HUPX Group – Refinitiv Workshop

Power Session

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An LSEG Business

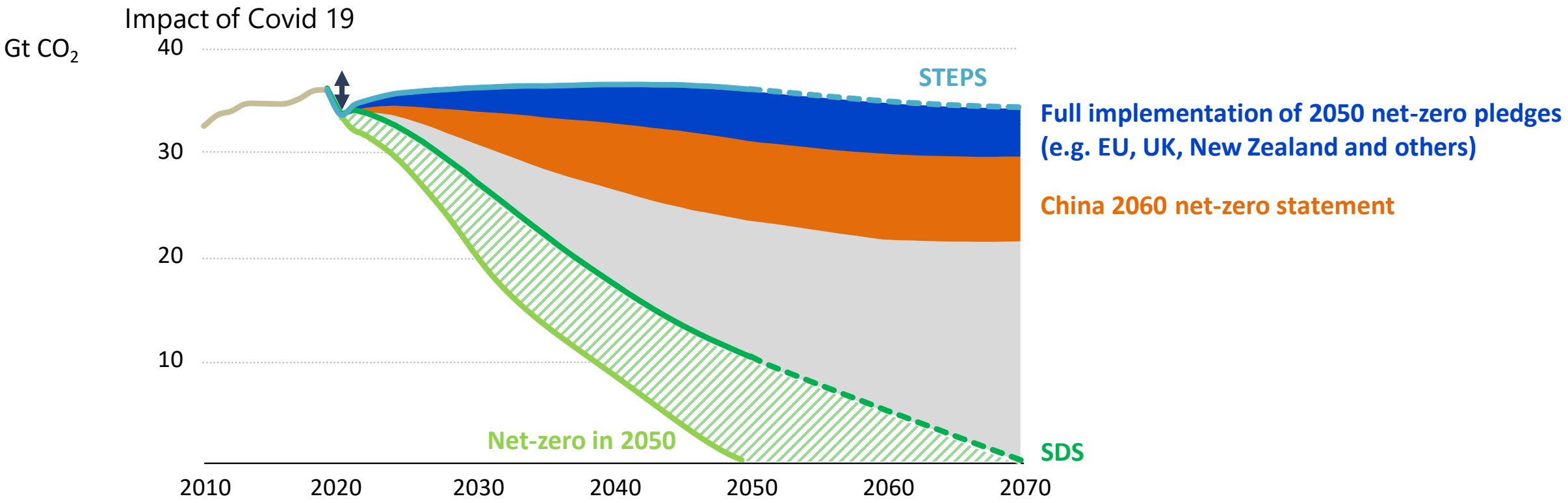
International Energy Agency

Clean energy at the heart of the economic recovery

Laszlo Varro

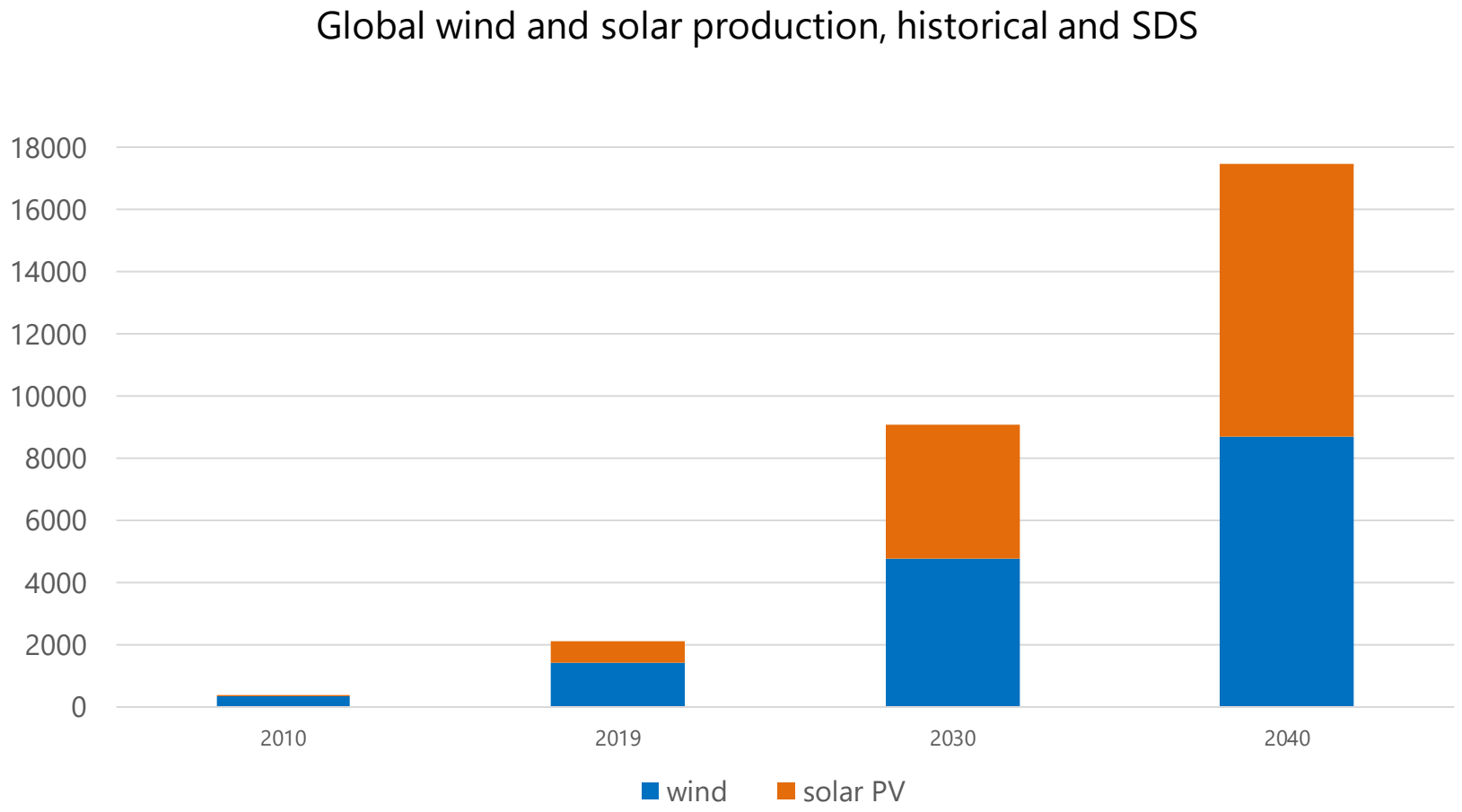
Chief Economist

The world is still far from putting emissions into decisive decline



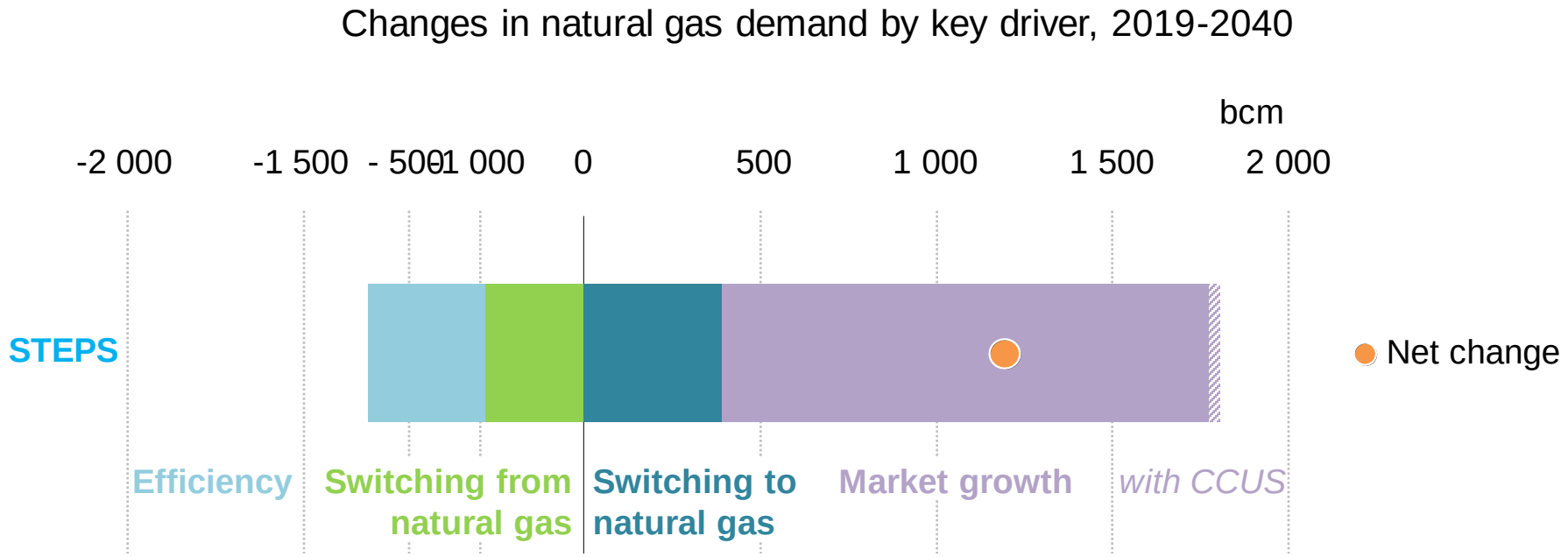
Global emissions are set to bounce back more slowly than after the financial crisis of 2008-2009, but the world is still a long way from a sustainable recovery

A sharp acceleration of renewable deployment is needed



In most regions annual deployment will have to exceed double of the previous peak year

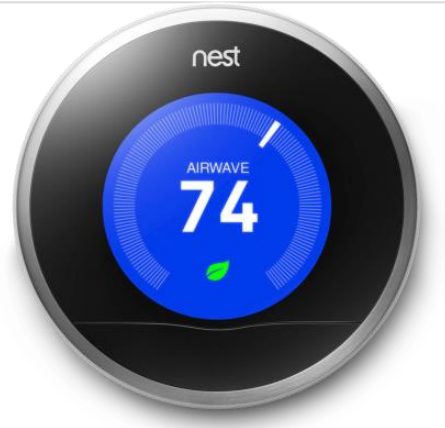
Is natural gas still a ‘transition fuel’?



The push in developing economies for industrial growth & improved air quality create openings for gas in the STEPS. Prospects in the SDS are diminished by faster efficiency gains & switching to renewables

A broad flexibility portfolio is needed

Transmission interconnection



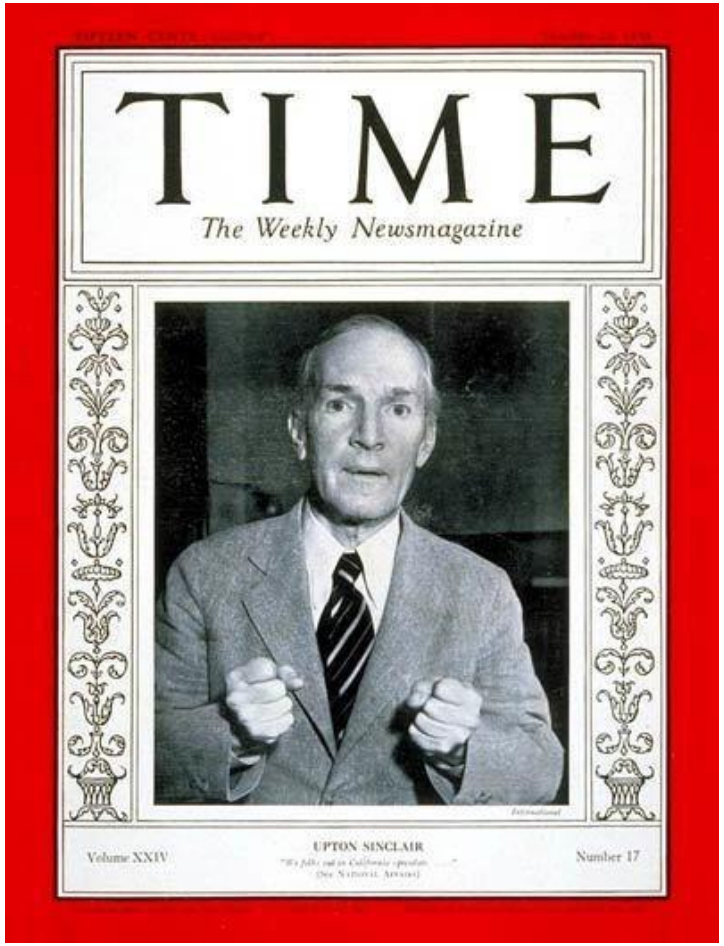
Demand response

Storage

Dispatchable generation

Gas turbines remain essential for electricity security

Flexibility transformation and the Upton Sinclair principle



"It Is Difficult to Get a Man to Understand Something When His Salary Depends Upon His Not Understanding It"

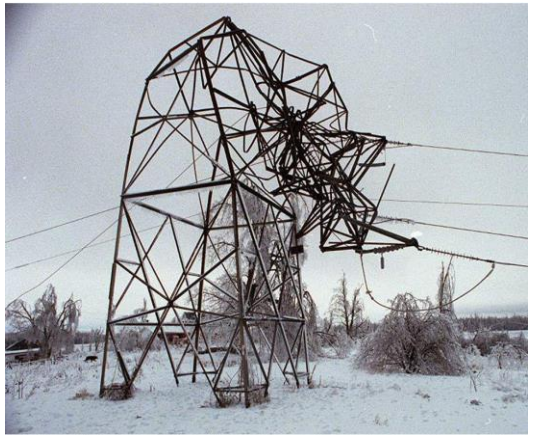
Current electricity regulation and network tariffs create adverse incentives to new flexibility solutions

Seasonal mismatch of renewable production in temperate latitudes

Heat pump heating and electric cars consume more in winter and can push some currently summer peak regions to winter peak, challenging the system value of solar.

Costs decline and integration capability improves, but

Social acceptance and permitting



Timely upgrades of the electricity network

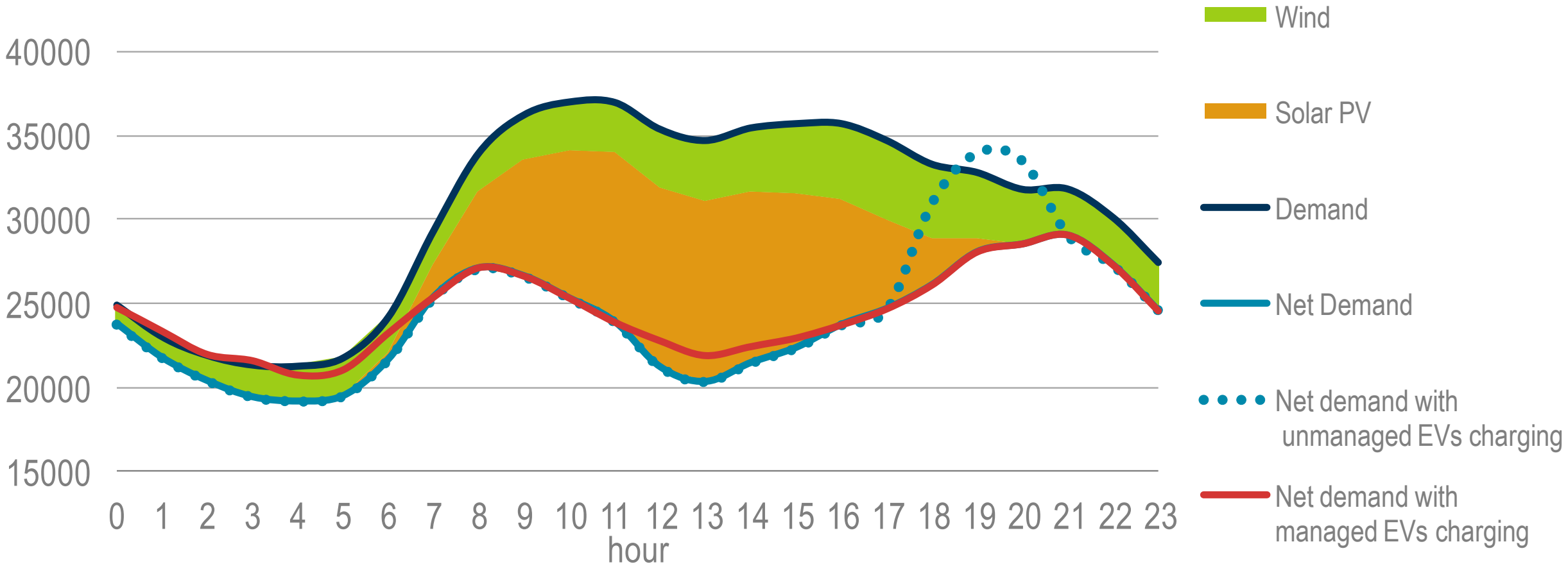
Infrastructure and land use barriers need to be addressed for a further acceleration

Transport: Social and behavior impacts of the virus cut in both directions

versus

Home office and digital tools have an impact on travel but there are also indications of a shift to cars from public transport.

Renewables and EVs transform the need for demand flexibility



Smart sector coupling will need to take VRE deployment into account to avoid exacerbating net demand load changes.

Emerging electrification of light delivery trucks

- Light trucks: 5 million barrels/day
- 2020: large and probably irreversible shift to e-commerce and home delivery
- Energy impact of same day delivery
- Large e-business operators have no capital constraint
- Options for optimised charging in logistical centres

Both supply chain changes and online delivery seems to have a smaller impact than macroeconomic fluctuations

Heavy trucks: batteries and H2 try to challenge diesel

- Battery weight with high driving distance
- Just in time logistical operations
- Network impact of megachargers

For medium and heavy trucks a slower transition and a roughly even battery/H2 split is expected

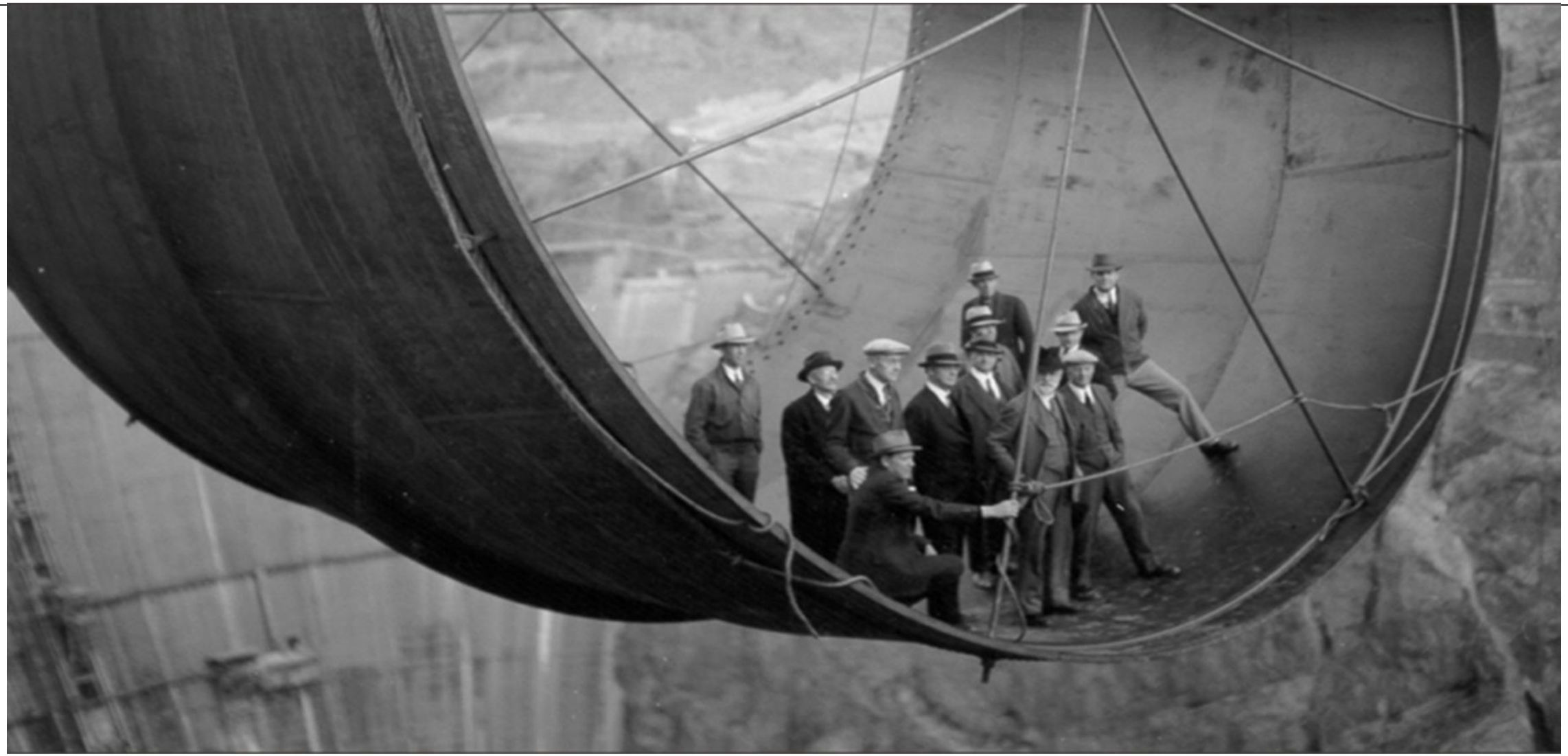
The implications of not reinvesting in nuclear

10 – 10 twh from solar PV and wind

16000 football fields of solar panels

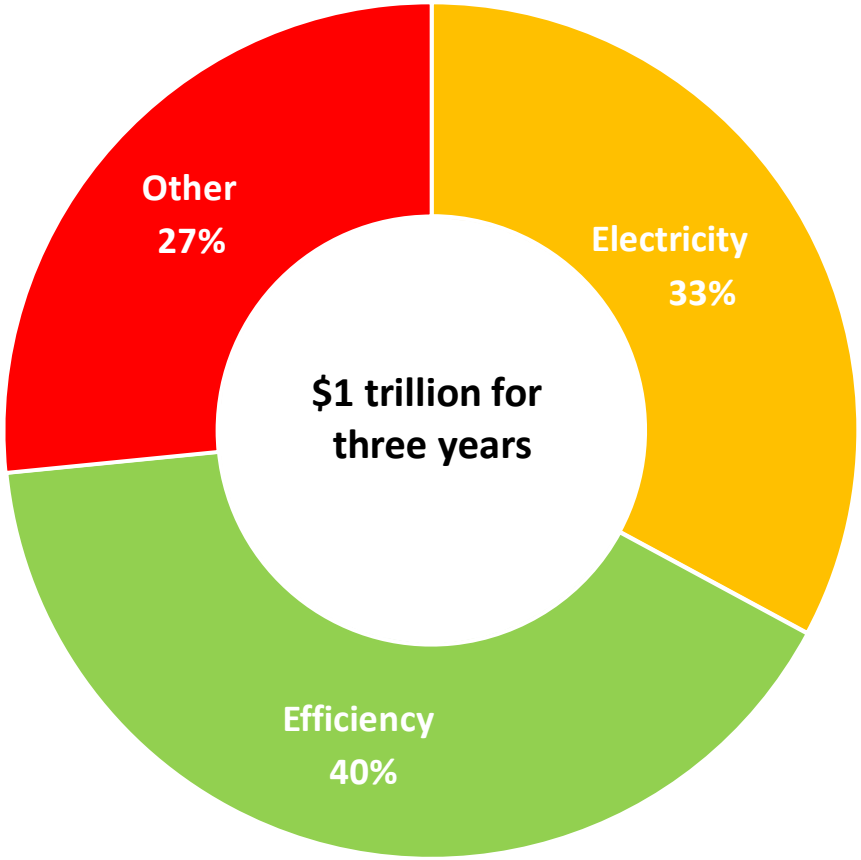
25000 football fields of wind farms

Keynesian impacts of clean energy investment



Stimulus funded low carbon investment for the economic recovery, 1935 version

A plan for a Sustainable Recovery post Covid-19



The Sustainable Recovery Plan provides an integrated approach to support economic recovery and jobs while improving the resiliency & sustainability of the energy system

Quantitative easing and the energy transition

Low carbon projects that are transformed into $/Euro fixed income assets enjoy extremely low WACC while other technologies or regions might face credit rationing

Don’t reinvent the wheel: 5 key lessons from previous green stimulus efforts

1. Scale up existing financing channels
2. Focus on modular technologies
3. Beware of large, complex engineering projects
4. Pay attention to the industrial value chain and skilled labor availability
5. Consider the broader social implications of stimulus policies

A Pan-European Power outlook

Mihaela Puica – Senior Power Analyst for European Power, Refinitiv

April, 2021, HUPX Group – Refinitiv Workshop

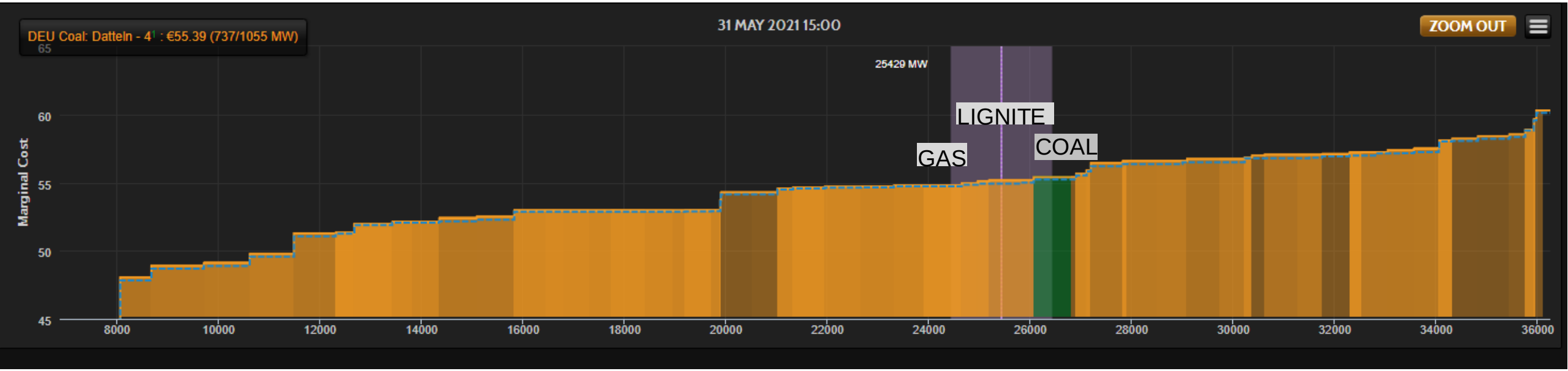
A Tale of Two Elements

- Supply stack

- Interconnectors

First Element: Merit orders began to reshuffle

- The German stack has been in continous reshuffle as fuel prices evolve on may types of factors (weather conditions, supply squeeze, decarbonization policy etc.)



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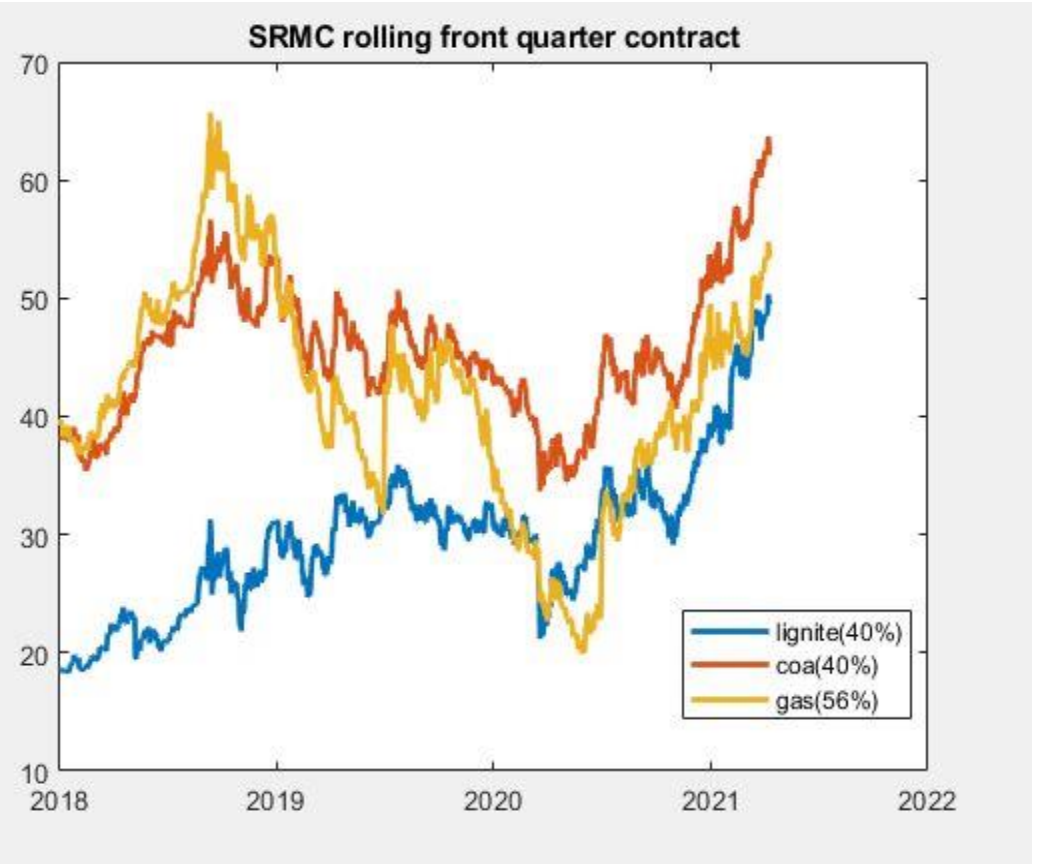
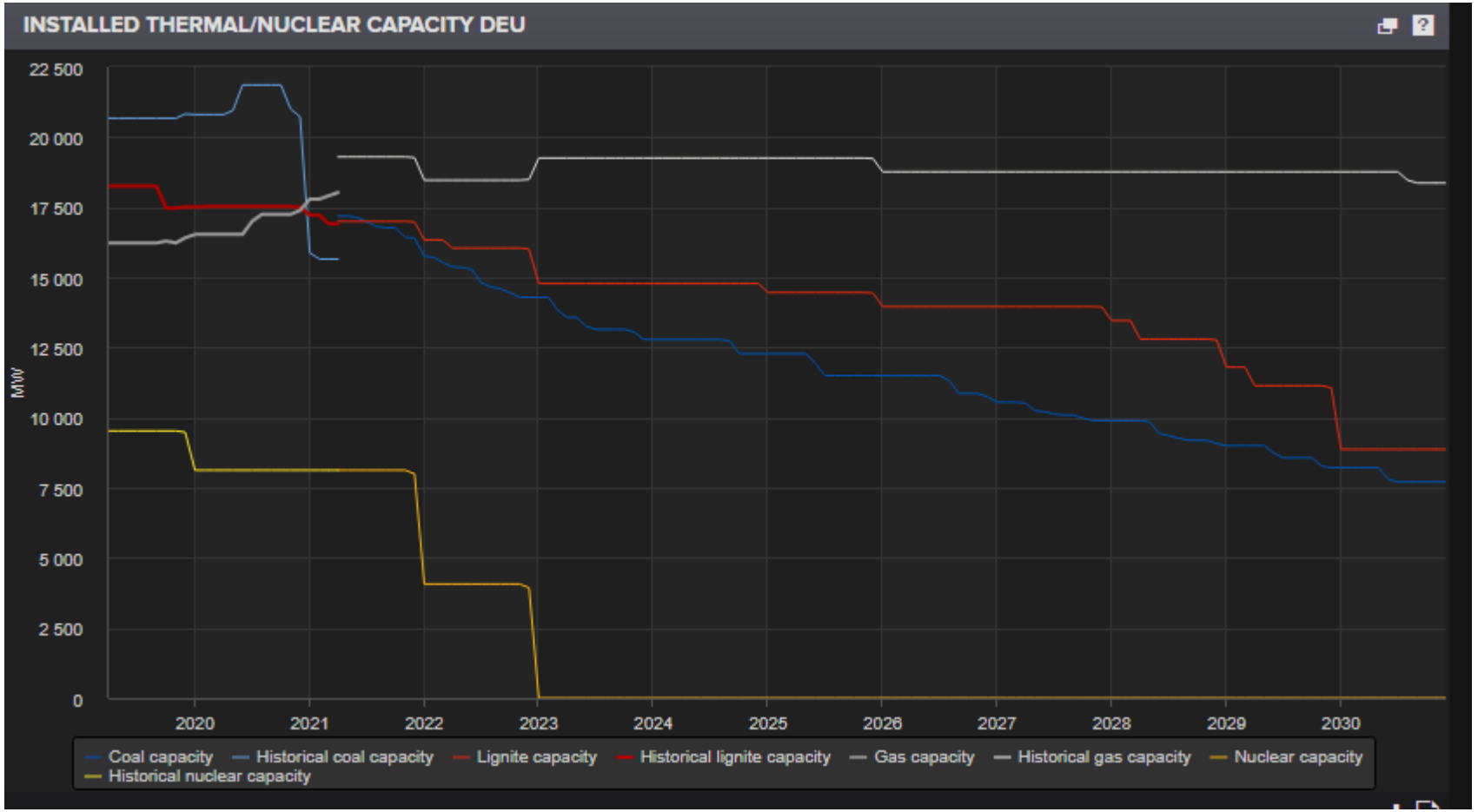
Indeed

- The continued rally for EUA carbon brought gas plants back into the money
- High-efficiency gas plants are now right after the lignite stack in merit order and replacing coal-fired generation
- Coal phaseout or ¾ empty gas storages put pressure on prices



Indeed

- Coal phaseout procedure is decided in DEU: 30 GW (2022) ➔17 GW (Apr 2030) ➔0 GW (2038)
- More tenders for capacity reduction: Oct 2021, Mar 2022, Aug 2022, Jun 2023, Jun 2024
- FRA: latest closure in 2022
- AUT closed its last coal plant in 2020



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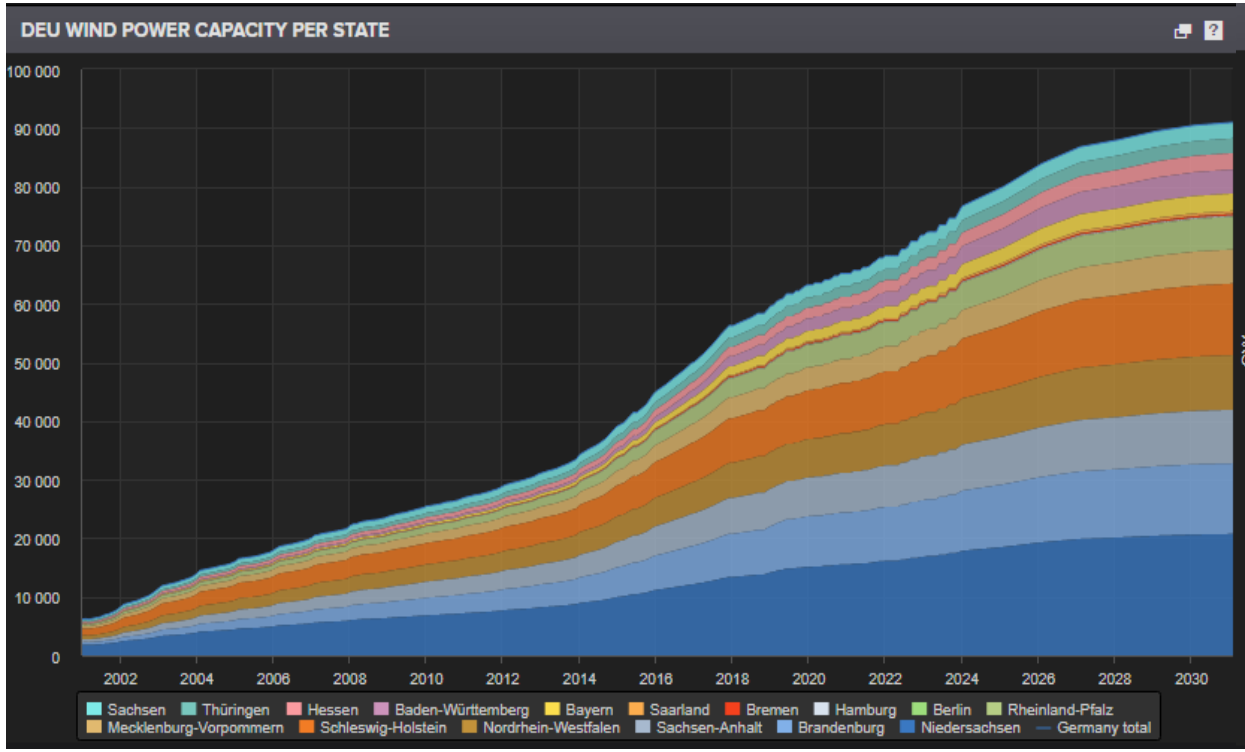
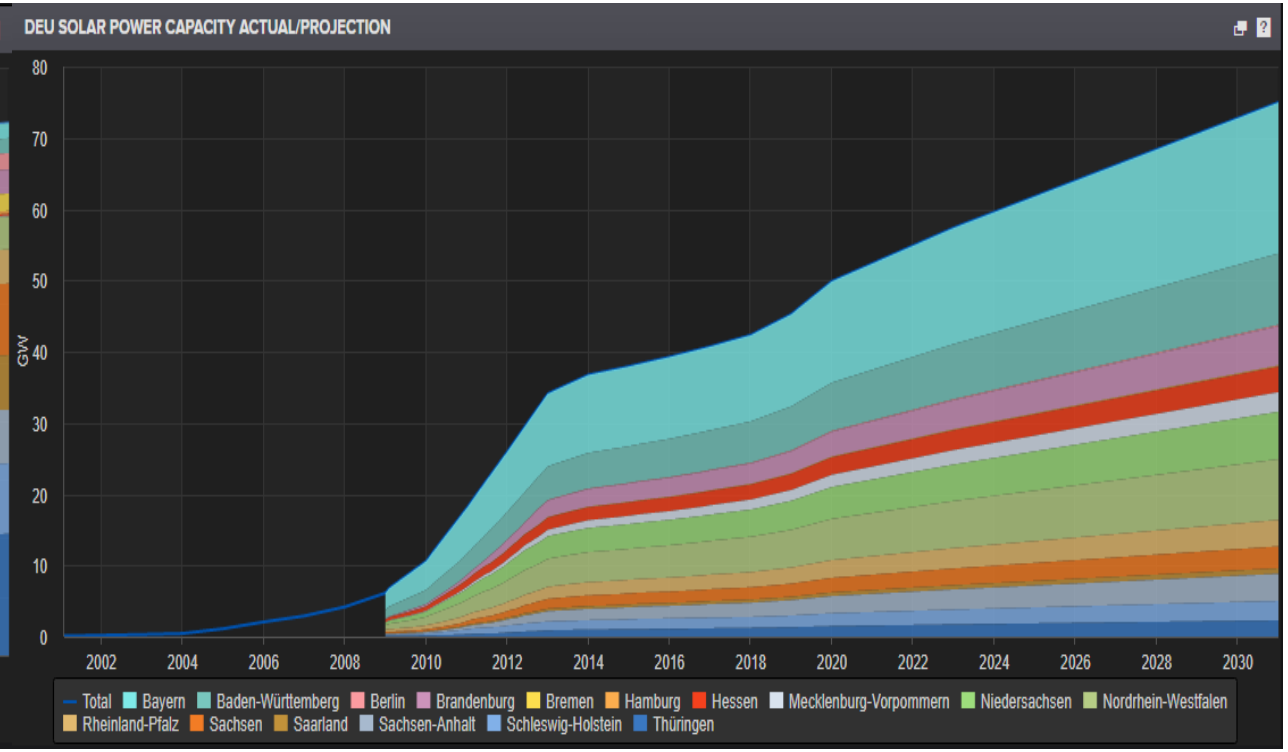
Indeed, more renewables to come

- More offshore wind capacity to come, above 13 GW (DEU) and 2 GW (NLD) by the end of 2022





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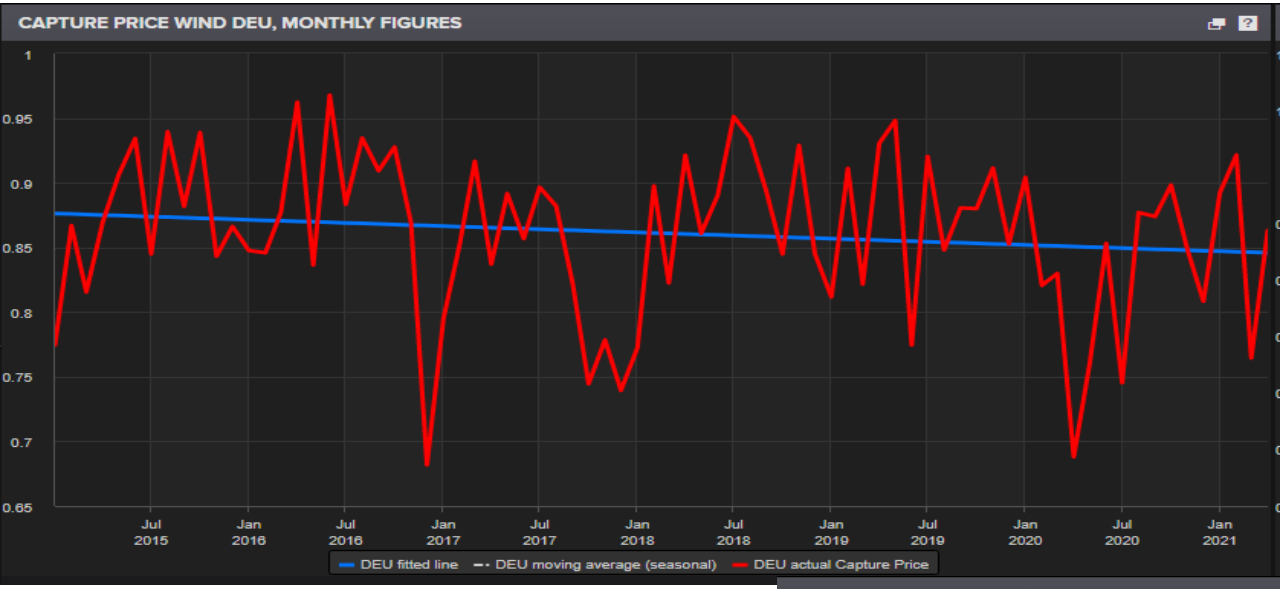
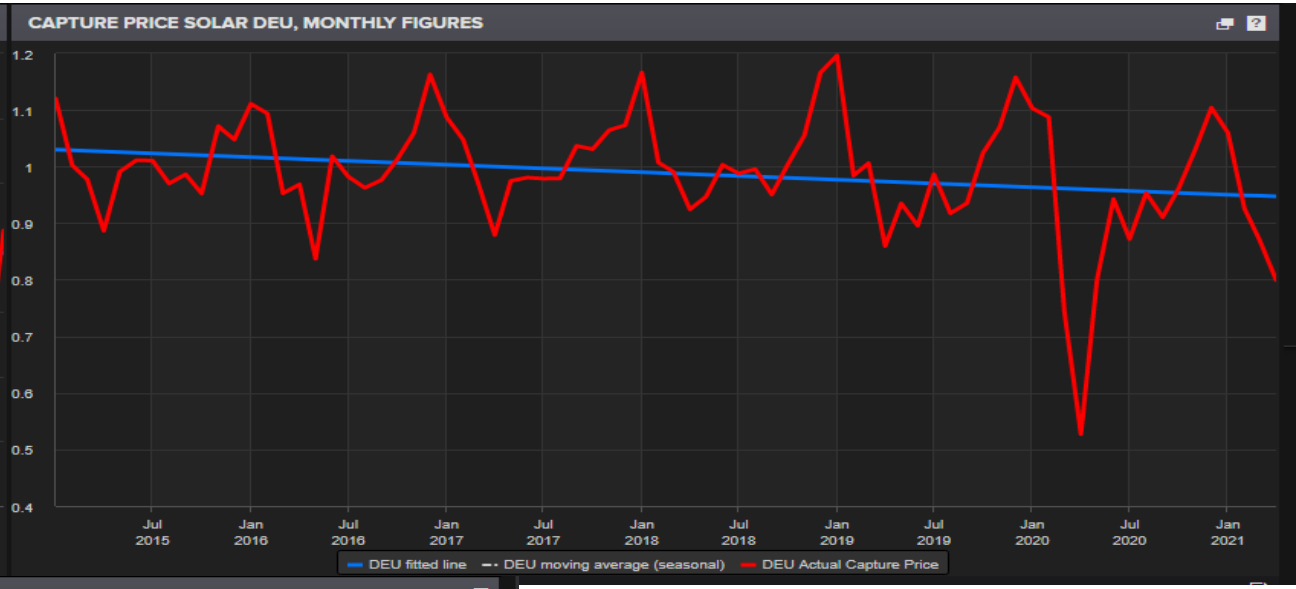
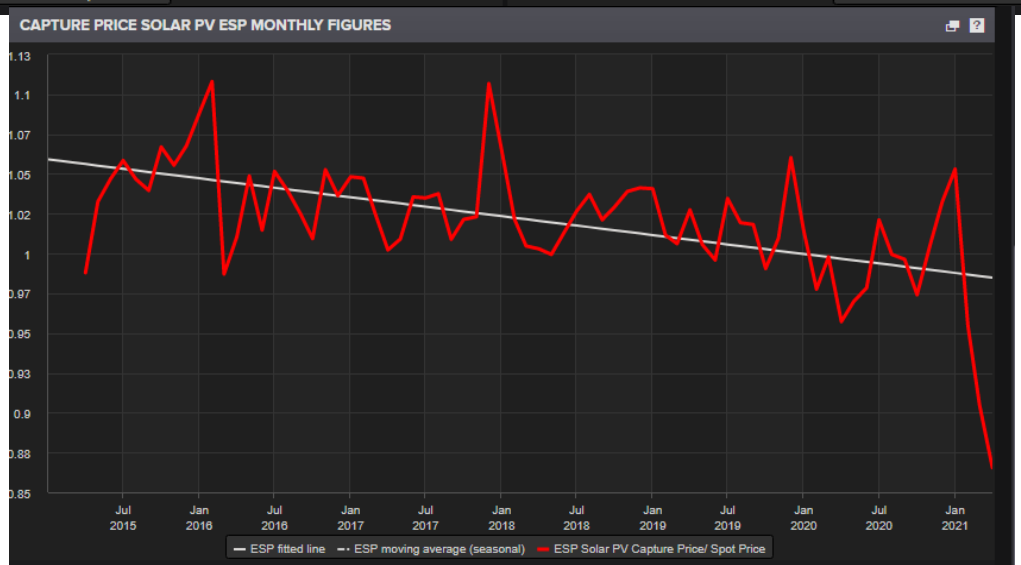
How many more renewables?

- Capture prices=average net price that a wind/solar producer gets from the system price for 1 MWh/h







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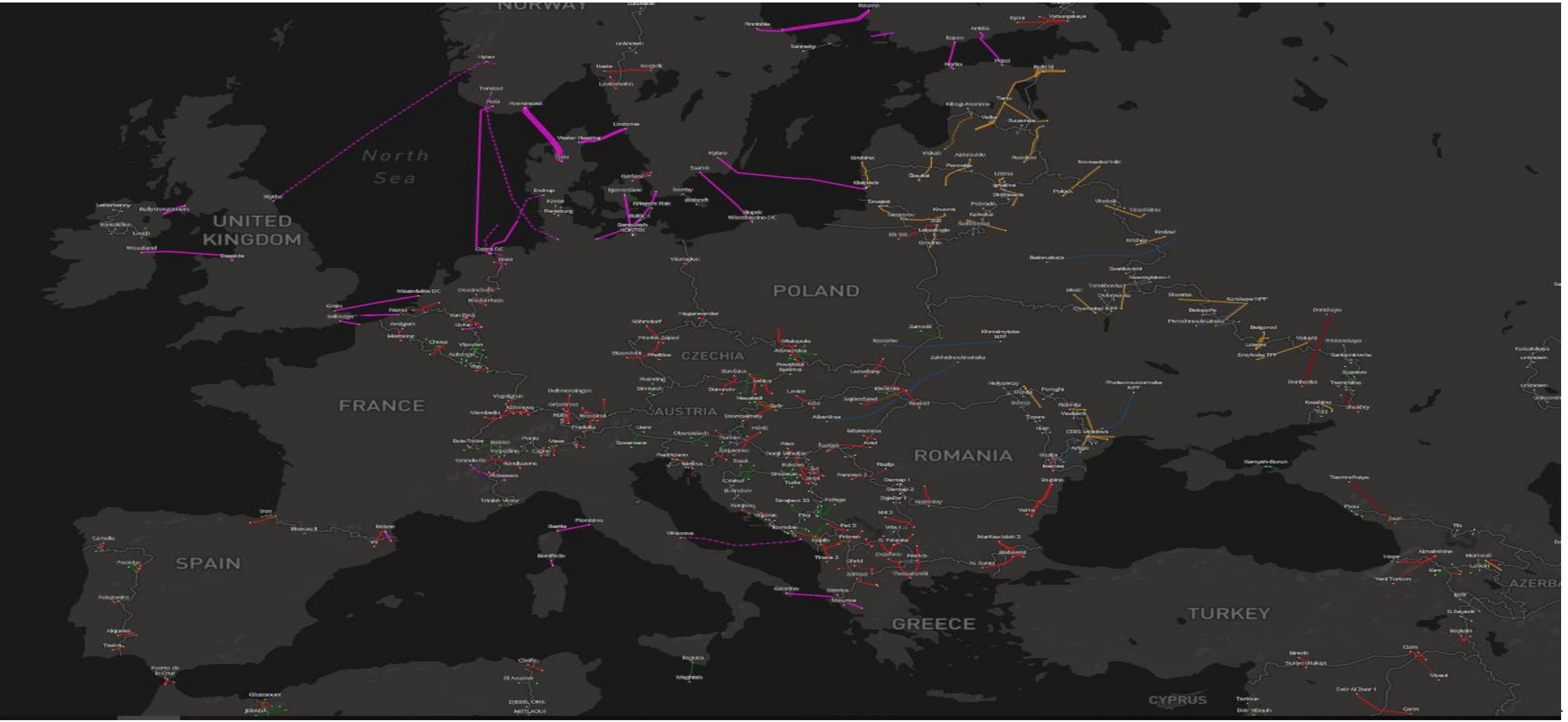
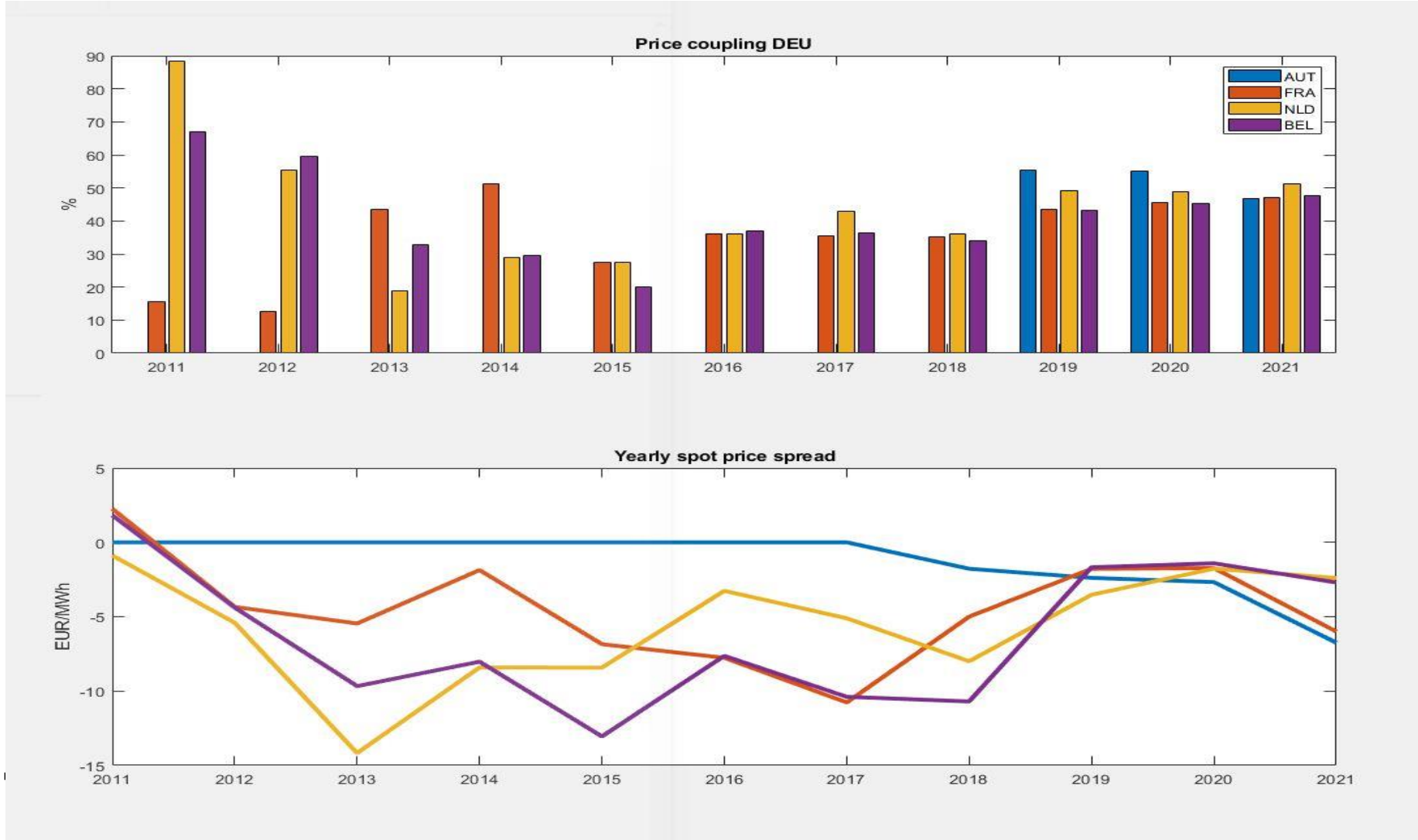
Second Element: More interconnectivity shaping prices



ENTSO-E Interconnected Europe

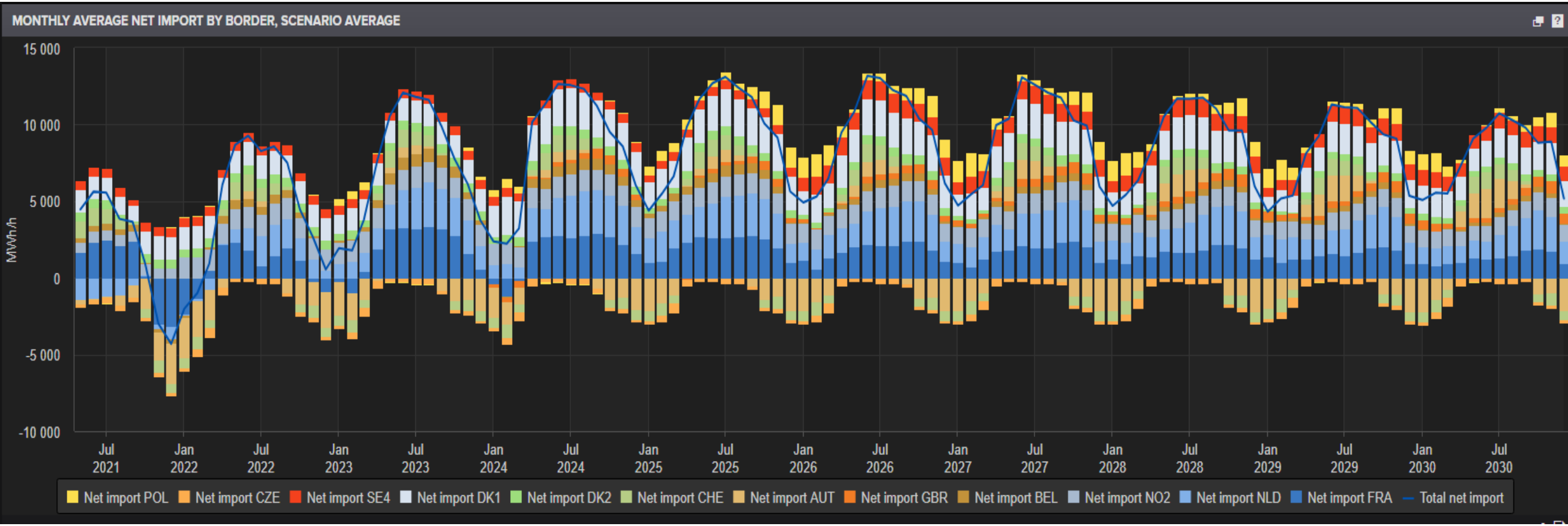
Indeed

- Flow-based market coupling implemented in May 2015 allowed for more price convergence in CWE



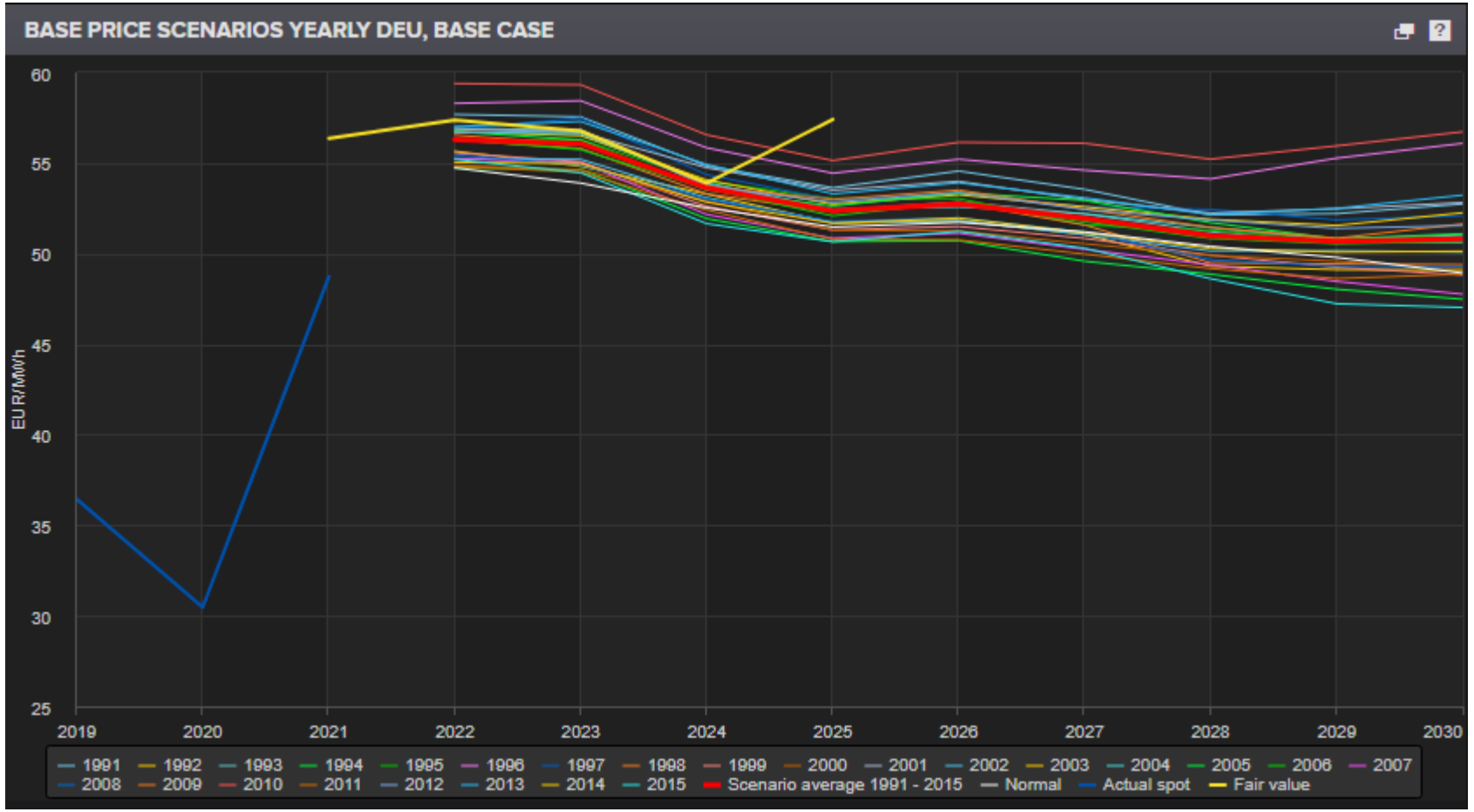
Indeed, more interconnectors to come

- More scheduled interconnections: DEU-POL (2 GW) in 2023; DEU-DK1 (1GW) in 2024; DEU-AUT (2 GW) in 2025; DEU-SE4 (0.7 GW) in 2026, among others
- DEU to slowly become net importer from 2022 onwards



Our price outlook

- May'21 Bullish
- Q3'21 Bearish
- Cal-22 Bearish



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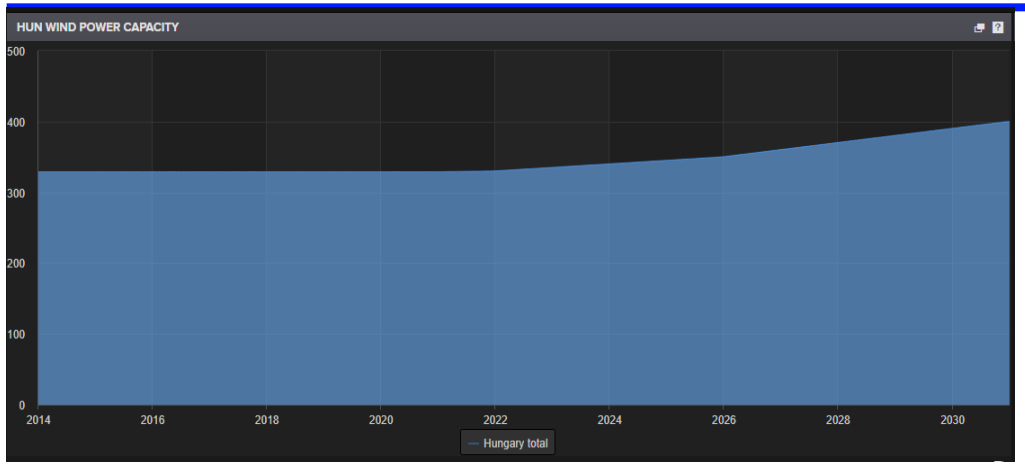
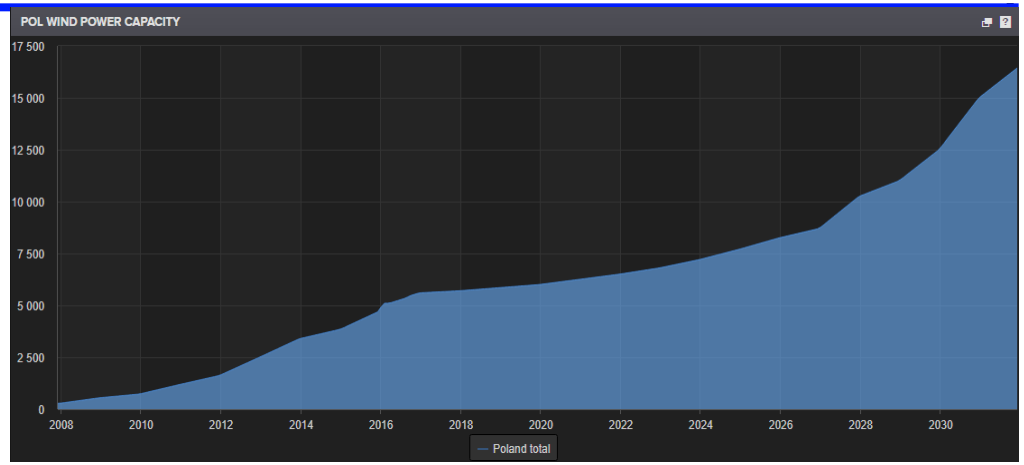
CEE: A Tale of Two Elements revisited

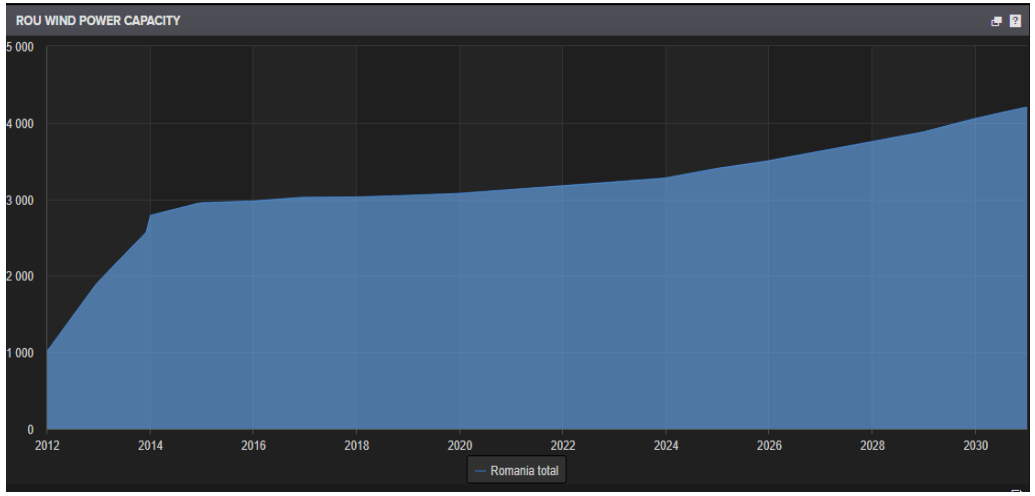
- Renewables assumptions

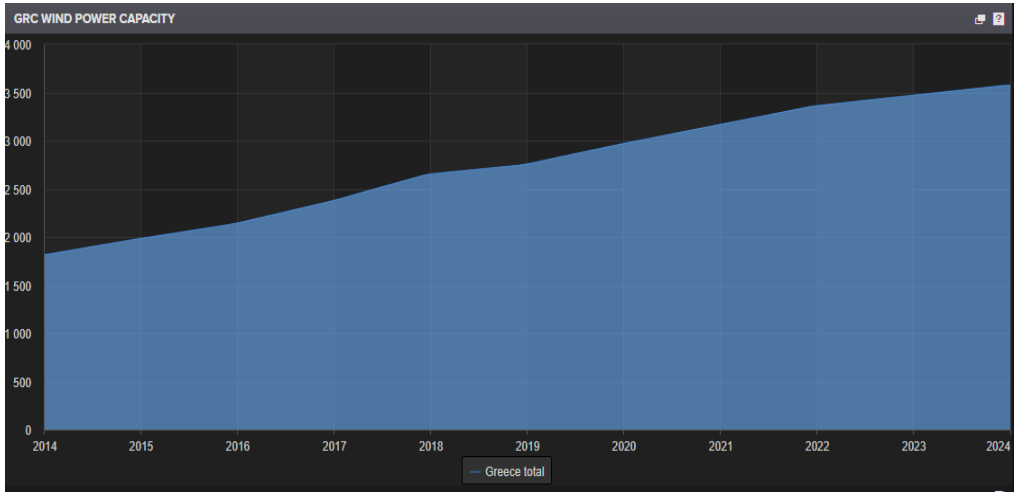
- Interconnectors & Prices

CEE: Renewable capacity assumptions









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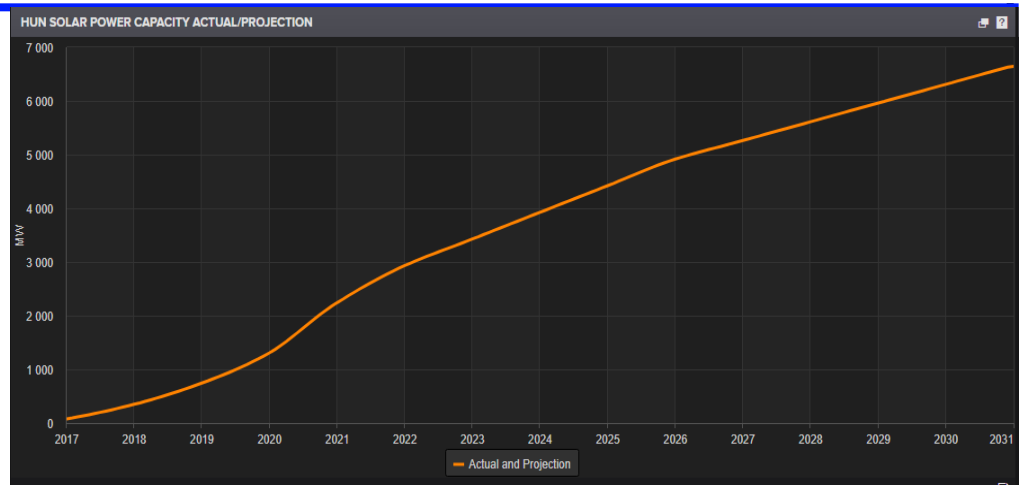
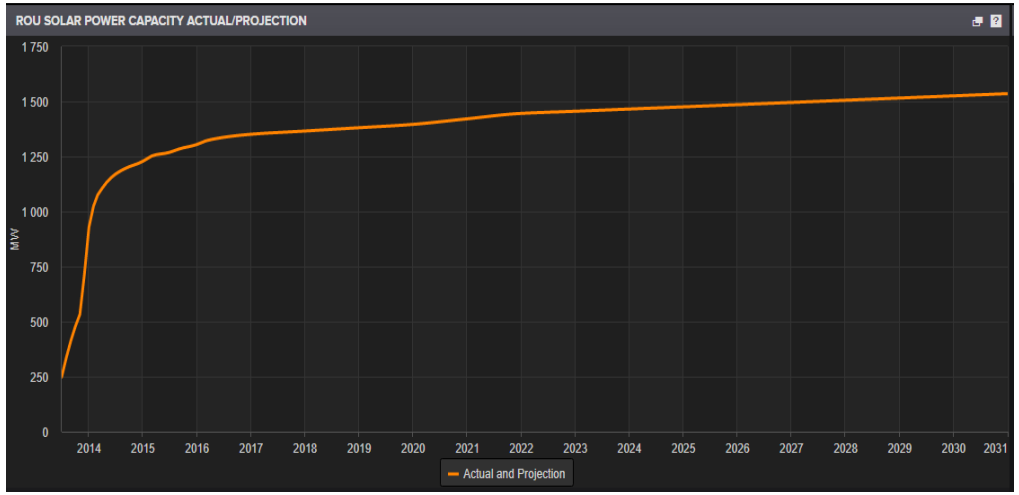
CEE: Renewable capacity assumptions





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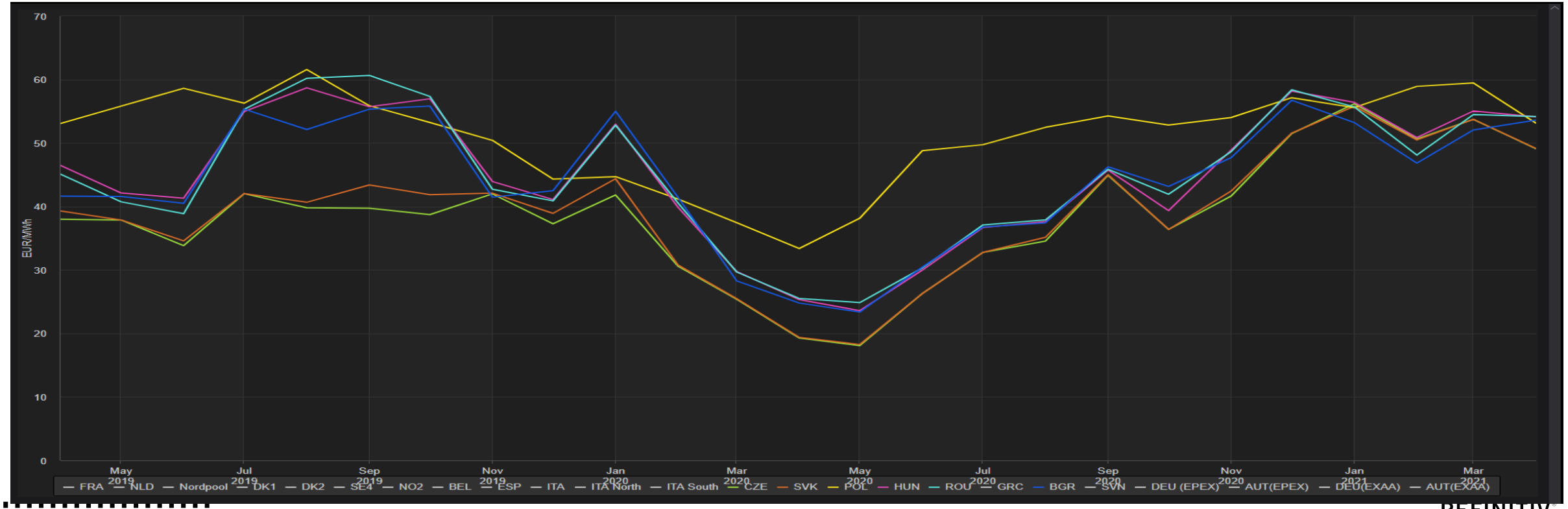
CEE: Price convergence

- HUN-ROU price convergence ➔ HUN net exporter to ROU
- BGR-ROU price convergence ➔ BGR to ROU exports since July 2020, mainly importer previously
- CZE-SVK price convergence ➔ CZE net exporter
- POL full imports from CZE



Our price outlook (EC12)

- HUN front week: 64.3 EUR/MWh Bullish
- CZE front week: 63.2 EUR/MWh
- POL front week: 60.3 EUR/MWh

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Thank you

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THE „HUPX REGION”

Underlying factors of having „HUPX region” today:

- generally strong cross-border capacities of the region
- changes in the generation (export/import) of Romania and Bulgaria
- increase of RO-BG cross-border capacity
- the Hungarian forward market is the most liquid in the region

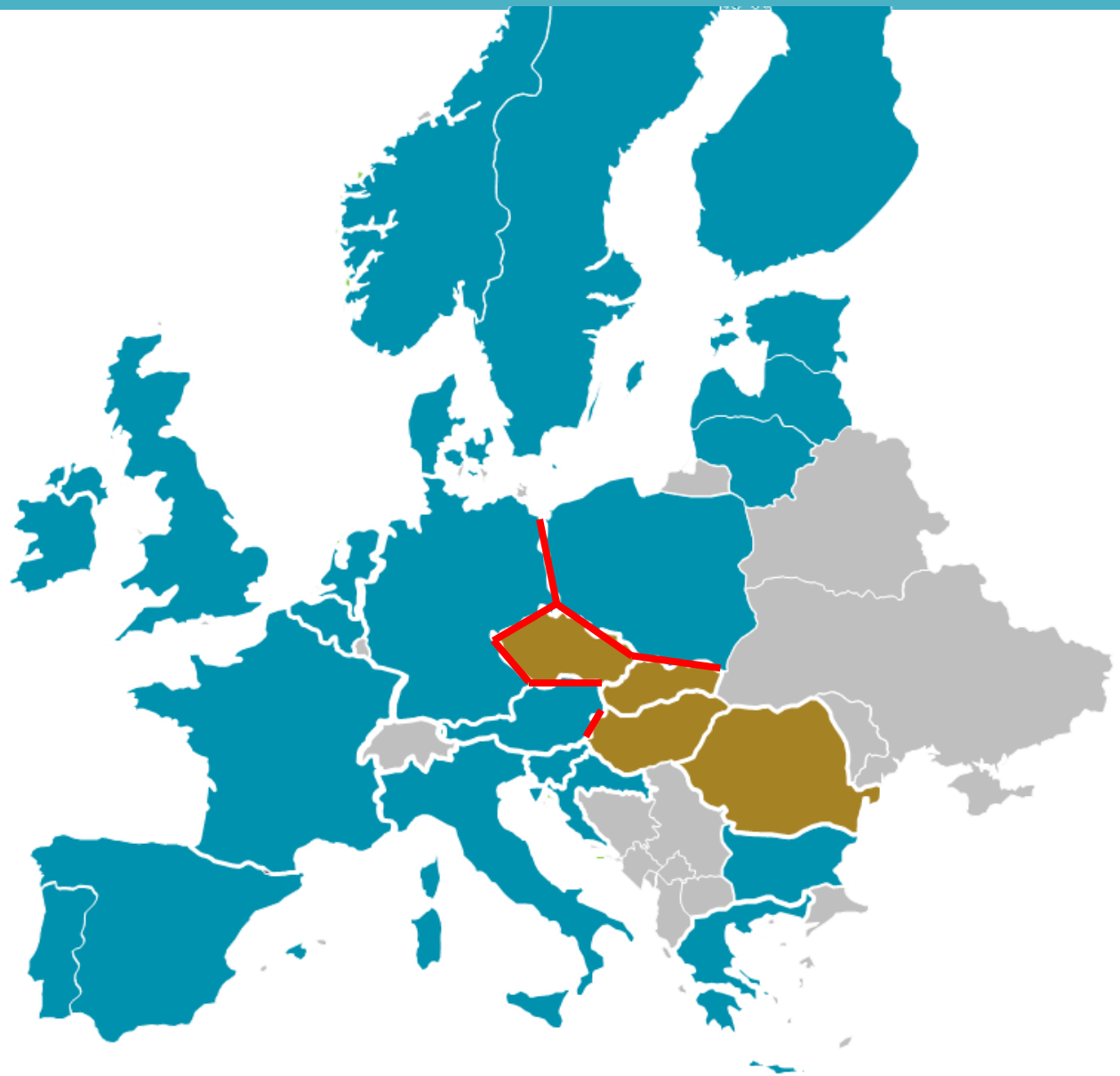
HUPX’s spot prices reflect the actual situation in the region.

Upcoming regional developments with significant impact on the markets

- **Significant increase of HU-SK cross-border capacity**

5th April 2021

Upcoming regional developments with significant impact on the markets



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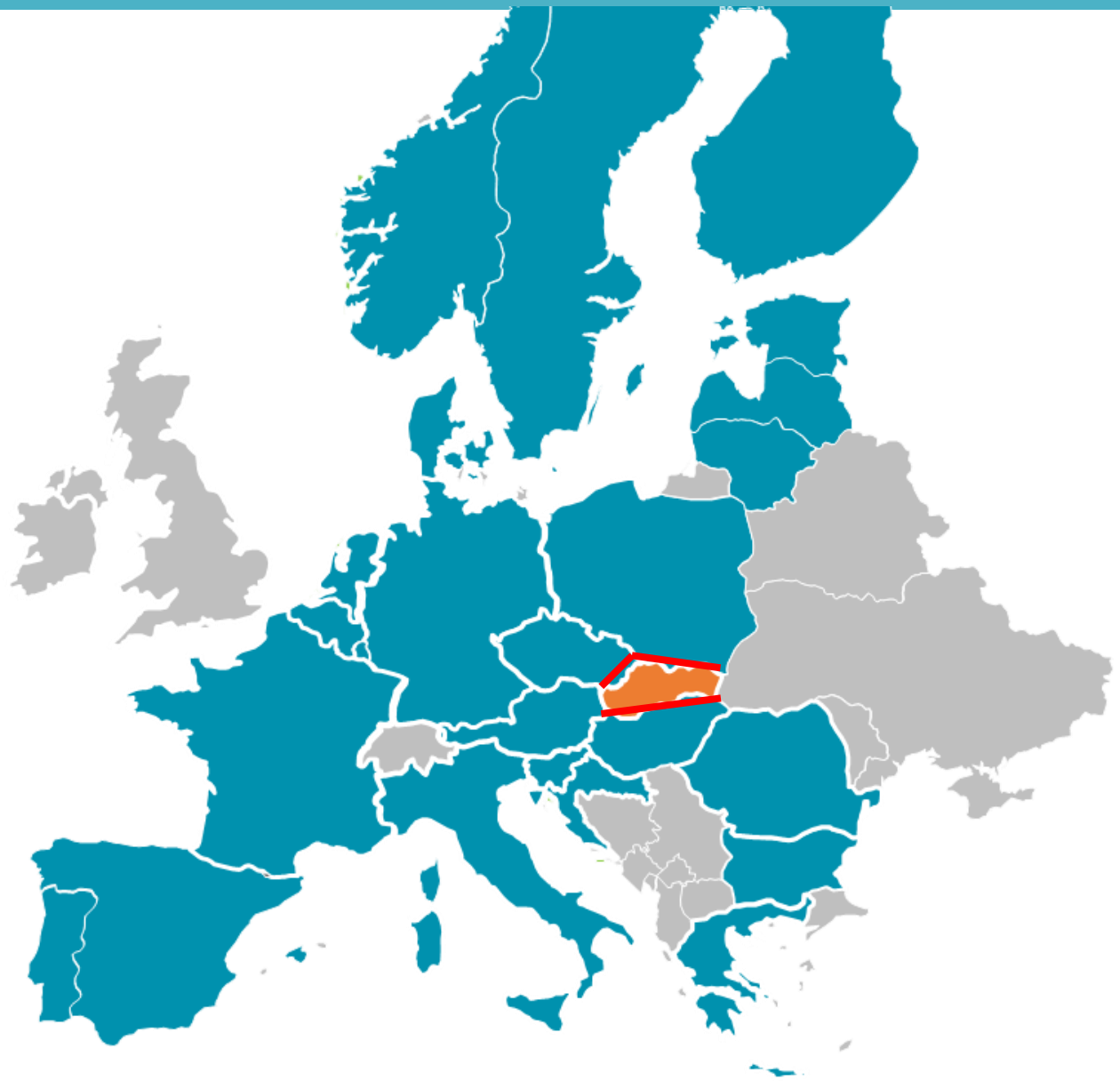
5th April 2021

- NTC based day-ahead market coupling on the DE-AT and PL and 4MMC borders (~MRC and 4MMC coupling)

2021 Q2

Upcoming regional developments with significant impact on the markets



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- Slovakia joins the SIDC (LIP17)

  after 2022 Q1

Upcoming regional developments with significant impact on the markets

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Upcoming regional developments with significant impact on the markets

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  after 2022 Q1

- Introduction of day-ahead flow-based capacity calculation in the Core region (Core FB MC)

  2022 Q1

- HU-SI interconnector goes live

  2022 Q1

European Single Intraday Coupling and HUPX IDM developments

European Single Intraday Coupling (SIDC) project: Hungary joined in the 2nd wave in November of 2019, the 3rd and 4th wave is in progress.

- ✓ HUPX IDM reached significant liquidity
- ✓ Number of HUPX IDM members increased rapidly
- ✓ Record-breaking volumes

Dec 2020 - 15 min cross-border product was launched on AT-HU border

Feb 2021 - 15 min cross-border product was launched on HU-RO border

INTRADAY

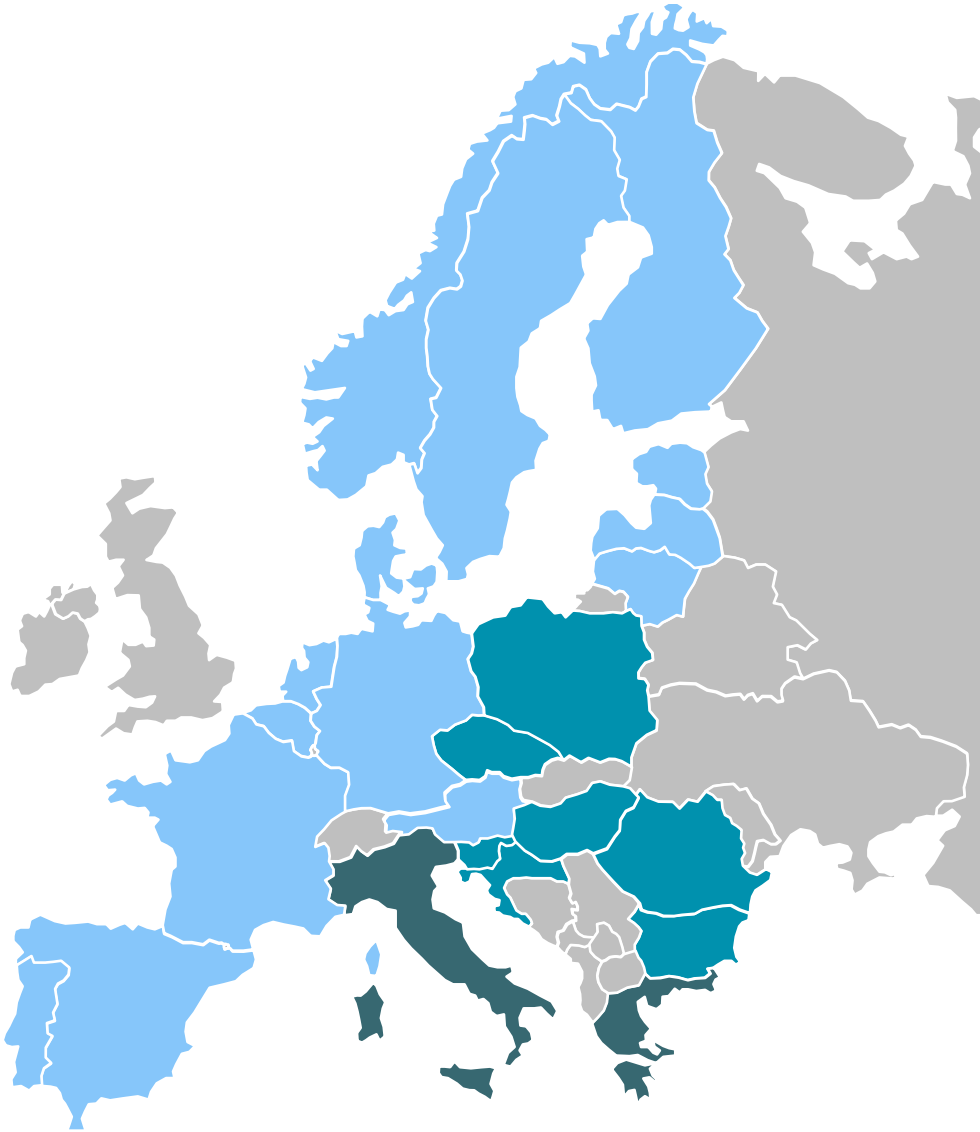
1st wave: Jun 2018

2nd wave Nov 2019

3rd wave: Q3 2021

4th wave: 2022 Q1

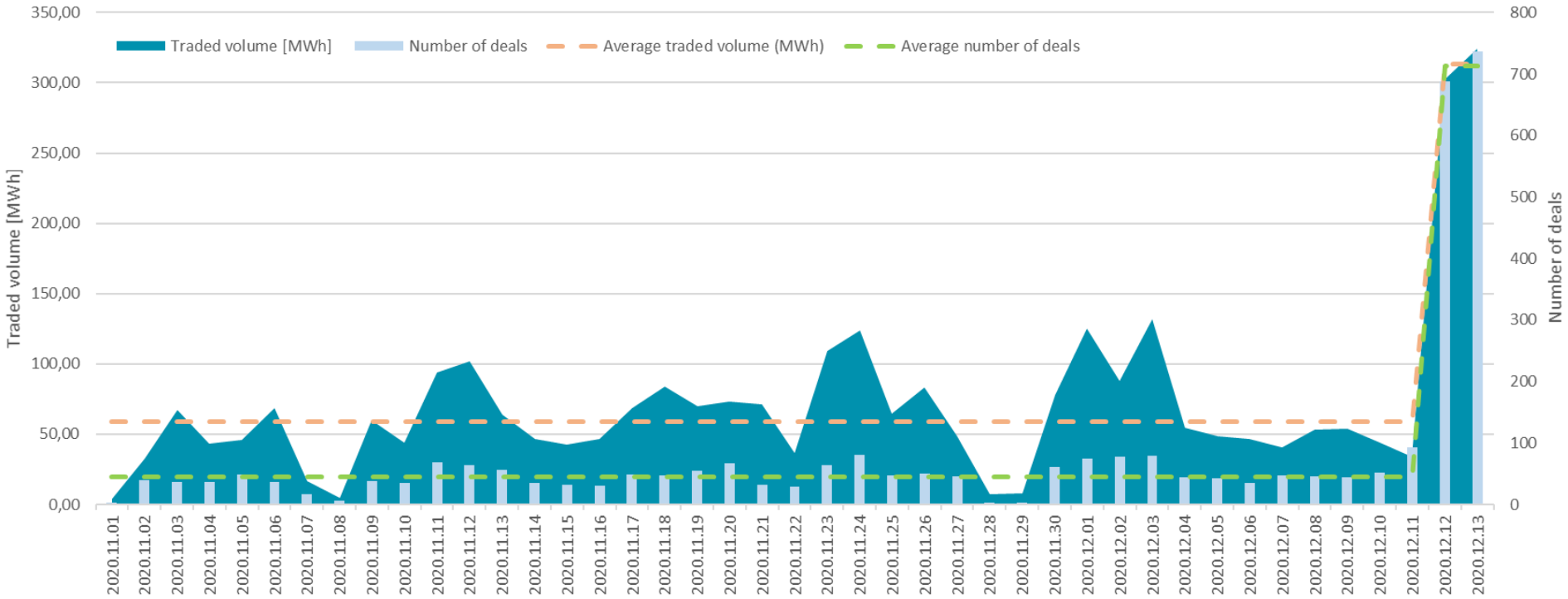
5th wave: after 2022 Q1



RECENT DEVELOPMENTS ON HUPX

Introduction of XBID 15 min products

10th December 2020



Volume:
x4,73

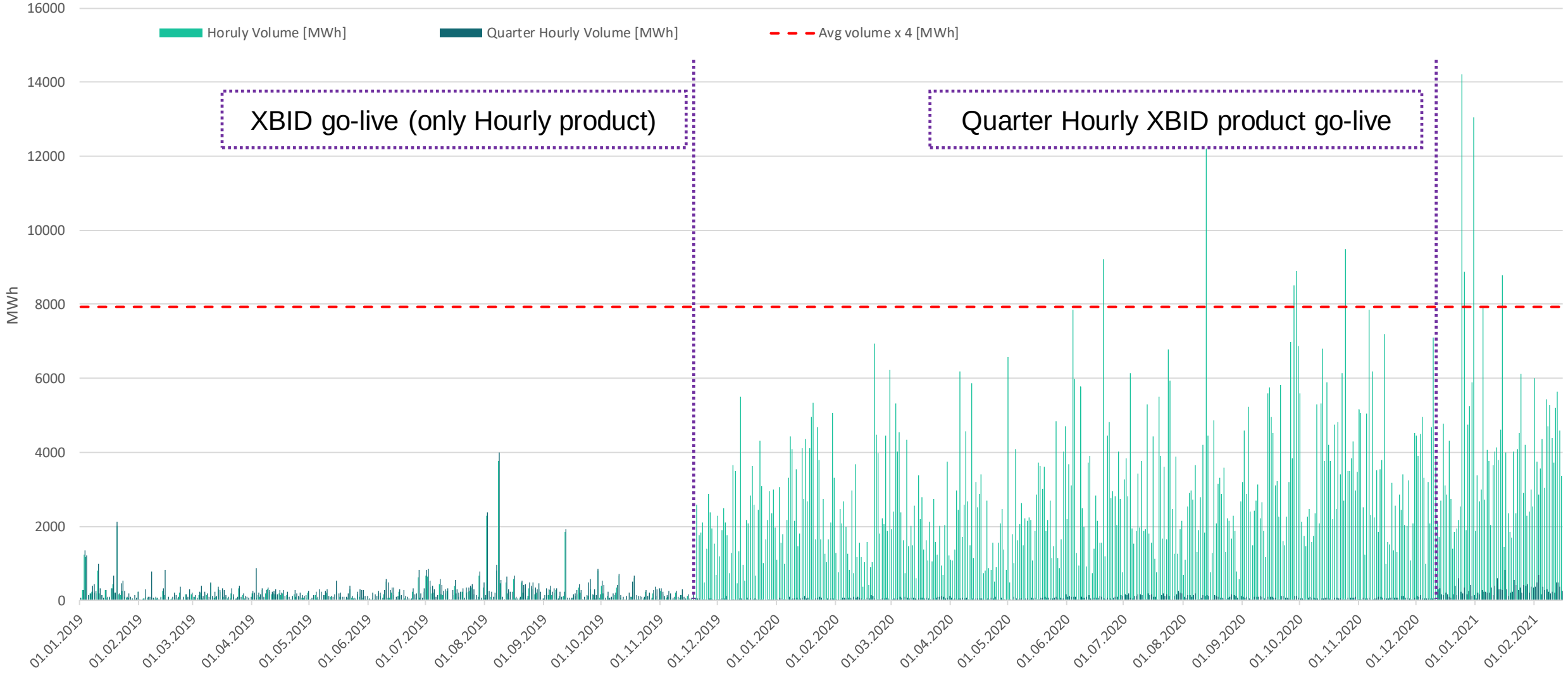
Deals:
x10

Lead-time reduction from 60 to 30 min on HUPX Intraday market

2021 Q2*

*Subject to testing

DAILY VOLUMES – IDM

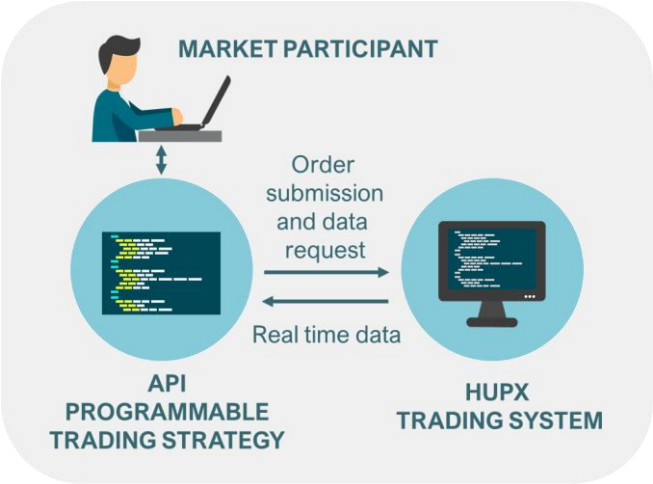


WHAT IS API?

API is a **communication channel** for **HUPX Intraday Market**

By trading via API you can automate your trading processes and / or download trading data from the M7 system automatically

Thus you can stay ahead of your competitors in the easiest most time efficient way.



WHY IS IT GOOD FOR MY BUSINESS?

- **Continuously monitors** the market and **automatically responds** to changes
- Allows you to **program your own trading strategy** and react quicker than other market participants
- **Manual actions are not needed** anymore
- You get **access to a wide range of reports (**public trade, order and cross-border capacity) for analysing market activity

HOW TO GET STARTED?

1. **Learn more** about API connection and see examples for XML messages: download the DFS180 Public Message Interface document and Schema xsd files from HUPX SFTP Intraday folder
2. **Test in SIMU** environment (also without HUPX membership). For support contact: **idmarketops@hupx.hu**
3. **Apply** for API connection via **membership@hupx.hu**

HUPX GOUP IS GOING GREEN – THE GUARANTEE OF ORIGIN MARKET

GO (Guarantees of Origin)

- Certifies the source of energy produced
- For RES and cogeneration units

MEKH (HEA): submitted its application for **AIB** membership (Association of Issuing Bodies)

Why AIB?

+ Standardized cross-border GO trading

+ PR in green markets

+ Faster GO issuing (within-day instead of 75 days)

+ Higher liquidity with international market participants

	Feed-in-Tariff GO auction
Trading platform	**Auction**
Available technologies	**Solar** and **wind**
Sellers (1st phase)	TSO / State: **MAVIR**
Buyers	GO Traders / End users
Estimated market size	1.6 TWh FiT wind & solar production in Hungary (2019)

Estimated Project Timeline

Finalization of the Market Design in 2021 Q1

IT development in 2021 Q2 – Q3

Member testing phase from 2021 Q4

Go-live in 2022 Q1

Source: ICIS

Suez Canal blockage

Ever Given container ship (400m long) was caught in a sandstorm and blocked the Suez Canal

- Around one million barrels of oil and roughly 10% of LNG pass through the canal each day
  - More than 8 TWh in 6 days
  - ~ 10 % of total Hungarian gas consumption
  - ~ 30 % of CEEGEX traded volumes in 2020
- About 450 vessels were in line to cross the canal
- Around 14 LNG vessels to cross southbound to Asia and the Middle East and around 6 to cross northbound heading to Belgium UK and Italy
- Some Qatari LNG cargoes shifted to head around the south of Africa
- High increase in charter rates during and after the blockage
- Due to delays, vessels missed the delivery slots resulting in additional delays and expenditure

Start
23.03.2021

End
29.03.2021

Qatari cargo travelling around South Africa to the UK would take around 27 days, compared with around 17 days for a route using the Suez Canal.

Risks:

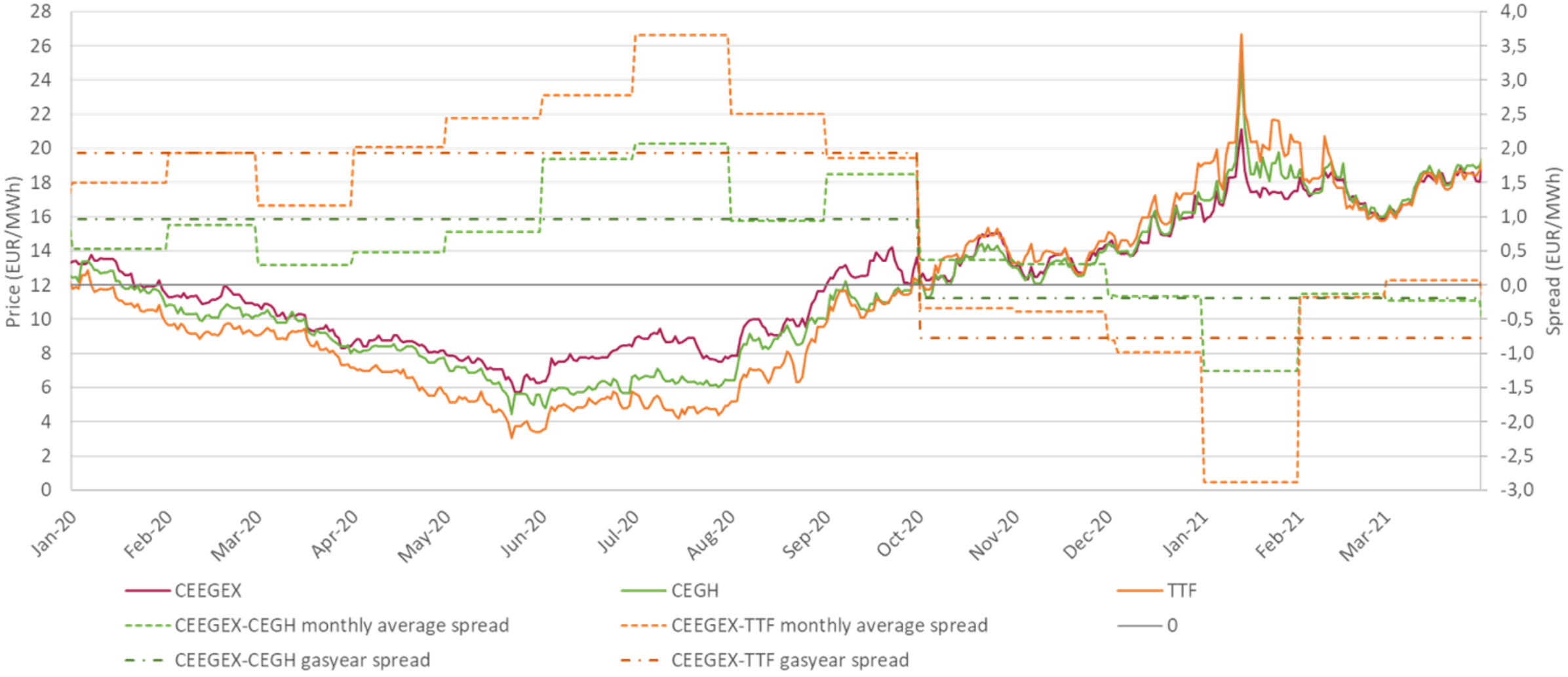
- Possibility to happen again
- Piracy Risk if diverted around Africa
- Longer delays can affect prices
- Additional delays due to missing slots at terminals

Key takeaways

- Possible infrastructure developments at Suez and Panama canal (potential expansion)
- Vessel size considerations
- Increase in the number of LNG vessels

Hungarian and benchmark spot gas prices

Source: EEX, CEEGEX



Questions

Do you expect any significant impact on prices after implementation of NTC-based market coupling between Germany and CEE region?

Assuming the coal phaseout timeline as it is at the moment in the CEE region, in Refinitiv we have and are still running a couple of simulations to assess these changes. For the time being, we have done so with the Polish market. The results have been discussed in the webinar during Refinitiv's presentation and you can see them on slide no.10. The chart that you see is the result of our new long-term project that we are launching in Eikon on 5th of May this year. With this, we will run similar simulations for Czech Republic and Hungary. We will disseminate these results with our costumers and followers in Eikon, Twitter, linkedIn.

Questions

Do you expect any significant impact on prices after implementation of NTC-based market coupling between Germany and CEE region?

- Based on previous experiences with market coupling on HUPX and in Europe it can be expected that the location price spreads tend to decline between the coupled areas. The futures markets has already started to adjust the Front Quarter and Front Year DE-HU spreads for example year-on year and we think the market prices are the best estimates there are currently.

Question for Mr Gabor - What about MC with Serbia) SEEPEX?

- HUPX is working on the next steps of the Single Day-ahead Coupling (SDAC) with full focus. That means that in Q2 2021 NTC coupling will happen between 4MMC and MRC region, in practice meaning that 4M-DE-AT-PL borders will be coupled with the harmonization of the gate closures (Interim Coupling). This will be followed by the implementation of the flow based day-ahead market coupling in the Core region (Core FB MC Project). The expected go-live is in Q1 2022.

On the long term, as the goal is to create a single pan European day-ahead electricity market, it would be logical to proceed further to South and Eastern Europe with market coupling, but at the moment there is no project yet in motion for that.

Questions

How high is the perceived risk of power producer bankruptcies in the CEE area should carbon rise to 50 Eur/Kton and above? Thanks

It is true that the coal plants have been kept on the margin even in CWE in the past years. To add a bit of context, Carbon Tracker published a report (https://carbontracker.org/reports/apocoalypse-now/) showing that 79% of EU coal/lignite-fired generators were running at a loss already in 2019.

2020 was a year with many lockdowns across Europe and some power demand destruction. So this would be an ingredient to accelerate those losses. For Germany, Ember published a report (https://ember-climate.org/commentary/2020/12/08/german-hard-coal/) where they state that 93% of the German coal producers were running with losses since 2018. Their load factors declined from 40% in 2018 to 20% in 2020. This year in CEE, the coal+lignite load factors stay higher than seen in Germany, but below 40% in Hungary and Romania and slightly above 40% in Poland.