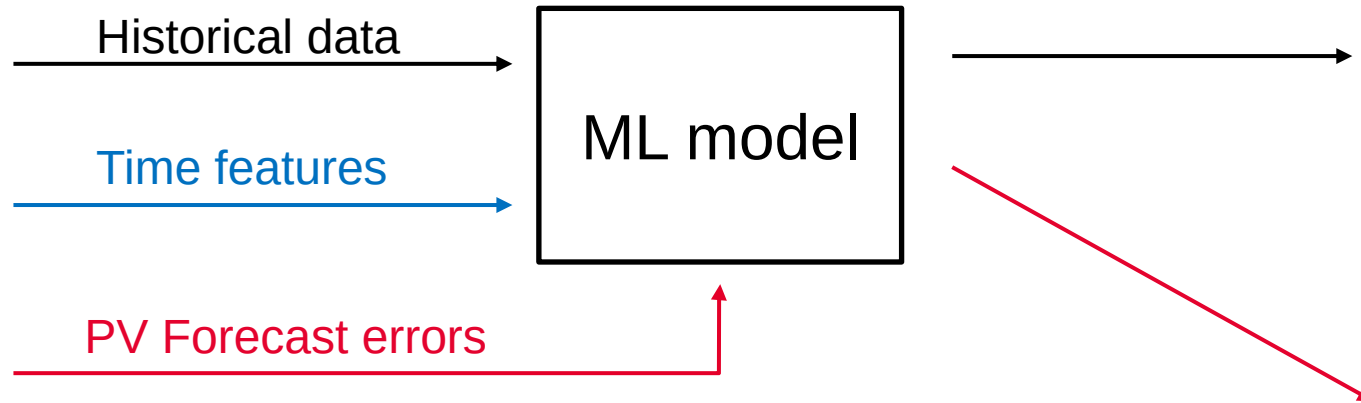
Some Insights from the analysis of the total system imbalance onbalancing group (BG) behavior

Correlation of “total system imbalance” with PV forecast error



- Equally high correlation for different forecast horizons
- Higher correlation on Sunday and Monday – clue that BG have different planning process over the weekend
- Using this information is hard, because different BG have different forecast tactics

Challenge PV



Goal: More active response to high system imbalances

Next steps:

- Ongoing research (not leveraged yet)
- **We need a very good PV intraday forecast with regional resolution to predict the forecast error accurately.**

Why / How?



Know too little about **Switzerland's largest power plant**.



Increasing frequency of **imbalances** due to PV.

Project idea:



Creation of **high-resolution photovoltaic forecasts**.



Provision on the **Swissgrid data platform** for **various use cases**.

Data basis:



Pronovo database

Master data of almost all Swiss PV systems



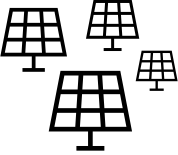
Weather API

Current weather forecasts

What we have achieved so far

- **Plant-specific forecasts** for all PV systems in the Pronovo database.




242.800 PV systems


Resolution: **15min**

- **Aggregations:**



CH



Regional



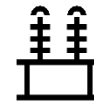
Cantonal



Postal code

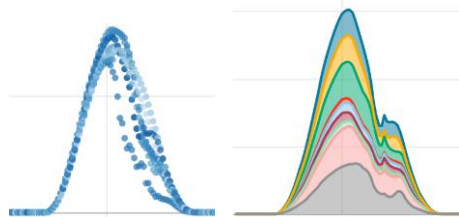


DSO



NL1 grid nodes

- **Provisioning:**



(Internal) **Dashboard**

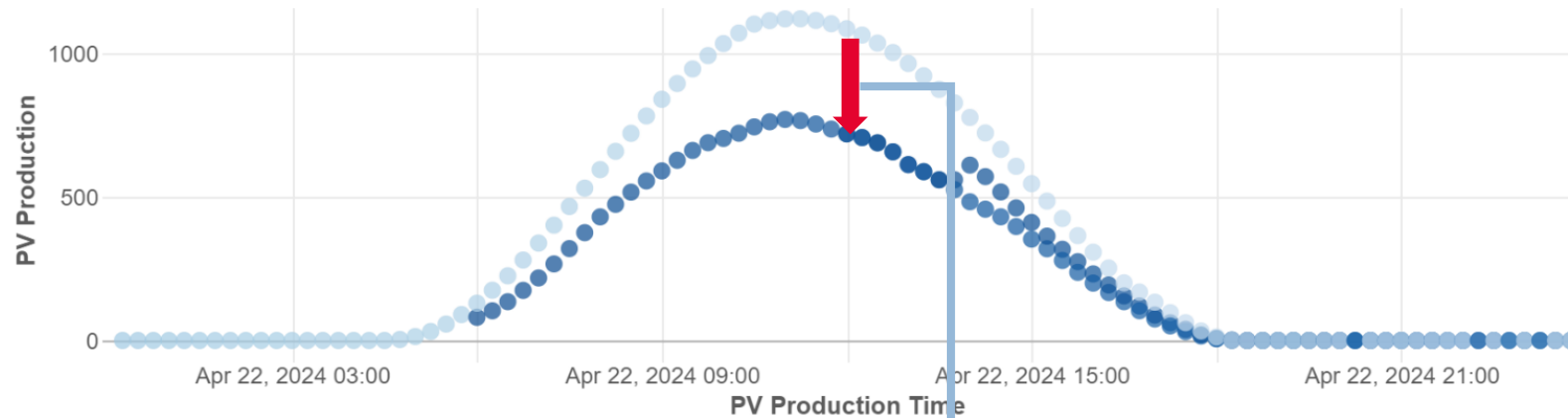


Swissgrid Data Platform

Example: 22nd of April 2024

Scatterplot of all Forecasts

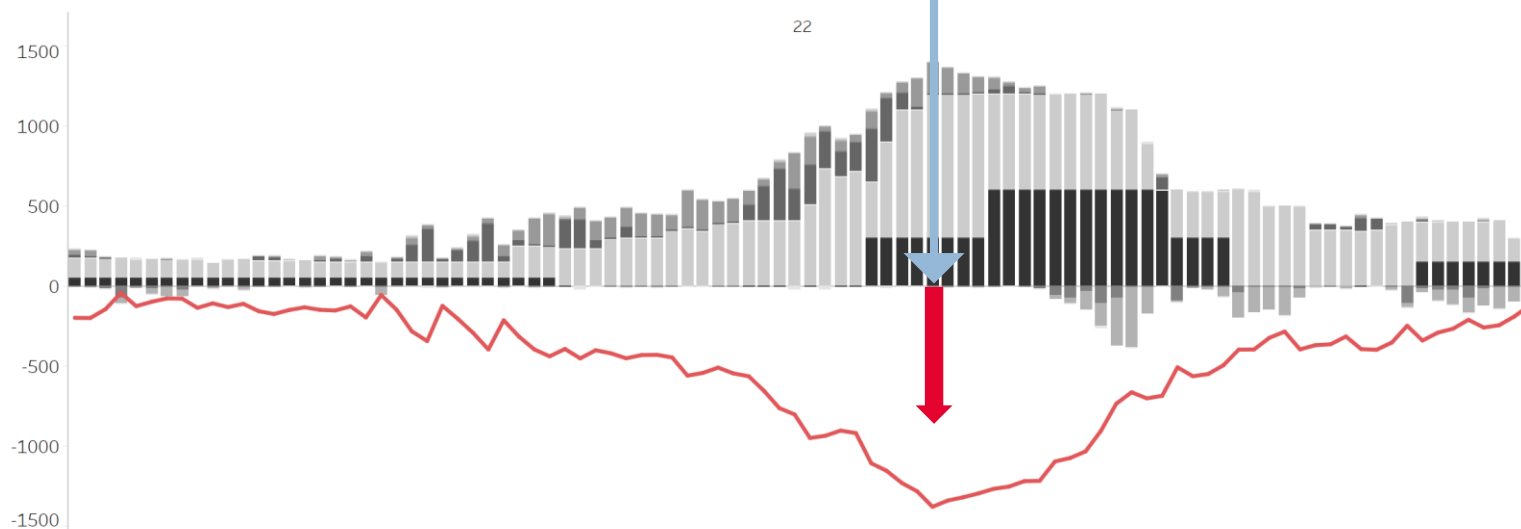
All forecasts for the day on one plot.



- Caution: Forecast only for **90.000** installations (~39%).
- Forecast from 19th & 20th (**D-3, D-2**): Peak > **1'000 MW**.
- Forecast from 21st (**D-1**): Peak at **500 MW**.
- Forecast from previous evening: Peak at **800 MW**.
- Intraday forecasts: Dispersion < **100 MW**.
- Backcast: Peak = **770 MW**.

Vergleich eingesetzte Regelenenergie mit verursachter Ausgleichsenergie der Bilanzgruppen 22. April 2024 MW

In dieser Darstellung ist die in der Schweiz total eingesetzte Regelenenergie (grau) gegenüber der total verursachten Ausgleichsenergie aller Bilanzgruppen (rot) dargestellt.



Using the forecasts from the last working day (April 19) would explain part of the imbalance.

Balancing processes and impact on imbalance price

Dimitrios Nousios
Head of Market & Product Design

Balancing processes and impact on imbalance price

New price mechanism for simultaneous balancing and redispatch activations in Integrated Market

TRE average prices have decreased with the introduction of the integrated market

Motivation for the introduction:

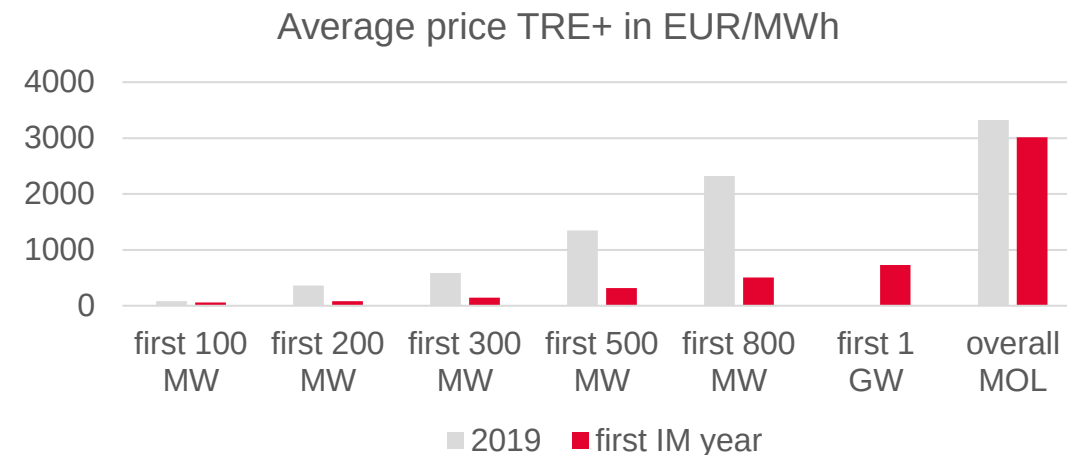
2020 the integrated market was established. It is a **common market for the flexibility of Swiss production units** that can be activated for both balancing and (zonal) redispatch.

The following goals should be achieved:

- A common market with higher liquidity and correspondingly lower prices
- Ensuring sufficient volume for the increasing need for redispatch measures, which are central to system security

These goals were achieved:

The available quantity has **increased significantly** and prices for the same quantity have **decreased significantly**.



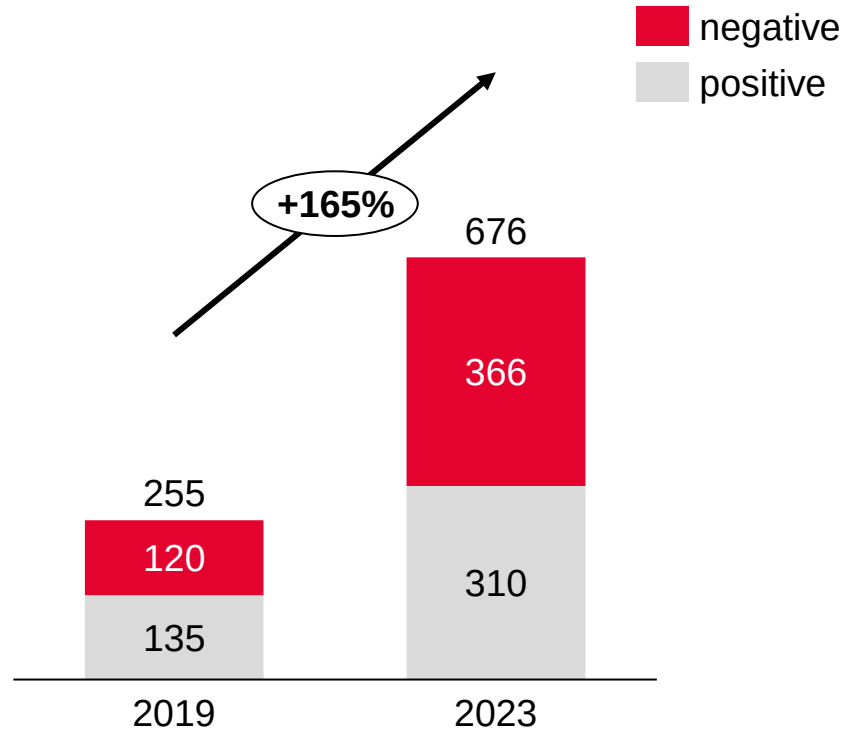
Note:
There was no TRE+ MOL over 1 GW in 2019.

Thanks to the integrated market, these measures could generally be carried out without any problems, thus ensuring power grid security in Switzerland.

Activation of control energy is primarily driven by balancing needs

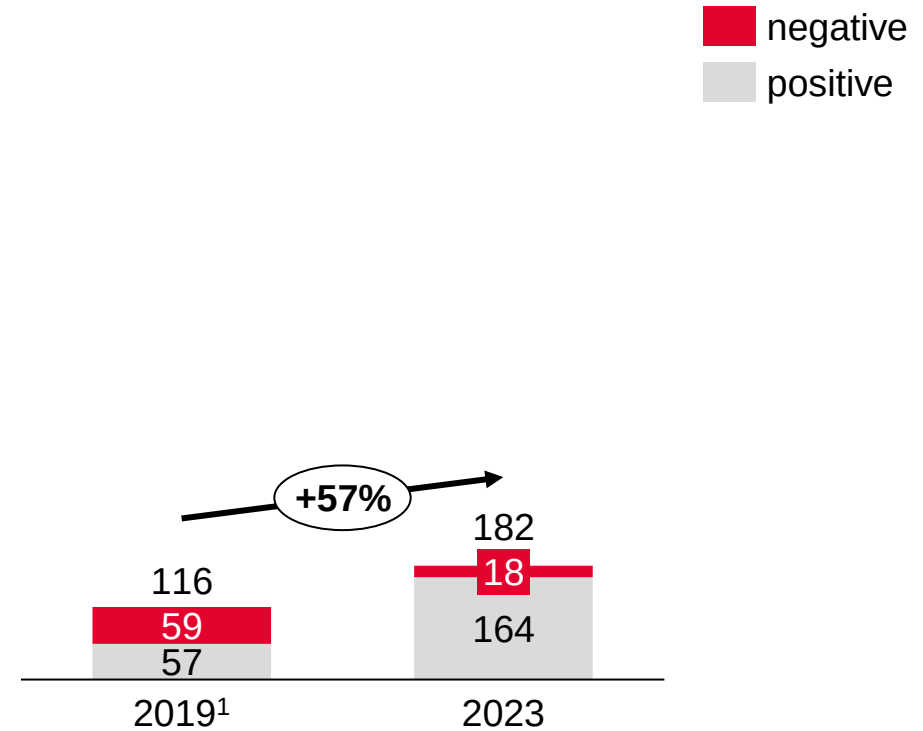
Activation for balancing

in GWh, TRE



Activation for international redispatch

in GWh, TRE



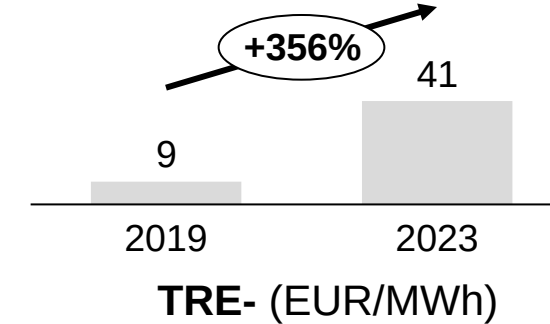
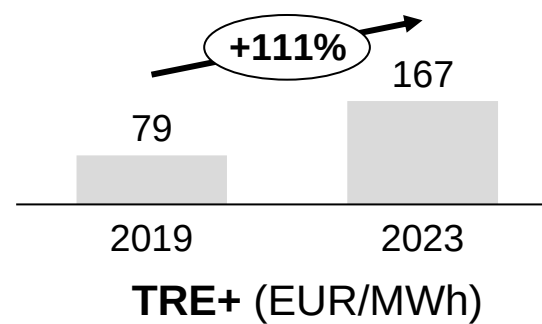
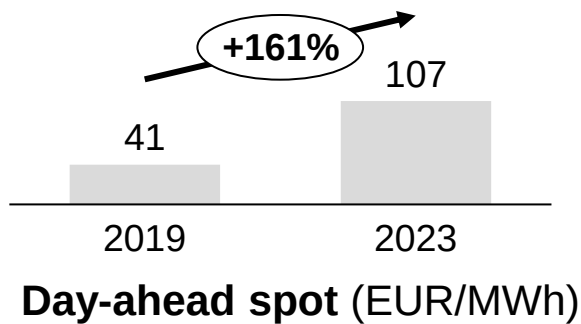
1 Total volumes of international redispatch (before introduction of IM), as no TRE was used

Balance groups benefit from the integrated market

The integrated market has greatly increased liquidity and lowered prices for the same volume.

At the same time, however, the demand for tertiary control energy has increased massively.

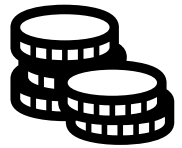
Average prices for TRE+ for BGs increased less than the spot price – with the exception of TRE- (2019-23):



Interactions between redispatch and balancing cannot be prevented on a common market.

Integrated market and balancing energy price

Definition of balancing energy price according to BGV contract Annex 1:



short: BGV pays

long: BGV receives

$$(A + P_1) \cdot \alpha_1$$

$$(B - P_1) \cdot \alpha_2$$

with $A = \max(P_{spot}; P_{sek+}; P_{ter+})$

with $B = \min(P_{spot}; P_{sek-}; P_{ter-})$



P_{ter} : only tertiary calls with the purpose «balancing of the Swiss control area»

- without redispatch
- without balancing of other control areas (TERRE, MEAS)

Principles for the consideration of TRE calls in the balancing energy price

The balancing energy price depends, among other factors, on the average price of all tertiary calls in the corresponding time interval (see Balance Group Contract Annex 1, Section 7.1). With the simultaneous activation of TRE for balancing and redispatch, it cannot be avoided that the different activation purposes have a reciprocal influence on the prices. The following principles are applied to ensure that costs are allocated to the originator and as fairly as possible:

1. TRE calls for **redispatch or balancing needs outside the CH control area** are not included in the calculation of the balancing energy price.
2. In case of **simultaneous demand for different purposes** (e.g. simultaneous balancing and redispatch), the following applies to the allocation of the calls to the demand purposes: The demand that is registered first has priority and the more favourable offers are allocated to it. In the case of simultaneous registration, the Swiss demand is prioritised.
3. If there is simultaneous demand for different purposes in opposite directions, only **the netted demand** is called and only the called TRE bids are included in the AEP.



The case of «simultaneous registration» occurred very frequently in 2020, so the BGs had an advantage. This case is now very unlikely and it is mainly the principle «first come, first served» that is usually applied.

An adjustment to the allocation principles was developed in consultation with ElCom.

The new price mechanism leads to a fairer distribution of costs



Swissgrid has analysed several possible options for adjusting the price mechanism. In the view of Swissgrid and ElCom, the "average price with consideration of the volume" variant leads to the fairest distribution of costs.

Principle: In case of simultaneous redispatch and balancing, both demands share the weighted average price of the more favourable calls up to the volume they share (i.e. twice the smaller demand) and the price of the more expensive calls is allocated to the larger demand for the additional quantity.

Advantages:

- Price peaks in the balancing energy price that are not related to imbalances in the Swiss control area are greatly reduced; generally lower balancing energy price
- Both balancing and redispatch continue to benefit from netting effects in case of opposing demand.
- Equal treatment of balancing and redispatch in case of simultaneous demand in the same direction reflects the integration of the market also in the price
- Fair and originator-centred cost distribution; takes account of the fact that large needs contribute disproportionately to high prices

The new price mechanism has been implemented as of 1. July 2024.

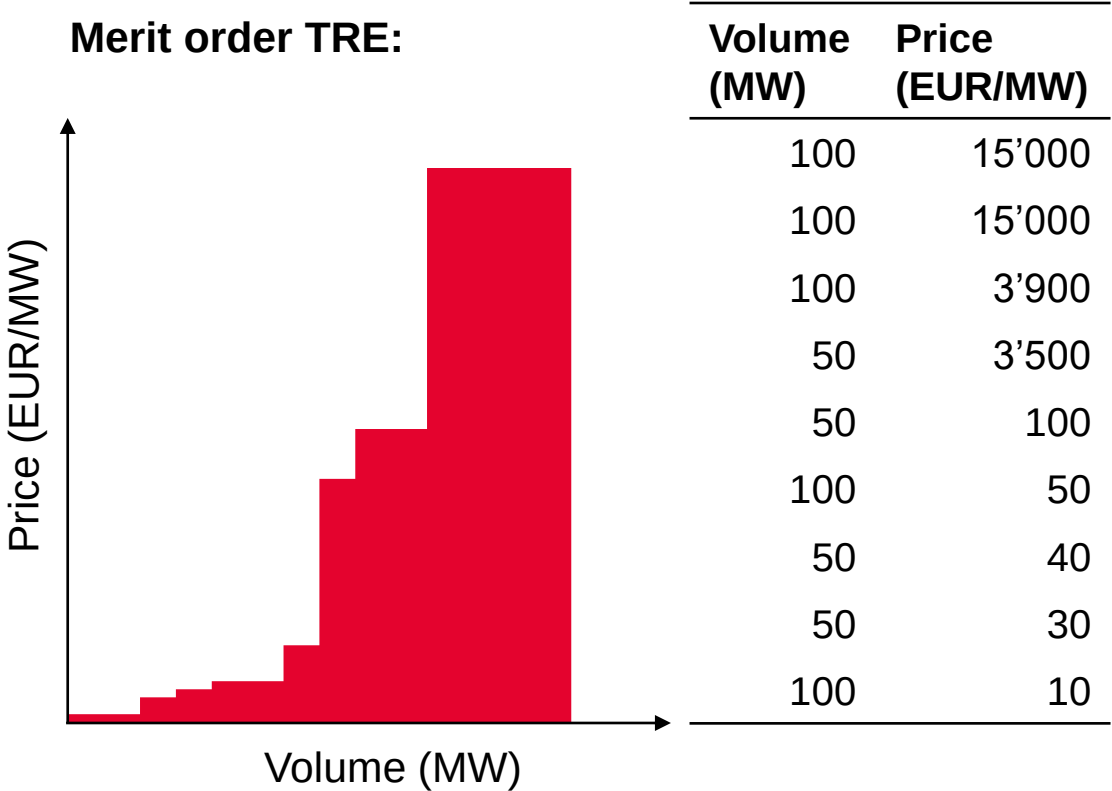
Calculation example for the new price mechanism

Principle: In case of simultaneous redispatch and balancing, both demands share the weighted average price of the more favourable calls up to the volume they share (i.e. twice the smaller demand) and the price of the more expensive calls is allocated to the larger demand for the additional quantity.

Example scenario:

- 400 MW international redispatch registered at 13:30
- 100 MW balancing need registered at 13:51

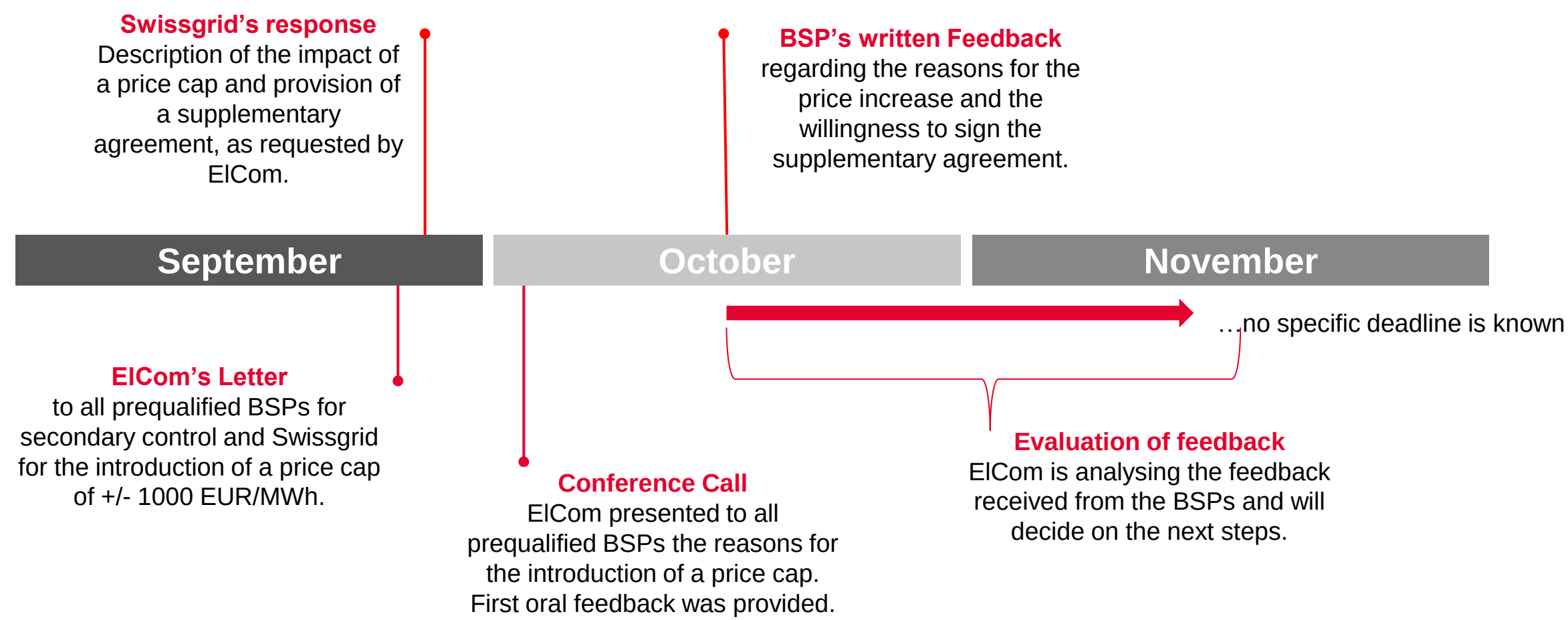
	Status Quo	New principle
Balancing energy price (EUR/MW)	3'900	23
Redispatch price (EUR/MW)	474	1'443



Balancing processes and impact on imbalance price

ElCom's initiative for the introduction of price caps in the secondary control energy market

ElCom's initiative for the introduction of price caps in the secondary control energy market



Balancing processes and impact on imbalance price

Backup Merit Order List for the activation of secondary control energy

How does it work today?

- In the event that the load frequency controller (LFC) does not receive or can not process the normal SRE-MOL (Merit Order List) for a delivery interval due to technical problems, it makes use of the backup MOL. The activation of the BSPs is then based not on the actual energy price information but rather on the results of the SRL weekly capacity auctions.
- This backup process can lead to the activation of expensive energy bids, without firstly utilizing the cheapest available bids.
- Operational experience after PICASSO Go Live shows that the MOL activation logic normally guarantees a safe operation. However, the use of Backup MOL sometimes could result in:
 - increased operational risk, when at the same time a critical network situation occurs,
 - higher costs for the balance groups, when a high aFFR volume is simultaneously activated.

Mitigation of high prices - Recap from last BGM Partner Meeting

Swissgrid has taken several measures to ensure that the frequency of use of the backup MOL is significantly reduced:

- implementation of redundant transmission channels for the MOL
- automatic Retry-Mechanisms
- possibility of manual uploading the MOL by the dispatchers, following proper monitoring and alarming processes

These measures lead to a massive reduction in the use of the backup MOL. Concretely:

- **from almost 16 hours** in the first six months of PICASSO operation **to almost 2 hours** in the first six months of 2023.
- In the period from **January 2023 to March 2024**, the backup MOL was used only for **6.5 hours** (99.94% availability)

Mitigation of high prices - Status update

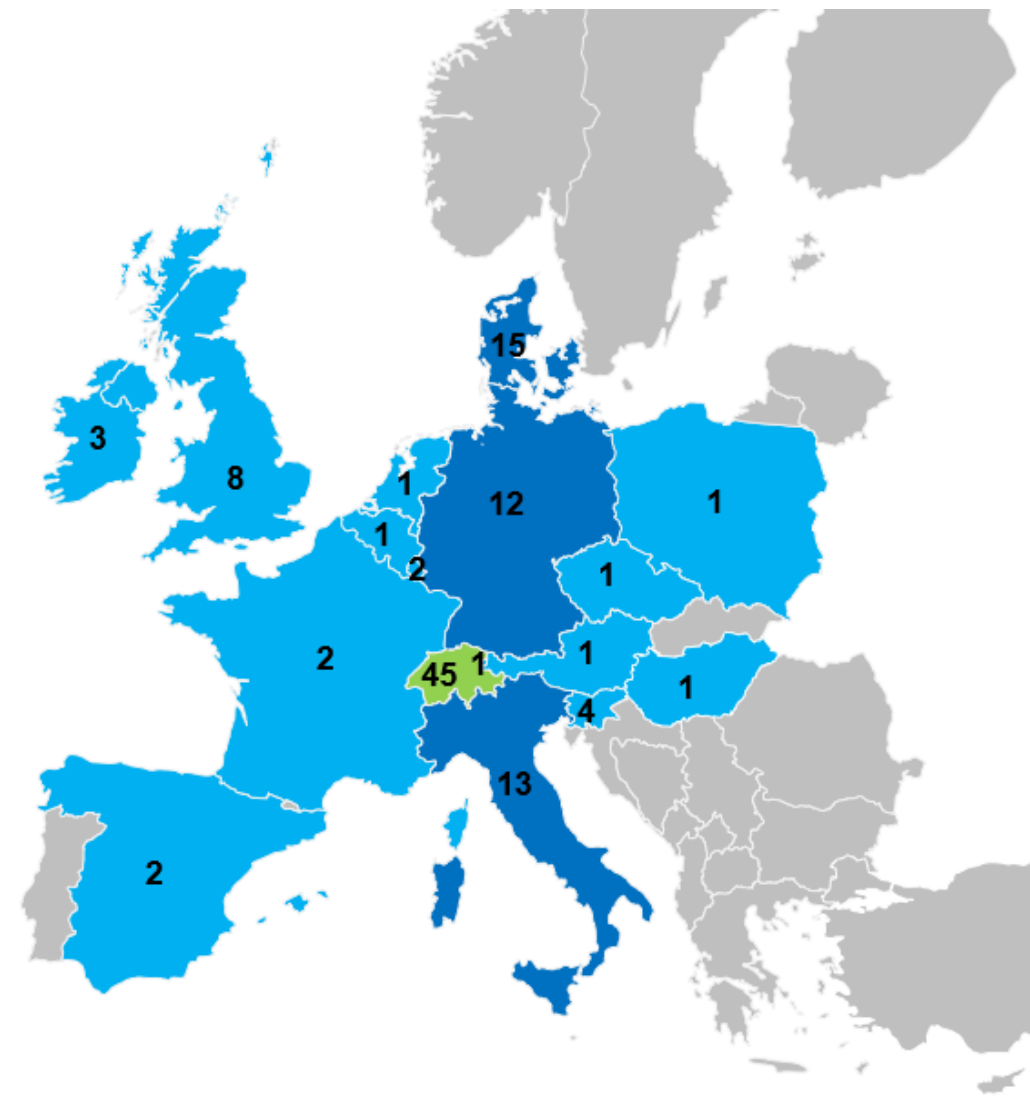
- In Q4 2023, various options for adjusting the current SRE backup process were evaluated with the BSPs. However, no agreement was reached on a specific option.
- Due to the significantly reduced frequency of backup cases and other ongoing parallel projects, this topic was not treated with the highest priority in the first half of 2024. (For example, the new IM price mechanism was prioritized higher.)
- On Monday, May 13th, the fallback MOL was activated from 00:00 to 05:45. Since then, additional measures were implemented to minimize the frequency of use of the backup MOL:
 - increase the robustness of the MOL creation and forwarding processes
 - dedicated monitoring and reporting processes for the identification and detailed analysis of each backup event
- In the period from **June 2024 to October 2024**, the backup MOL was used only for **2 hours**.
- Swissgrid performed in Q3 2024 additional simulations, in order to quantify the financial impact of each of the options that were discussed with the BSPs.
- These options have been discussed with ElCom as part of the measures to mitigate the increase of SRE prices.
- The goal is to have a final decision before the upcoming amendment of the BSP contracts, which is currently planned for H1 2025 due to other parallel projects (e.g.: introduction of daily SRL auctions).

Swiss balance group management and operational incidents

Marco Lenzin
Specialist Balance Group & Sched. Services

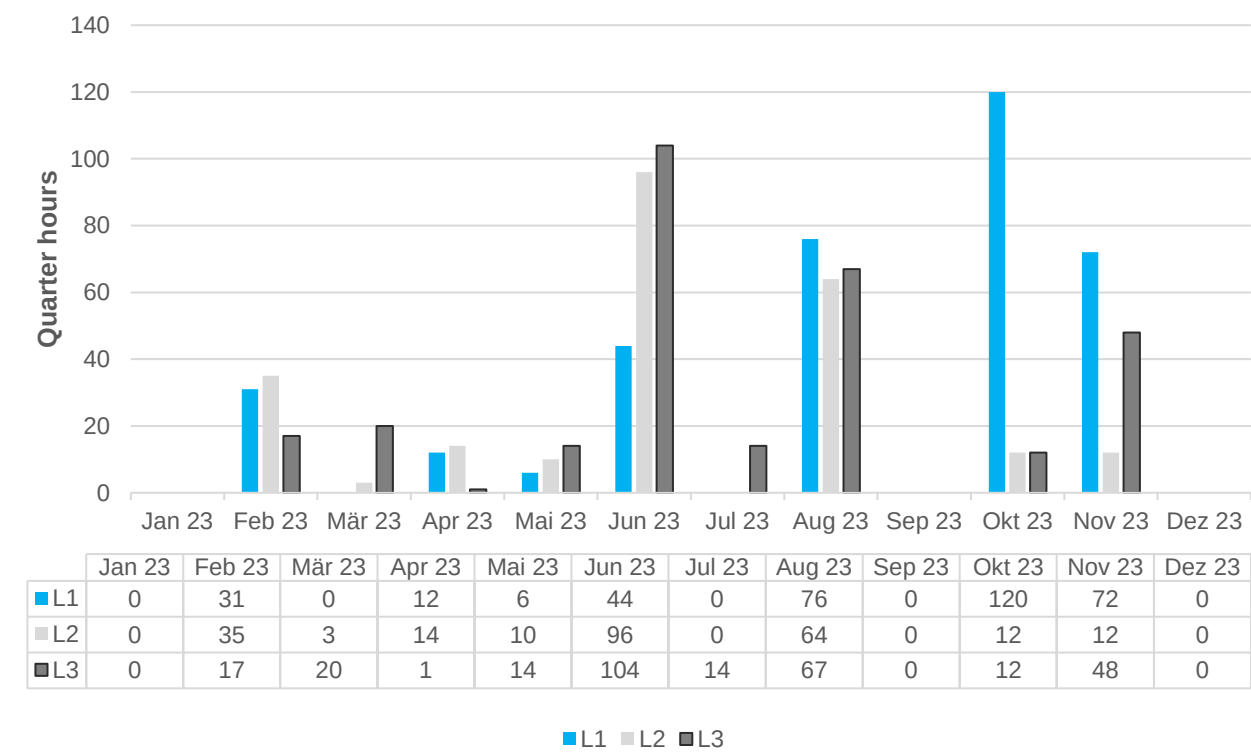
Balance Group Management

	BGs			Mutations
2020	106	5	6	101
2021	104	3	1	88
2022	107	2	5	122
2023	111	3	7	143
2024	116	7	12	169
			(11 planned)	End of October



Balance Group Management

Number of limit violations in quarter hours

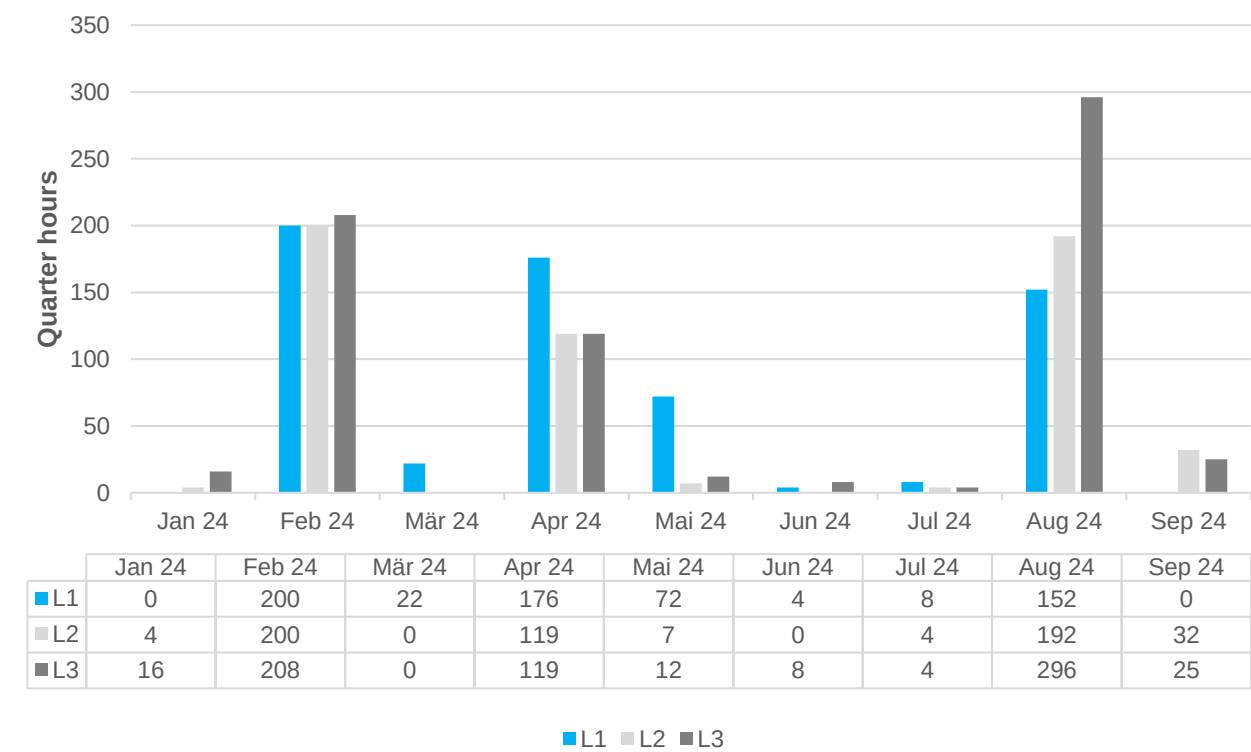


Facts 2023

- Request for a written statement: **3 BGs**
- Meeting with Swissgrid: **9 BGs**
- Intraday suspension: **0 BG**
- Penalties in case of repeated L3 violations:
8 BGs → 7'335.48 EUR
- Total Imbalance in 161 quarter hours
- CONS violation: 659 quarter hours

Balance Group Management

Number of limit violations in quarter hours



Facts 2024

- Request for a written statement: **10 BGs**
- Meeting with Swissgrid: **5 BGs**
- Intraday suspension: **0 BG**
- Penalties in case of repeated L3 violations:
5 BGs → 149'288.55 EUR
- Total Imbalance in 712 quarter hours
- CONS violation: 348 quarter hours

Experience with the collateralization of balance group management

Experience

There are options for increasing and also an option for reducing the collateral

➔ 2.4.3 Adjustment and renewal of collateral (general balancegroup regulations)

Partial monthly increase of the amount of collateral



More work for the balance groups

More work for Swissgrid (mutations and collateral)

- So far there have been no reductions for balance groups with metering points



- In consultation with the balance groups, the collateral will now be adjusted on a quarterly basis
- In the case of serious events, the increase of the amount of collateral will continue to be made monthly



Furthermore, limitset can be increased for all balance groups if the open position exceeds the limits several times

High balancing energy prices

Until 1 July 2024 (high imbalance price with simultaneous redispatch / MEAS)

In case, the request from the redispatch was before the TRE demand request. This means that the cheaper bids were allocated for redispatch and the expensive bids were included in the balancing energy price.

- 12 quarter hours: Previous redispatch / MEAS and then TRE+ calls for the control area
- 13 quarter hours: Previous redispatch / MEAS and then TRE- calls for the control area

High balancing energy prices BG-short > 5'000 EUR/MWh

High long prices due to high SRE+ prices

- 6 quarter hours with a high average positive secondary control energy prices (SRE+)

High long prices due to high TRE+ prices

- 6 quarter hours with a high average positive tertiary control energy prices (TRE+)

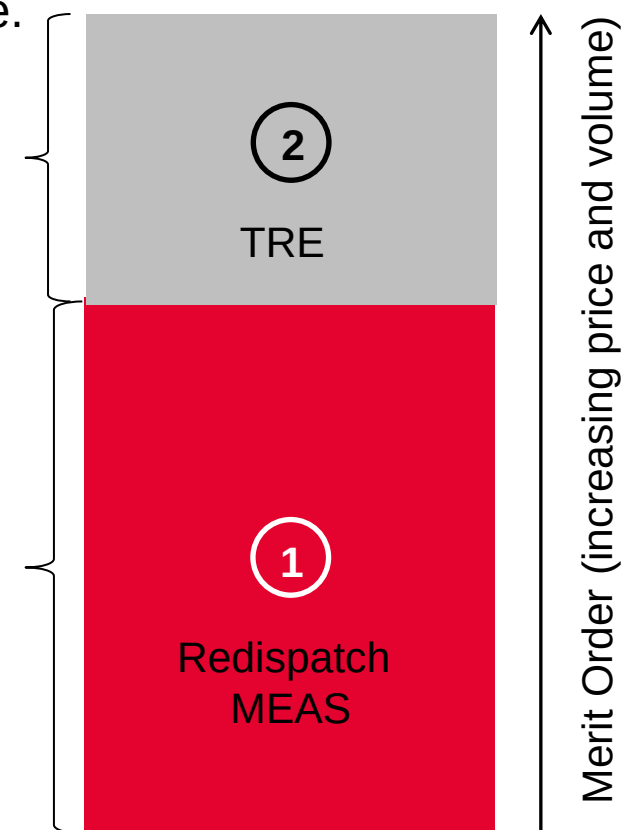
High balancing energy prices BG-long < -5'000 EUR/MWh

High short prices due to high SRE- prices (4* Backup MOL)

- 19 quarter hours with a high average negative secondary control energy prices (SRE-)

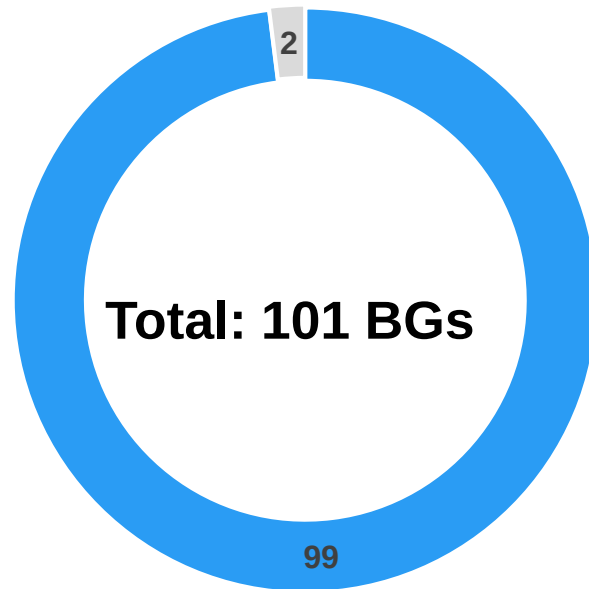
High short prices due to high TRE- prices

- 18 quarter hours with a high average negative tertiary control energy prices (TRE-)



Connection Balance Group (Status 1th November 2024)

Secondary Channel (Backup) - sFTP



■ sFTP PROD active ■ sFTP PROD in process

- Email and FTP will be removed as communication channels in the technical balance group regulations as of 01.01.2025
- All balance groups have to be connected via ECP as primary channel
- We recommend a backup connection, as it has already happened and the ECP connection was interrupted

Amendments in Appendixes of Balance Group contract which will enter into force on 1st January 2025

General Balance Group Regulations

- Maximum power from photovoltaics system (PVmax) to be provided
- Clarifications on the reimbursement of energy reserves
- Forecasts of load and production must be updated at least once a day, also on weekends and on public holidays
- Add description regarding the effects on balance group responsible parties in case of a direct intervention in the dispatching of power plants

Technical Balance Group Regulations

- Insert the permissible decimal places of the nominations per border
- Change of the wording from Trial run to BG Acceptance Test, which is carried out by Swissgrid

Appendix 5: Energy Reserves

- Detailing the terms of payment

Detailed information on the adjustments will soon be sent to all balance groups by e-mail

Know Your Customer (KYC Light)

We started with a test phase and are checking the master data in the customer portal for randomly selected balance groups

Know Your Customer in the registration process

The verification (Know Your Customer) already takes place when a balance group is registered

Why the KYC Light?

Experience has shown that information in the customer portal was repeatedly incorrect or not adjusted

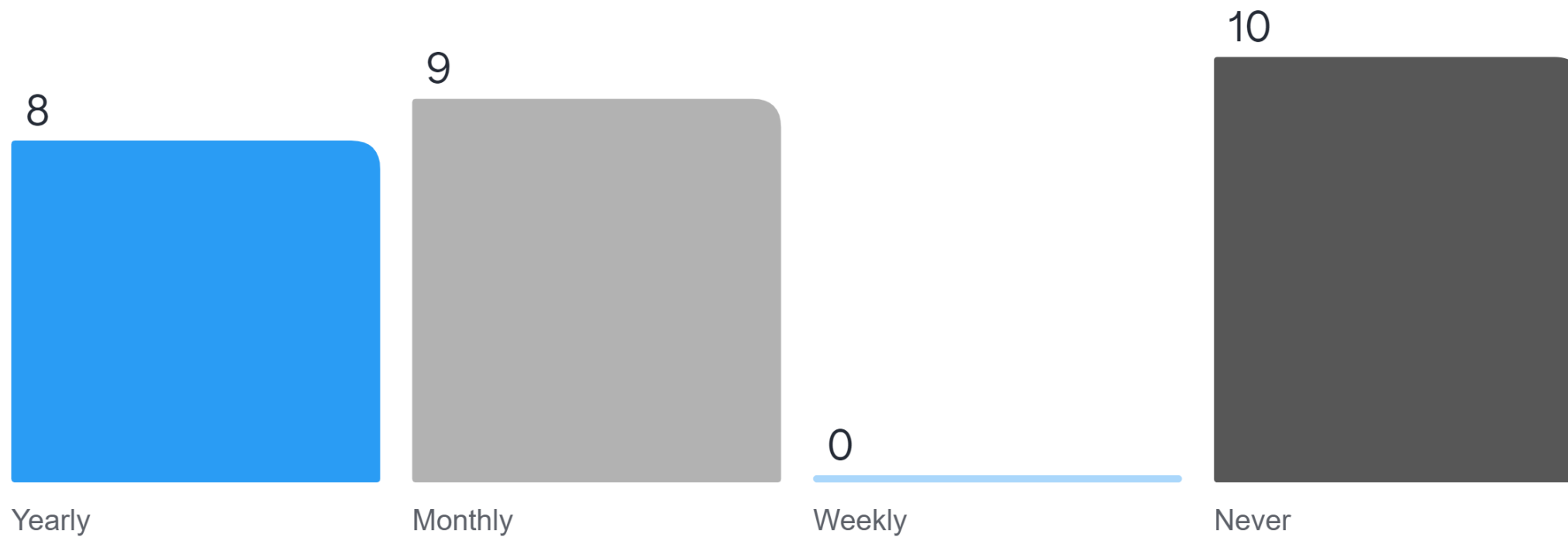
- For example: The contact person or bank details were no longer up to date
- The operational data were also not adjusted (incorrect telephone numbers)



Based on this, a review (Know Your Customer Light) is carried out to ensure the quality of the customer portal

Survey of meeting participants

How often do you check your data in the customer portal?



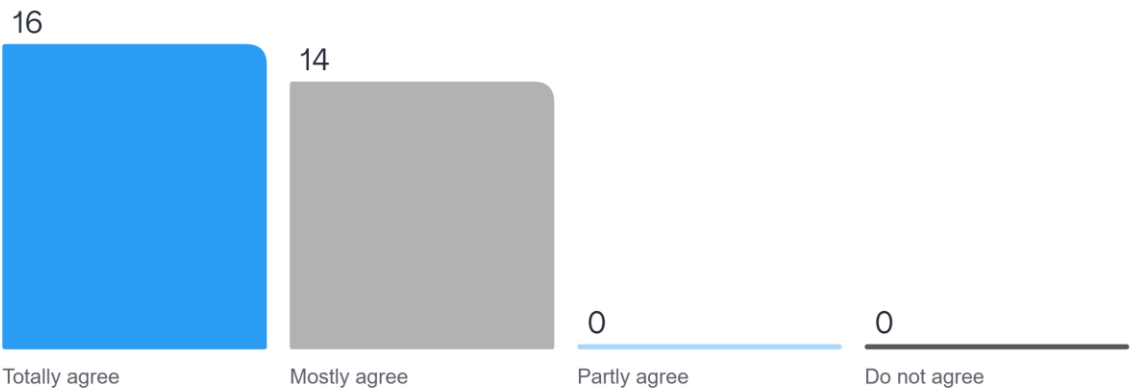
Feedback session

Survey of meeting participants

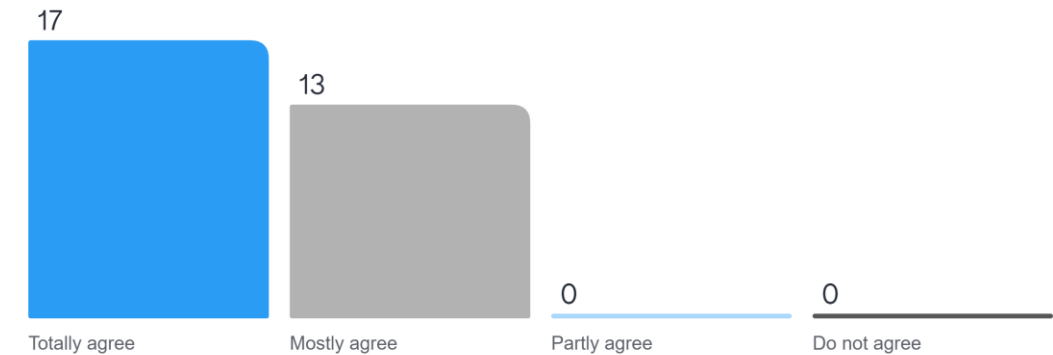
The organization of the BGM Partner Meeting was professional and I felt welcome all day long



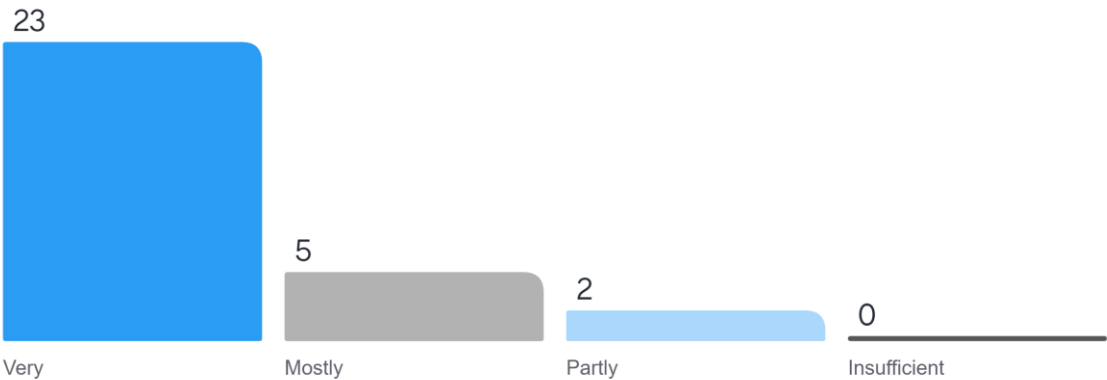
I was able to gain important new insights



The selection of topics was well-balanced and met my expectations



I am satisfied with the format of hybrid meeting



A man wearing a yellow jacket, a black helmet, and a backpack is riding a bicycle on a city street at night. He is looking towards the camera. To his right, a tram is moving quickly, creating a horizontal blur effect. The street is illuminated by streetlights, and a yellow bicycle symbol is painted on the pavement. In the background, city buildings and a distant smokestack are visible under a dark sky.

See you again in a year

Swissgrid Ltd
Bleichemattstrasse 31
P.O. Box
5001 Aarau
Switzerland

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