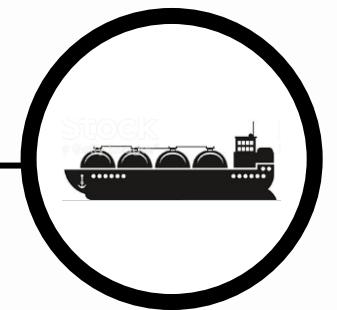


Global & Regional Market Analysis

Natural Gas

September 2022

26/10/2022





Stories of the recent weeks

Russian flows have remained at 0% on the NS1 since 31 August after an announced three-day maintenance. On 5 Sept Russia explicitly conditioned the resumption of gas deliveries to Europe on an end to Western Sanctions.



NS1&2 lost pressure and become inoperable on 26 Sept, 4 gas leaks have been confirmed by the end of Sept. Seismographs in SE and DK detected underwater explosions in the same area, NO had noticed an increased activity of drones in the North Sea area.



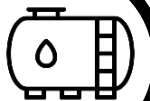
Gazprom said on 27 Sept it could impose sanctions on Ukrainian TSO, which would in effect cease the Ukrainian deliveries to Europe - totaling around 37mcm/day.



On 9 Sept an extraordinary EC meeting took place, where several measures were presented, out of which revenue caps in power sector, peak hour demand cuts and solidarity contribution of fossil fuel companies were accepted by EU energy ministers on 30 Sept.

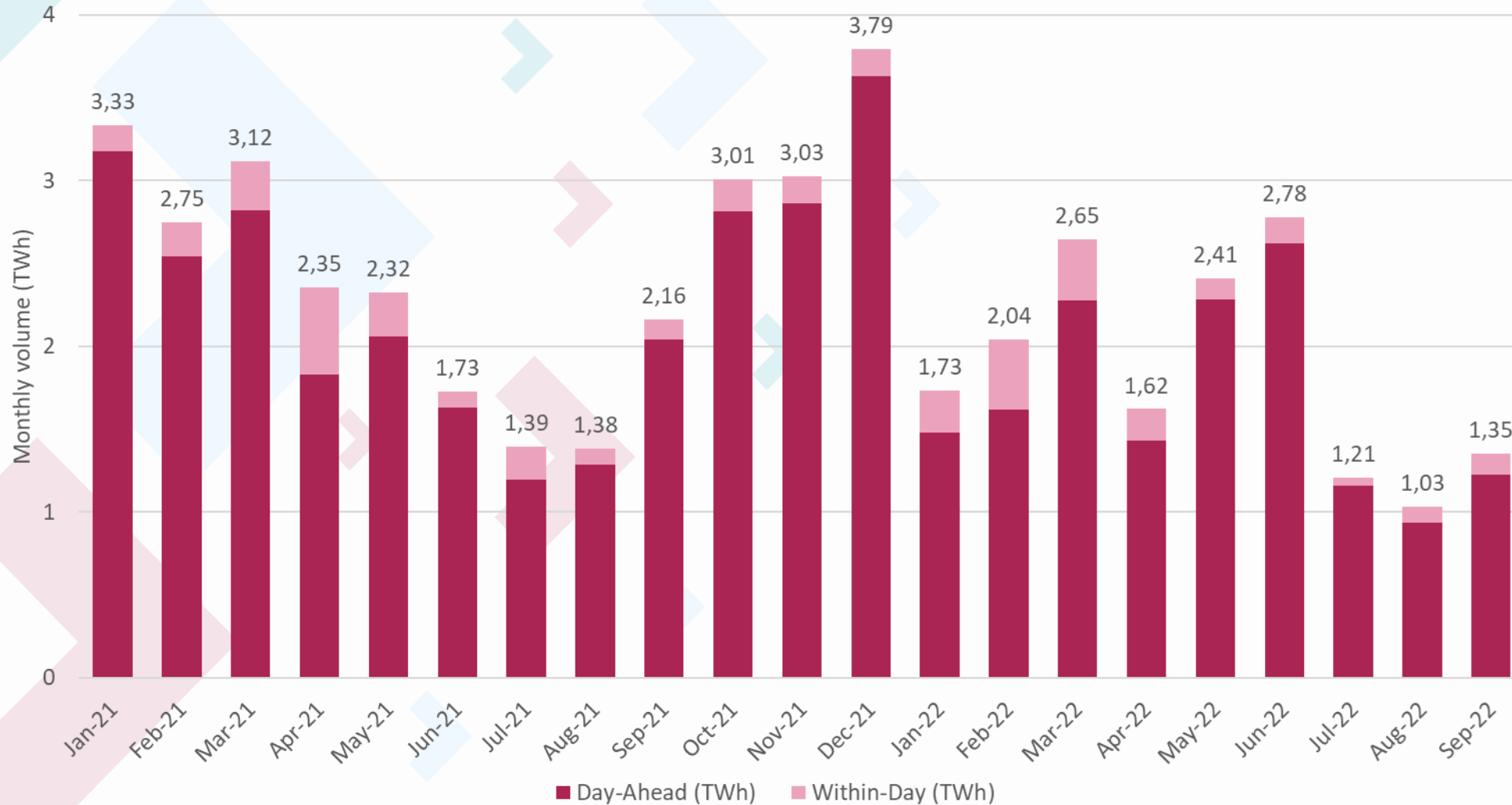


Hungarian state-owned companies and public institutions have to reduce their gas consumption by 25% this winter. On 19 Sept Hungarian storages reached 70% (4.44 bcm). HUSA has started to create a “special gas reserve” ahead of the 1 Nov deadline.



CEEGEX monthly traded volumes

Source: CEEGEX

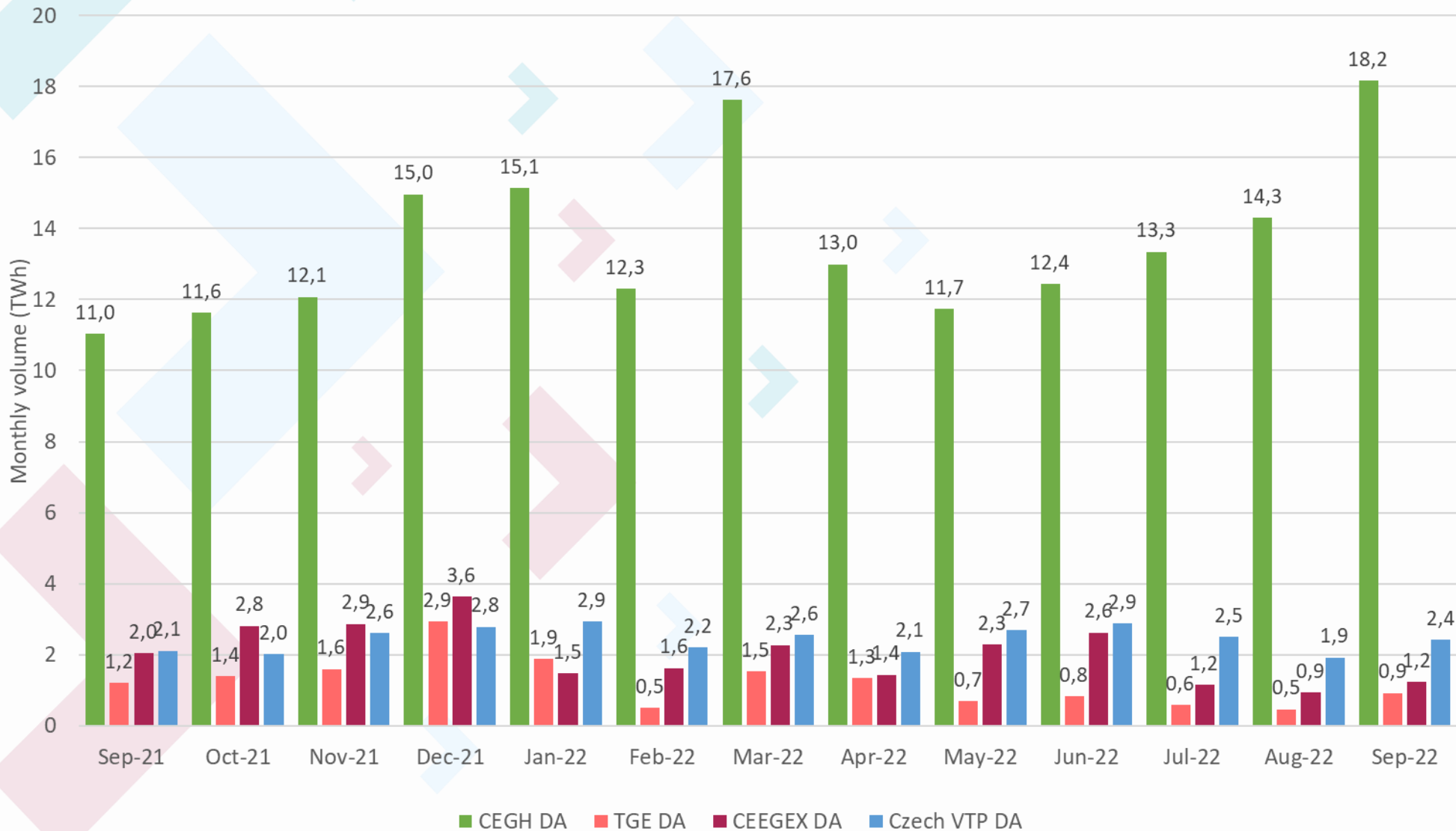


EXPERT OPINION:

- CEEGEX traded volumes increased in September, but remained below last year's values.
- Lower TTF FM-CX spread and a moderate decrease in prices might have incentivized spot trading in September.
- However, high margin requirements and the achievement of target storage levels kept a lid on traded volumes.

Regional scope DA markets

Source: CEEGEX, CEGH

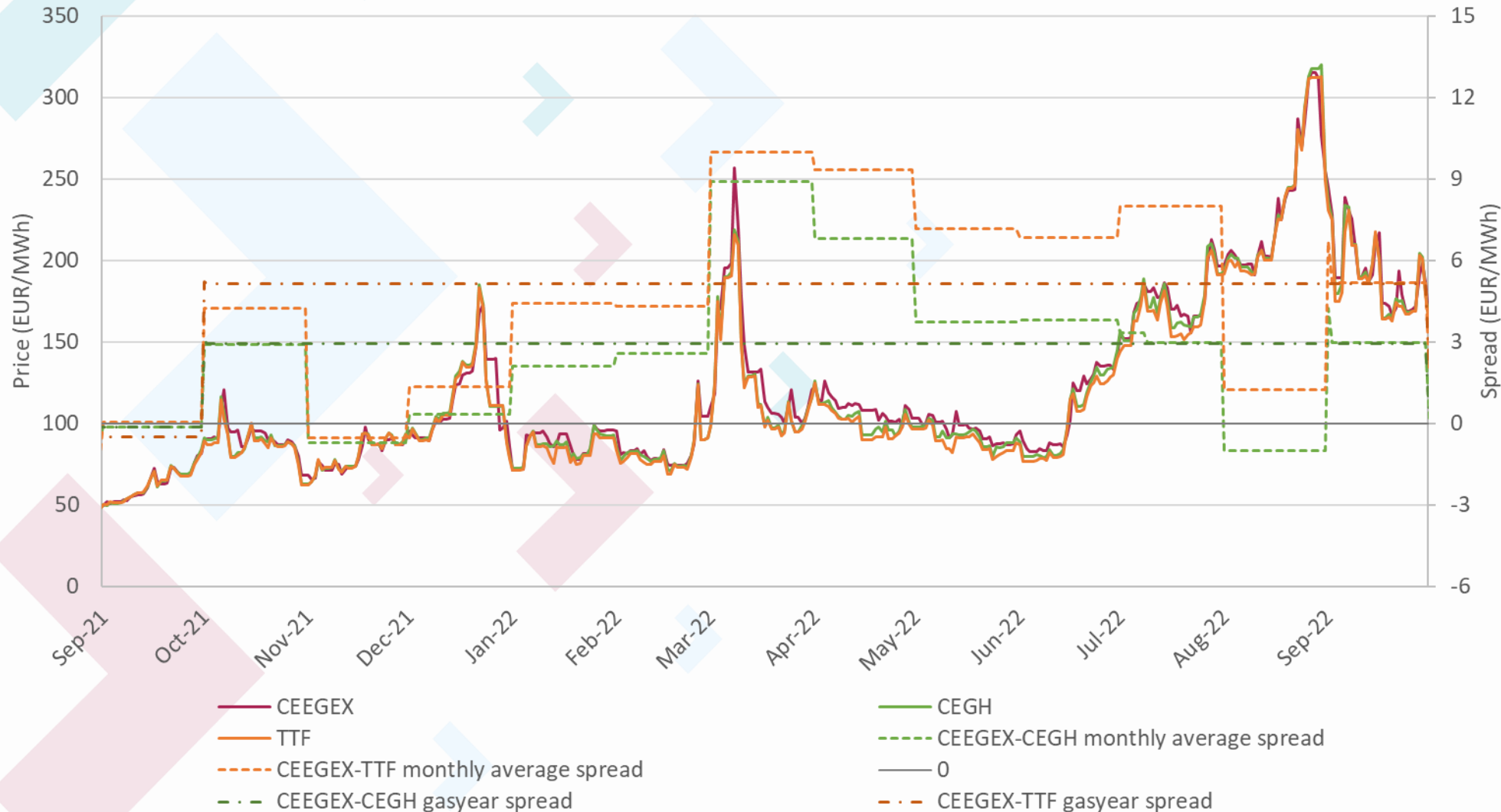


EXPERT OPINION:

- Similar increase in volumes was observable on other regional markets, while CEGH reached highest traded volumes since last September.
- Austria reached 80% of their storage capacity only by the end of September. This might have further incentivized spot trading on top of lower TTF FM-CEGH spread.
- Hungary, Poland and the Czech Republic had already reached the target level by the end of August.

Regional prices and spreads

Source: CEEGEX, EEX, IEA



EXPERT OPINION:

- In August the CX-CEGH spread was in the negative territory due to extreme price spikes.
- In September bearish price moves resulted in spreads on a similar level than in January-February 2022, just before the outbreak of the war.
- Despite constant supply fears, in September strong technical bearish signals, robust LNG supply and lower demand were dominating European gas markets.

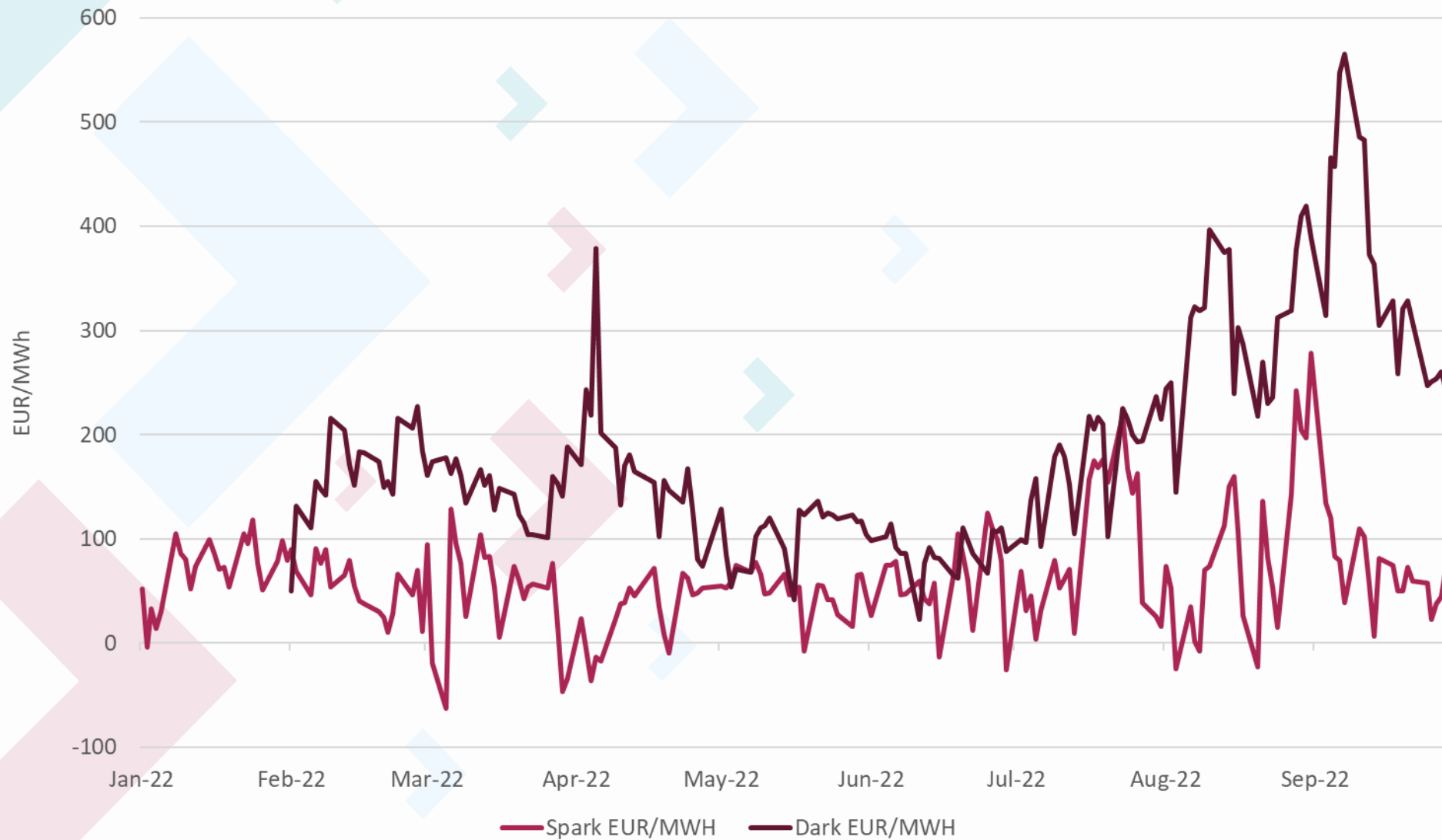
Japanese candles – last 3 months

Source: CEEGEX, ICIS



FM Clean spark spread and dark spread

Source: ...

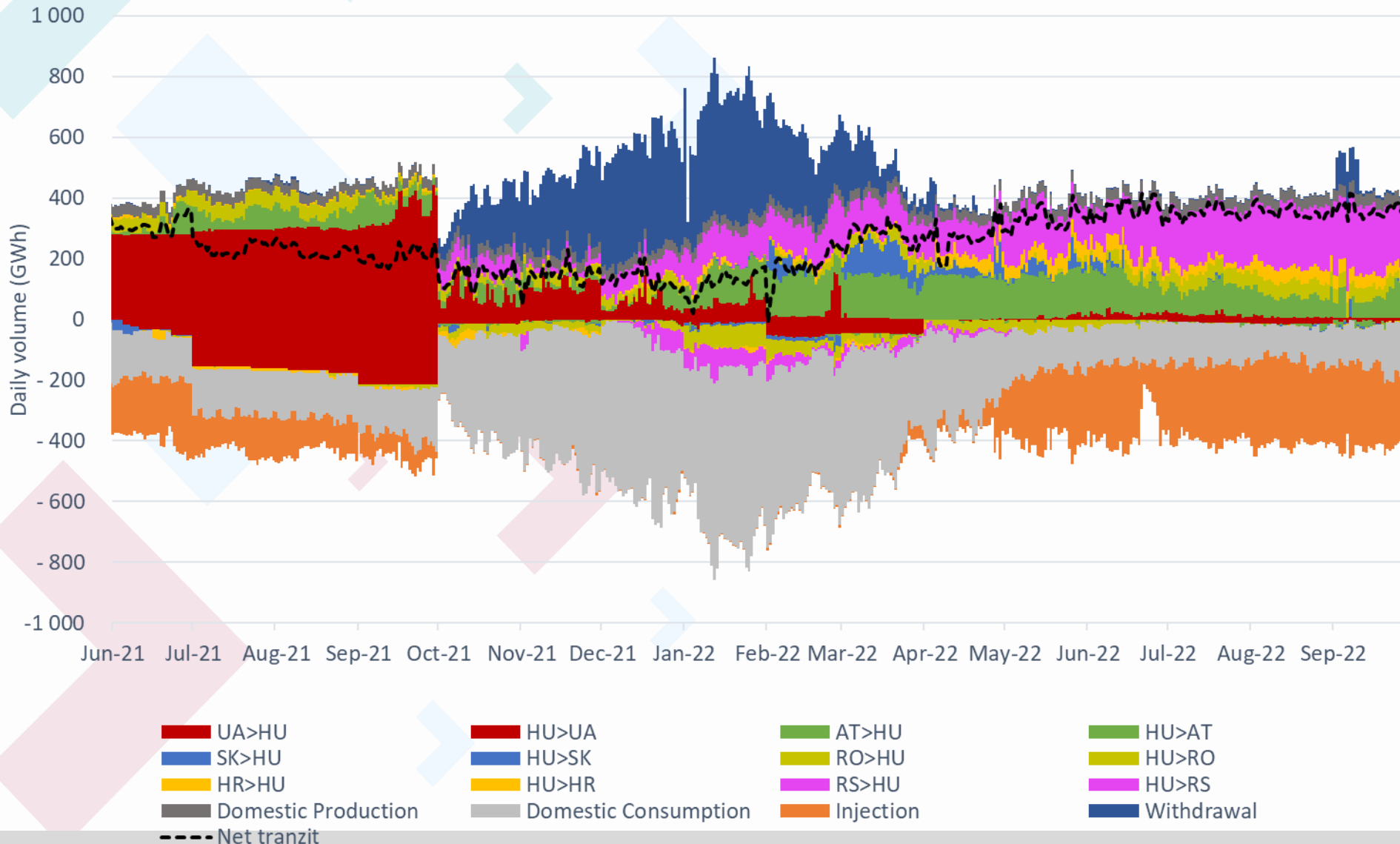


EXPERT OPINION:

- In September both the CSS and DS increased to their highest levels this year.
- The peak proved to be short-lived and spreads decreased in the second half of the month.
- The CSS returned below 100 EUR/MWh – it was mostly in this territory during the year.
- But the DS remained above 200 EUR/MWh - to a higher level than so far this year.
- Both spreads remained in the positive territory, which means power generation was profitable both from natural gas and coal, taking into consideration carbon costs.

Hungarian gas market balance

Source: AGSI, FGSZ

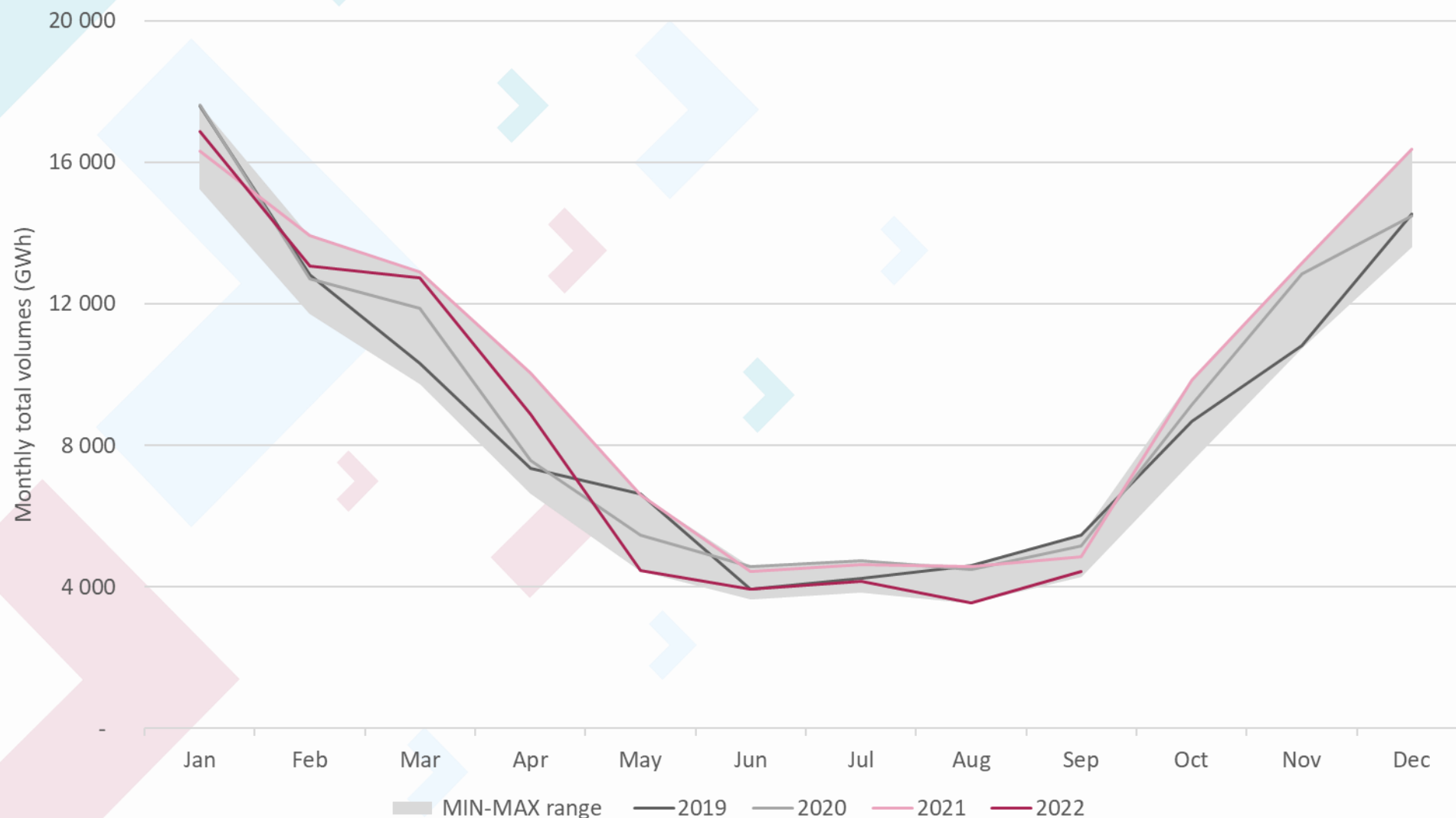


EXPERT OPINION:

- Domestic consumption started to increase in comparison to summer months - most probably colder weather and higher use of volumes under expiring gas contracts were the cause.
- The pace of injections slowed in comparison to the summer period.
- Overall imports and exports lowered slightly in Sept. Flows from RS are becoming the dominant import route and AT volumes also increased in the second half of the month. HR imports remained stable, but RO flows lowered. SK imports disappeared. UA imports ticked up at the very end of Sept.

Domestic consumption

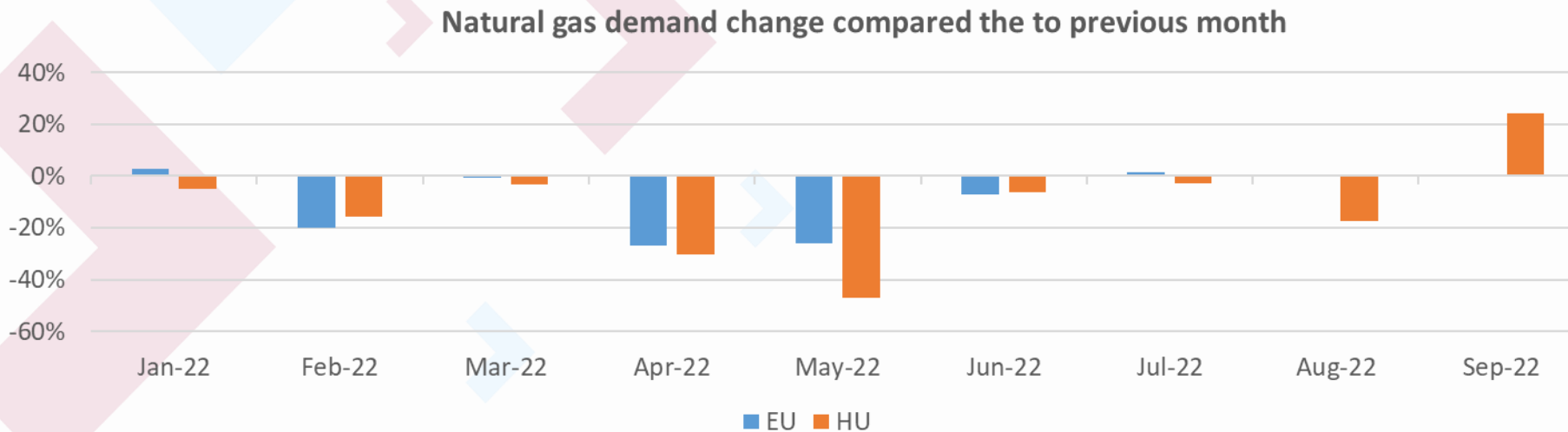
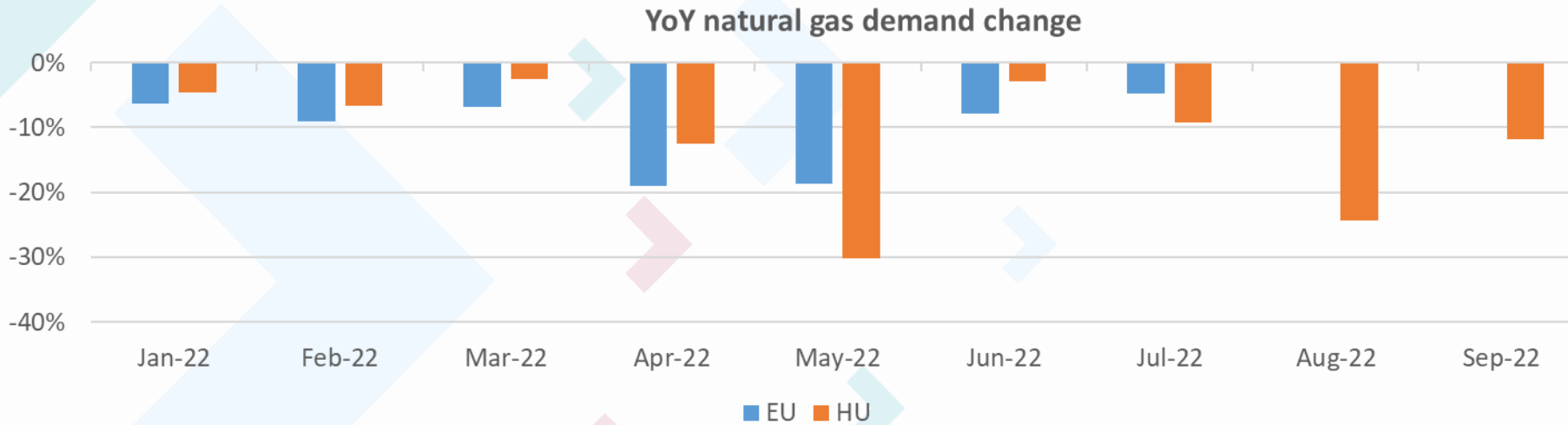
Source: AGSI, FGSZ, ICIS, IEA, MEKH



EXPERT OPINION:

- Hungarian domestic consumption started to increase in September, still Q3 usage is well below the 2019-2021 average.
- In 2021 Hungarian domestic consumption grew by 12% in comparison to 2020, when COVID lockdowns curbed energy usage.
- Since May, the consumption fell even below 2020 values.

Natural gas demand changes

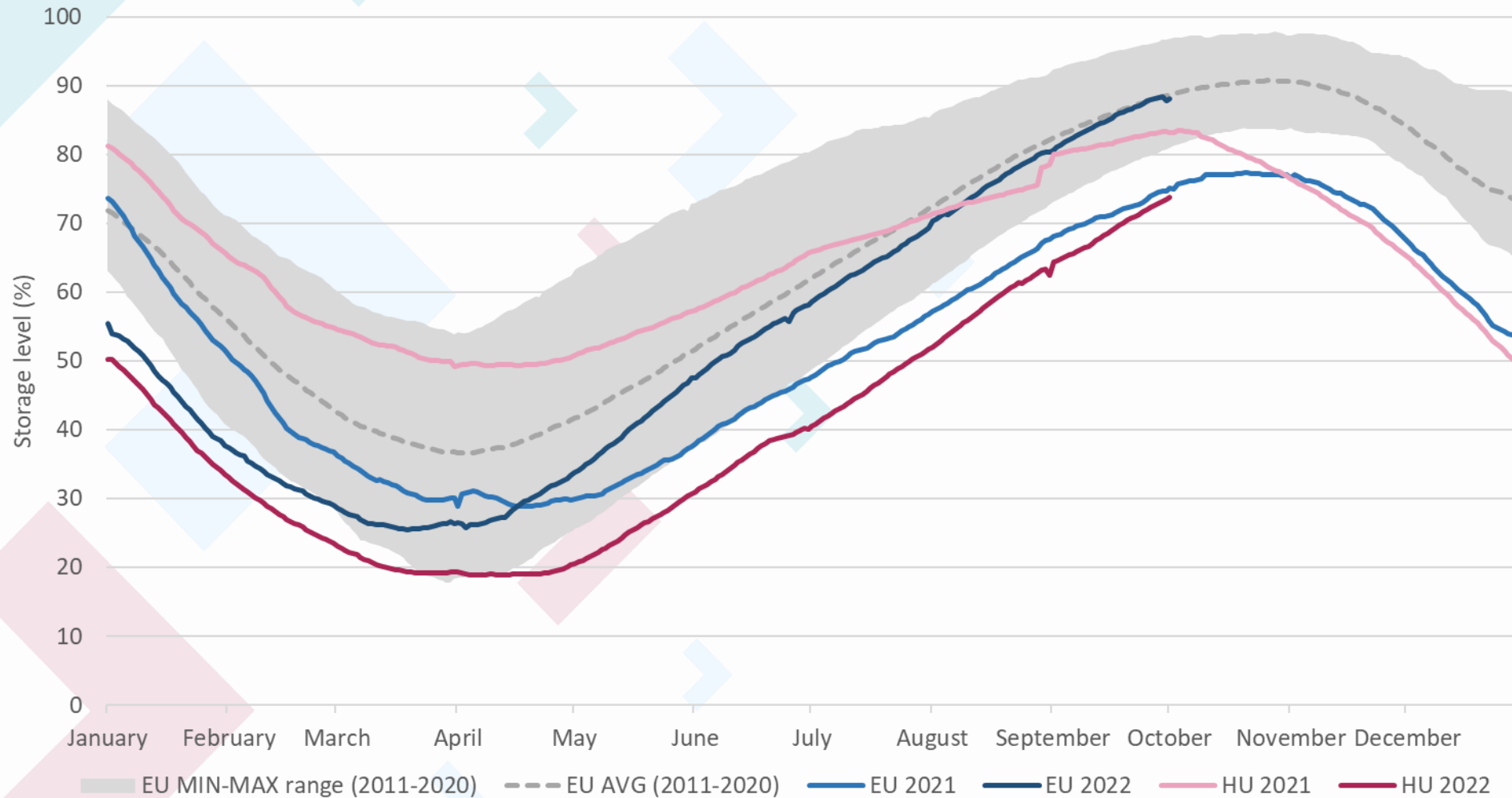


EXPERT OPINION:

- In 2022 European gas demand decreased significantly on a YoY basis. Hungarian demand followed a similar pattern.
- According to an ICIS analysis European natural gas demand in September was almost 11% lower than the five-year average.
- Nonetheless, between 17-20 Sept gas demand in Europe jumped above the 5-years average due to a cold spell.
- Eurostat public data for September are not available yet, but the Hungarian domestic consumption data confirms this statement.

Gas storage level in EU and HU

Source: AGSI, ICIS, MEKH

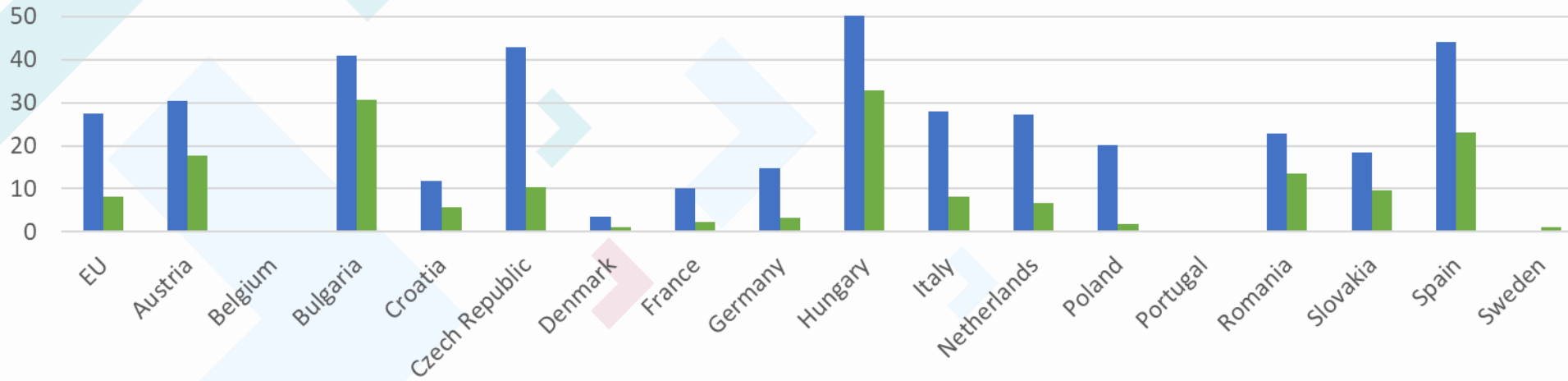


EXPERT OPINION:

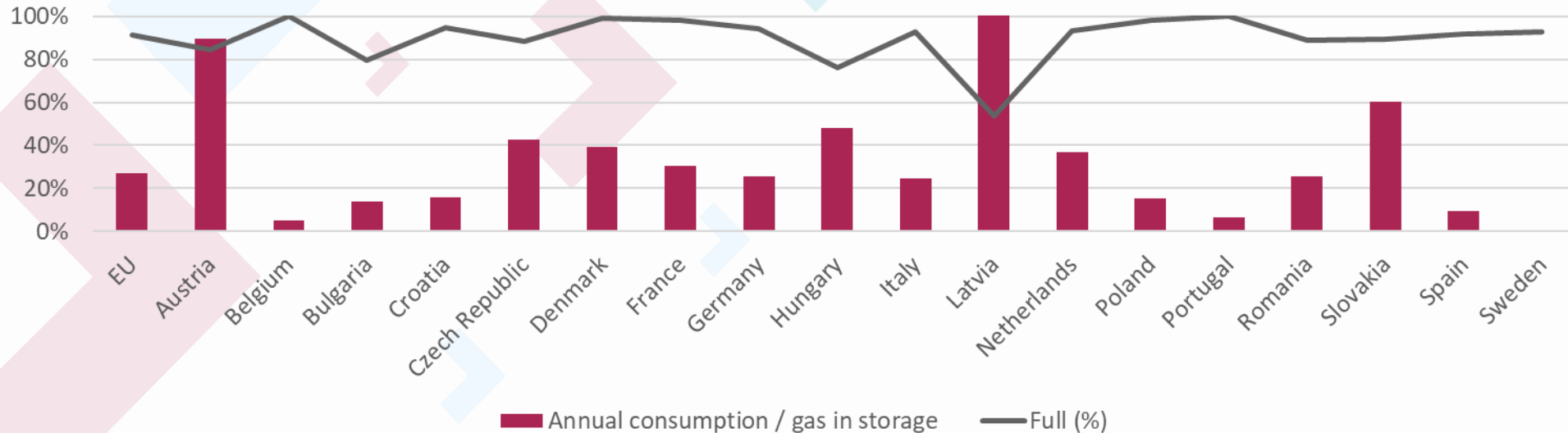
- European aggregated storage levels were at 80% by the end of August, and at 88% by the end of September, reaching the 10-year average.
- Hungarian storage levels exceeded 70% of the total storage capacity, which is above the target 35% of the average consumption of the last 5-years.
- Maintaining adequate storage levels for the winter is key to ensure the security of gas supply. Lower pressure slows down the pace of withdrawal.

At the end of February Ukrainian storage operator temporarily halted withdrawals and suspended publishing storage data on its website in response to the emergency situation.

Storage projections



■ How many days until full with max capacity with current trends? ■ How many days until full with max capacity?



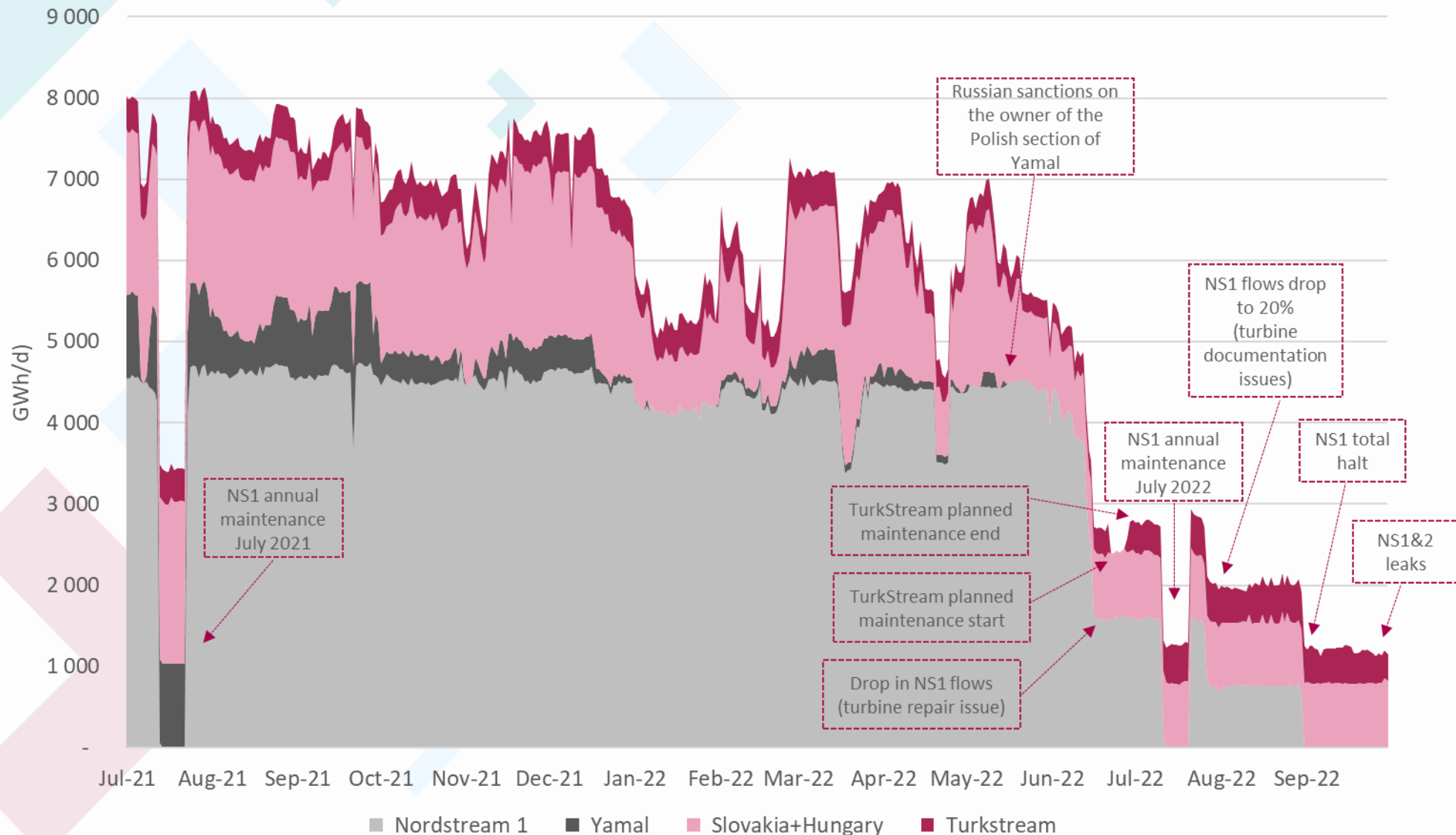
■ Annual consumption / gas in storage — Full (%)

EXPERT OPINION:

- As winter is coming, the gas storage sites are nearly full, over 90% of the EU wide capacities are gone. However, it is only accounting for 26,9% of the annual consumption in Europe. Belgium and Portugal finished with the injection.
- On full capacity, the EU needs approximately 13 days to able to fill all the storages, however due to physical requirements this should not be possible, the current trends indicate that EU countries would need 38-40 days to fully fill the storage sites. That would mean mid- late November.
- Data until 2022.10.09

Gasflows from Russia

Source: ENTSOG, ICIS

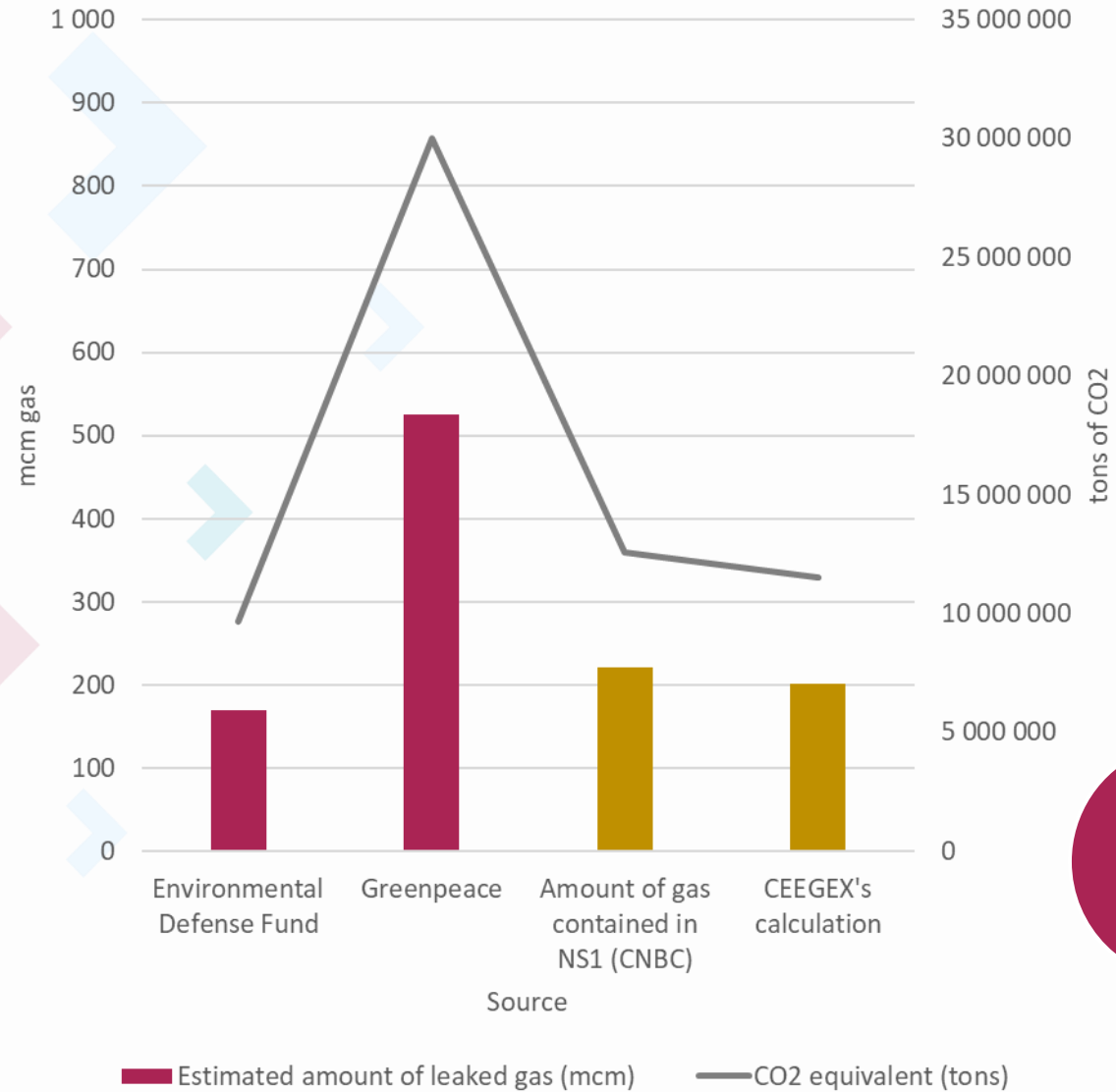


EXPERT OPINION:

- NS1 3-day outage started on 31 August, but flows have not returned after the planned due date and remained at 0 mcm/d until now.
- Yamal flows via Belarus disappeared after Russian sanctions in May.
- Flows from the Ukrainian remained low and Russia threatened to cut all deliveries via Ukraine in case a gas price cap would be accepted by the EU.
- Deliveries via TurkStream remained stable.

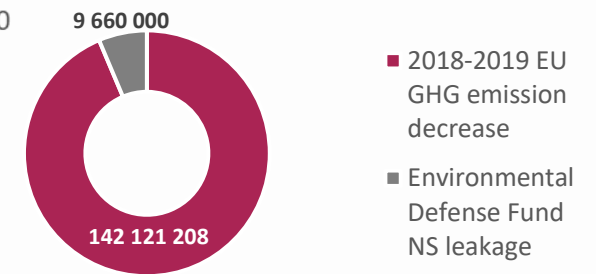
Nord stream leaks

Source: CNBC, Euobserver, Greenpeace, Bloomberg, EEA



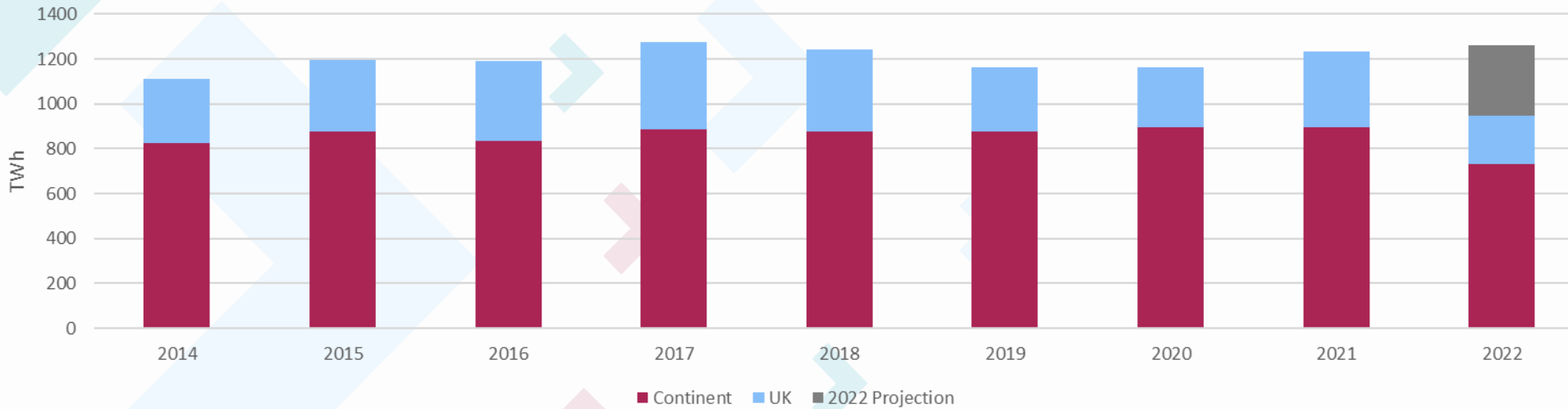
EXPERT OPINION:

- Nord Steam 1 and 2 pipeline are affected in gas leakage.
- The leakage has huge environmental effect due to the high GHG ratio of natural gas (84 times more potent than CO2).
- The amount of leaked gas depends on the structure of the pipelines.
- The average Hungarian gas consumption is 8,5-10 bcm.

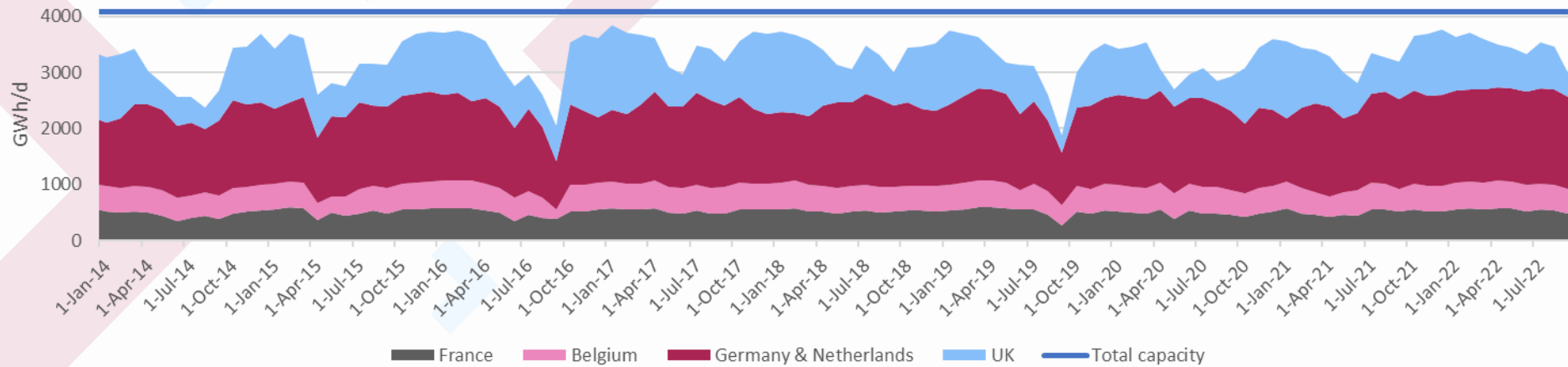


Norwegian flows

Yearly natural gas import from Norway



Avg. daily flows from Norway



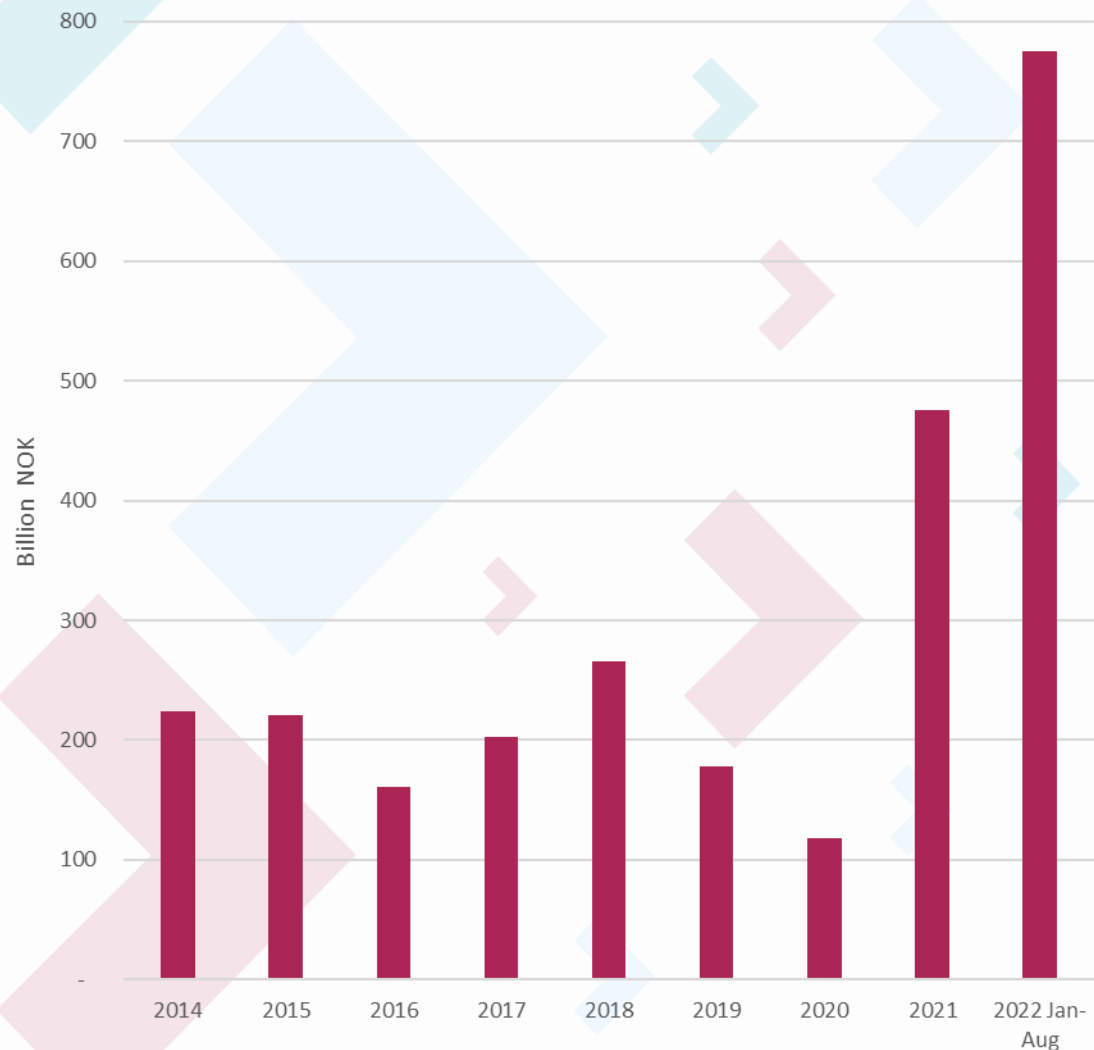
EXPERT OPINION:

- Natural gas imports from Norway have increased proportionately this year.
- By the end of the year, it is expected to reach the previous record volume but not much higher volumes.
- Most of the imports are destined for the continent (mainly Germany and the Netherlands).
- UK imports remain lower than in previous years.
- Pipelines to the continent are operating at near full capacity. Utilisation of the pipeline to the UK varies.

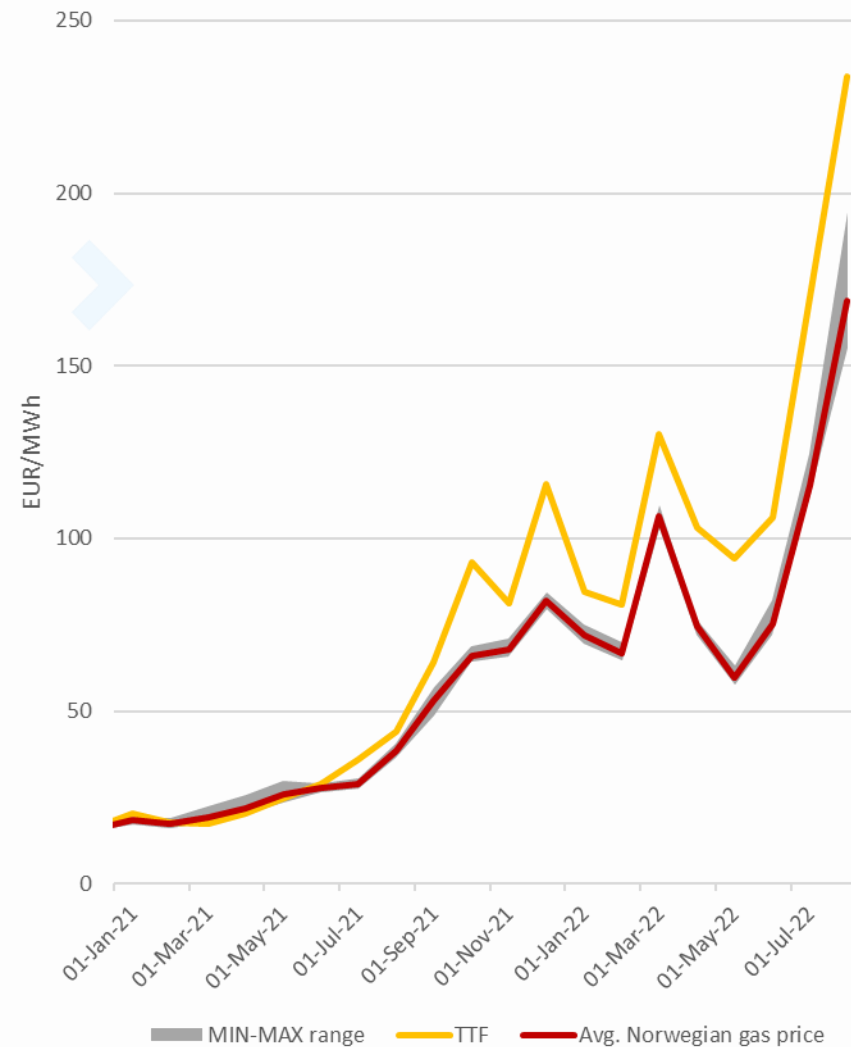
Winner of the energy crisis

Source: Norwegian Customs Service, MNB, EEX

Norway gas export revenue



Norwegian gas price vs TTF



EXPERT OPINION:

- Norway has already achieved record revenues from European gas trading in 2021
- Compared to an average of NOK 208 billion between 2014 and 2019, it has gained NOK 475 billion in 2021 and NOK 775 billion in the first 8 months of 2022 (around €75 billion)
- By the end of the year, it is likely to quadruple the average revenues of the years before the crisis.
- The price of gas varies widely from country to country e.g. France paid an average of €194.6 per MWh in August while Belgium paid only €155.5 per MWh

Recent infrastructure developments

1

GIPL:

- Poland – Lithuania - Access to Lithuanian LNG
- Became operational: 1 May 2022
- Capacity: LI>PL 1.9 bcm/y PL>LI 2bcm/y

2

Baltic pipe:

- Norway – Denmark - Poland
- Became operational: 27 September 2022
- Length: 275 km
- Capacity: NO>DK>PL 10bcm/y / PL>DK 3bcm/y

3

GIPS:

- Poland - Slovakia
- Planned start: October 2022
- Length: 165 km
- Capacity: SK>PL 5.7 bcm/y PL>SK 4.7 bcm/y

4

IGB:

- Greece – Bulgaria
- Became operational: 1 October 2022
- Length: 180 km
- Capacity: 3-5 bcm/y

5

Eemshaven FRSU LNG terminal

- Became operational: 19 September 2022
- Reach its full capacity in Nov-Dec
- Total capacity: 8 bcm/y

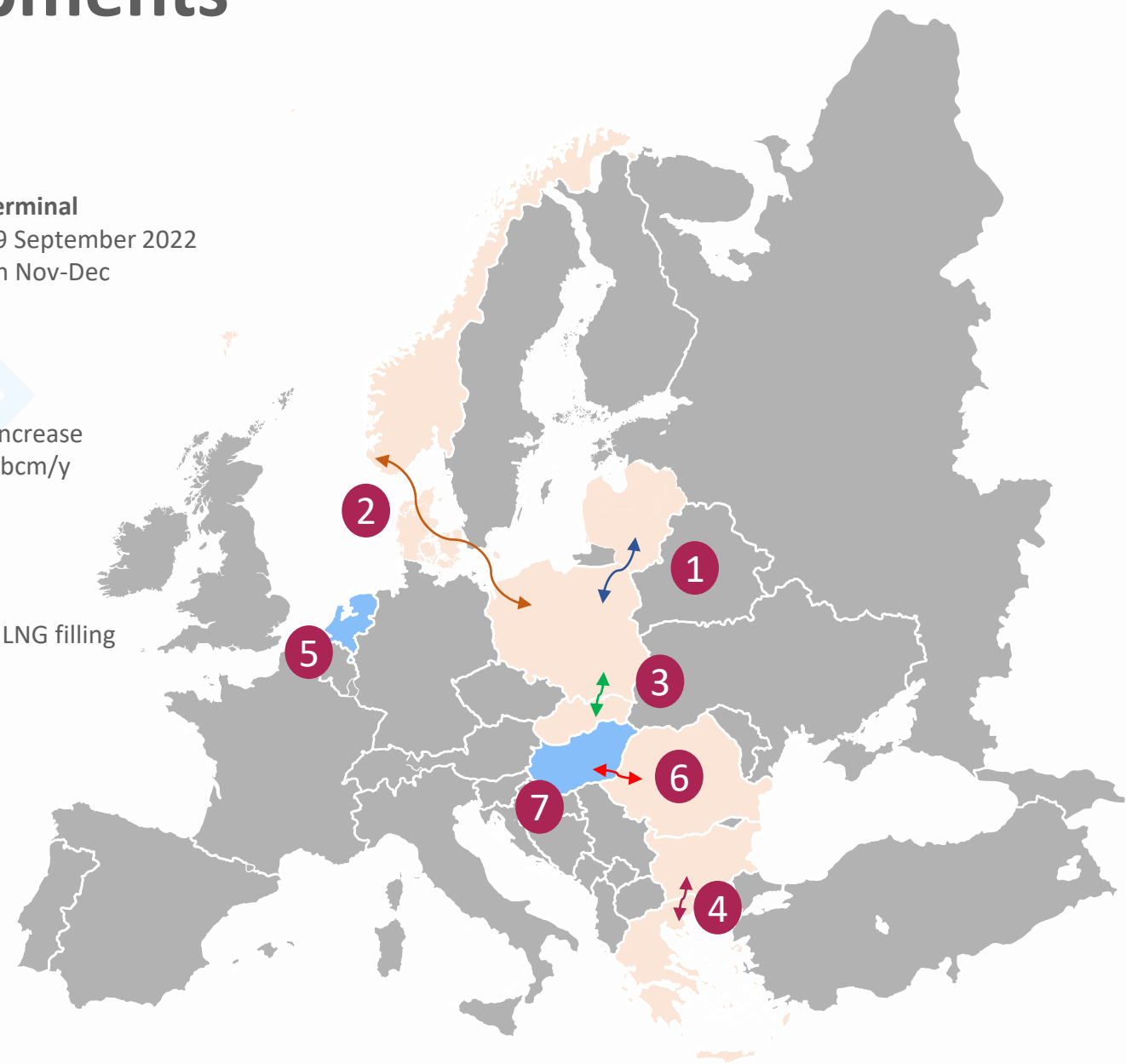
6

Csanádpalota capacity increase

- From 1.75 bcm/y to 2.5 bcm/y

7

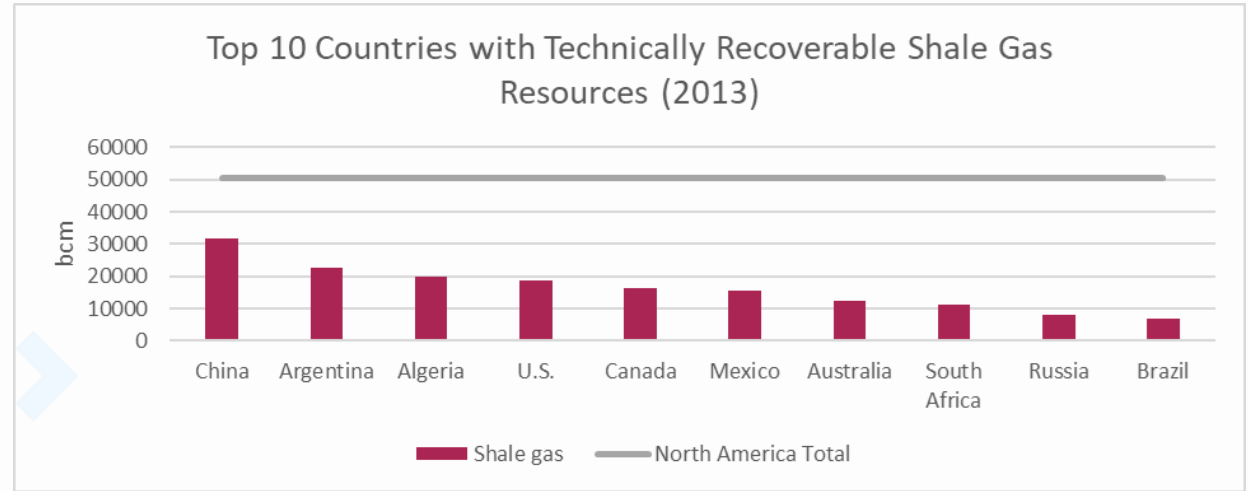
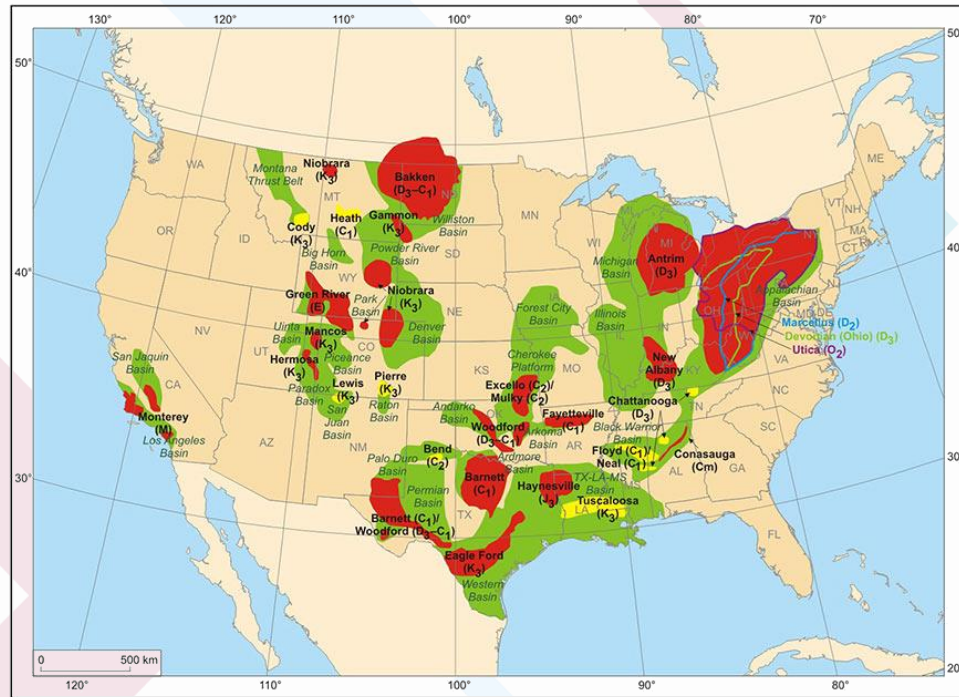
Hungary opened its 3rd LNG filling station



Shale gas & USA

Source: EIA (2013)

Shale gas is **natural gas that is found trapped within shale formations**. Due to **the low permeability** of the shale rock formation, the extraction of this unconventional gas employs hydraulic fracturing of the rocks, or **“fracking,”** a combined process of **vertical and horizontal drilling**, which **injects liquids** at high pressure and induces seismicity to break the formation **and releases the gas**.



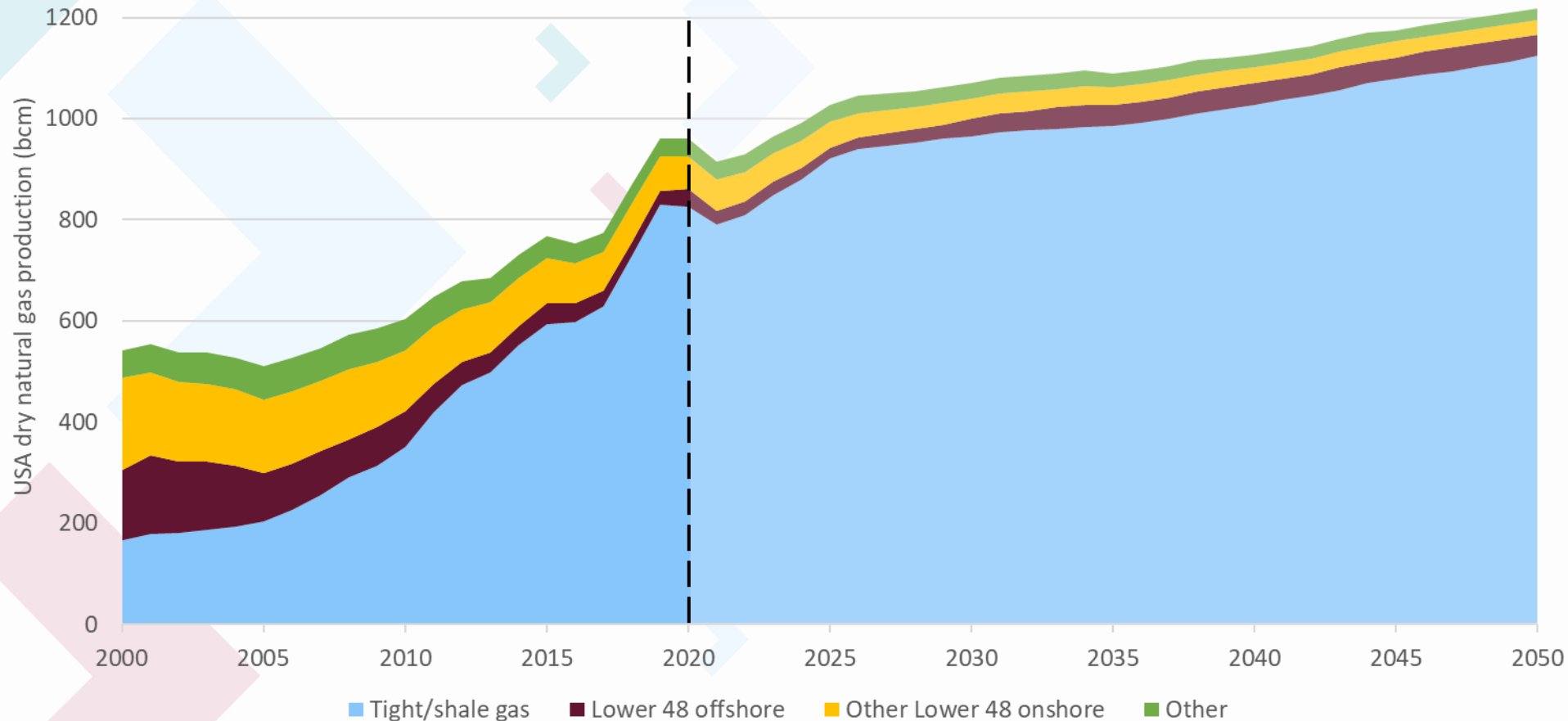
Unlike most countries, where oil is owned by the government, **in the United States, citizens who own property with shale gas resources can sell them for a profit or lease their land to gas-producing companies**. Private ownership of these lands allows individuals to decide to sell in order to receive royalties for the resources.

Large deposits of unconventional gas are located across the US. **The most significant fields** including the Barnett reservoir in Texas and the Marcellus reservoir, which run across **New York, Pennsylvania and most of the West Virginia**.

Legend:
Red: currently exploited shale formations
Yellow: shale gas perspective area
Green: sedimentary basins

USA shale gas production

Source: Bloomberg, EIA



EXPERT OPINION:

- According to EIA, U.S. shale gas production in 2021 was around **760 billion cubic meters (bcm)**, **79%** of the total U.S. dry natural gas production.
- The White House promised **50 billion cubic meters** of natural gas export annually to Europe by 2030.
- Shale producers in the USA are projected to make **200 billion USD** this year making the industry debt-free by 2024 due to high oil and natural gas prices.

Shale gas - Hungarian outlook

Source: HVG, Telex, CEEnergy



Positive outlook:

- Hungary has significant gas reserves, mostly in Makó and Békés county. The **total shale gas** under the surface is more than **3400 billion cubic meters**, of which around **1500 can be extracted**. The extractable conventional natural gas is only around 70 billion cubic meters, which is a huge difference.
- Hungary tries to increase the local gas extraction from **1.5 billion to 2 billion cubic meters**. In the framework of the Corvinus project MVM CEEnergy Zrt. and Horizont General LLC. aim to find and extract shale gas in Nyékkpuszta, Békés county. The mining could start at the end of this year.



Difficulties:

- One of the main difficulties of extracting shale gas is the location of it. **The gas reserve is 3700-4500 meters under the surface**, which means that it is really difficult to reach it. The required method is hydraulic fracturing (fracking).
- The depth is not only a problem, because it is costly and time consuming to mine, but the temperature can be very high as well. Moreover, compared to most parts of the world, temperatures in Hungary are rising much faster going downwards.

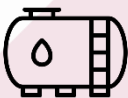


Environmental impact:

- Unfortunately, **fracking has a huge negative impact on the environment**. During the process, they drill into the ground from several directions and inject water and chemicals to it. This results in the layer's destruction, and also consumes lot of water, which is a particular concern in the recently frequent drought.
- Environmentalists have already raised their voice in 2015, when the proposed law supported shale gas extraction. Fracking is banned in most countries of Europe.

IEA Gas Market Report Q4-22

Sources: IEA



- **In 2022 the gas crisis has triggered:**
 - market adjustments and policy measures,
 - EU increased LNG procurement,
 - **Europe's gas consumption declined by 10%** since January, driven by a **15% drop in the industrial sector**.
- **EU storages are above 80%** -> deliverability of storage sites declines with the decreasing level of **working gas in stock** -> gas demand savings & LNG imports crucial to **maintain gas storage at adequate levels** until the end of the 2022/23 heating season.
- Solidarity, unity and responsible household behavior crucial to ensure supply security.
- **Main changes on the global LNG markets:**
 - **Global LNG trade expanded by 6%:** 65% increase LNG demand in Europe and 7% decline in LNG demand in the Asia. In 2023 the volume of global LNG trade is set to increase by 4%.
 - Share of destination-flexible volumes dropped, **destination-fixed contracts** are accounting for 47%, **long-term contracts (over 10 years)** accounting for around 74% of newly signed LNG contract volumes.
 - High prices erode gas demand across Asia & prompted **profound changes in LNG trade dynamics across Asia:** record high prices have driven price sensitive Asian buyers away from **spot purchases**. Europe has drawn away from Asia not only **flexible LNG volumes**, but also the **limited number of available FSRU vessels**.
 - **LNG investment** decisions are recovering gradually from the low point in 2020. However, **LNG capacity outages** continue to tighten the global gas market (Freeport LNG terminal).
 - **Expiring legacy contracts** could further boost market flexibility: about 180 bcm of active LNG contracts are set to expire between 2022 and 2025, followed by an additional 135 bcm between 2026 and 2030.
- **Gas demand growth from the industrial sector:** North America some growth, South America negative gas consumption, Europe drop in demand, Asia modest recovery.
- **Storage dynamics:** EU above 5-year average, USA below 5-year average, Japan and Korea LNG closing stocks above 5-year average.
- **TTF is expected to trade at a premium above Asian spot LNG** during the 2022/23 gas winter, enabling strong LNG inflow into Europe.