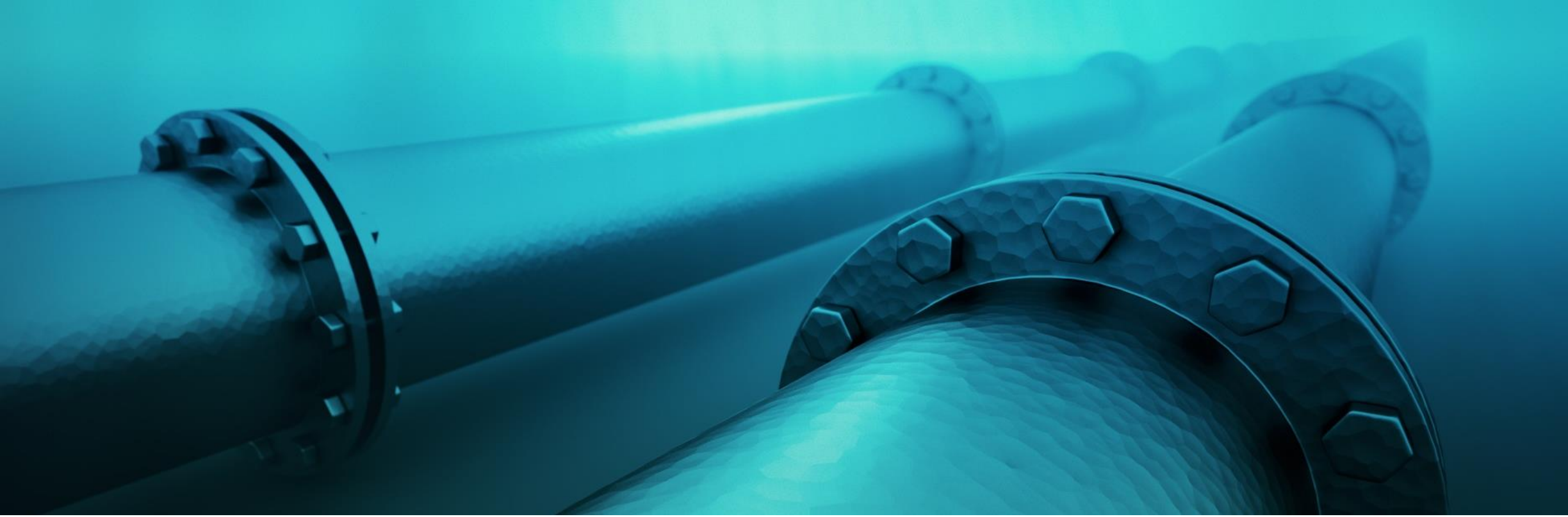

Natural Gas Europe Outlook: Managing without Russian gas.

Monday October 3rd, 2022

Marina Tsygankova (Research Manager, European Gas Research)

Wayne Bryan (Director, European Gas Research)

Anne Kat Brevik (Director, LNG research)

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Price & Volatility

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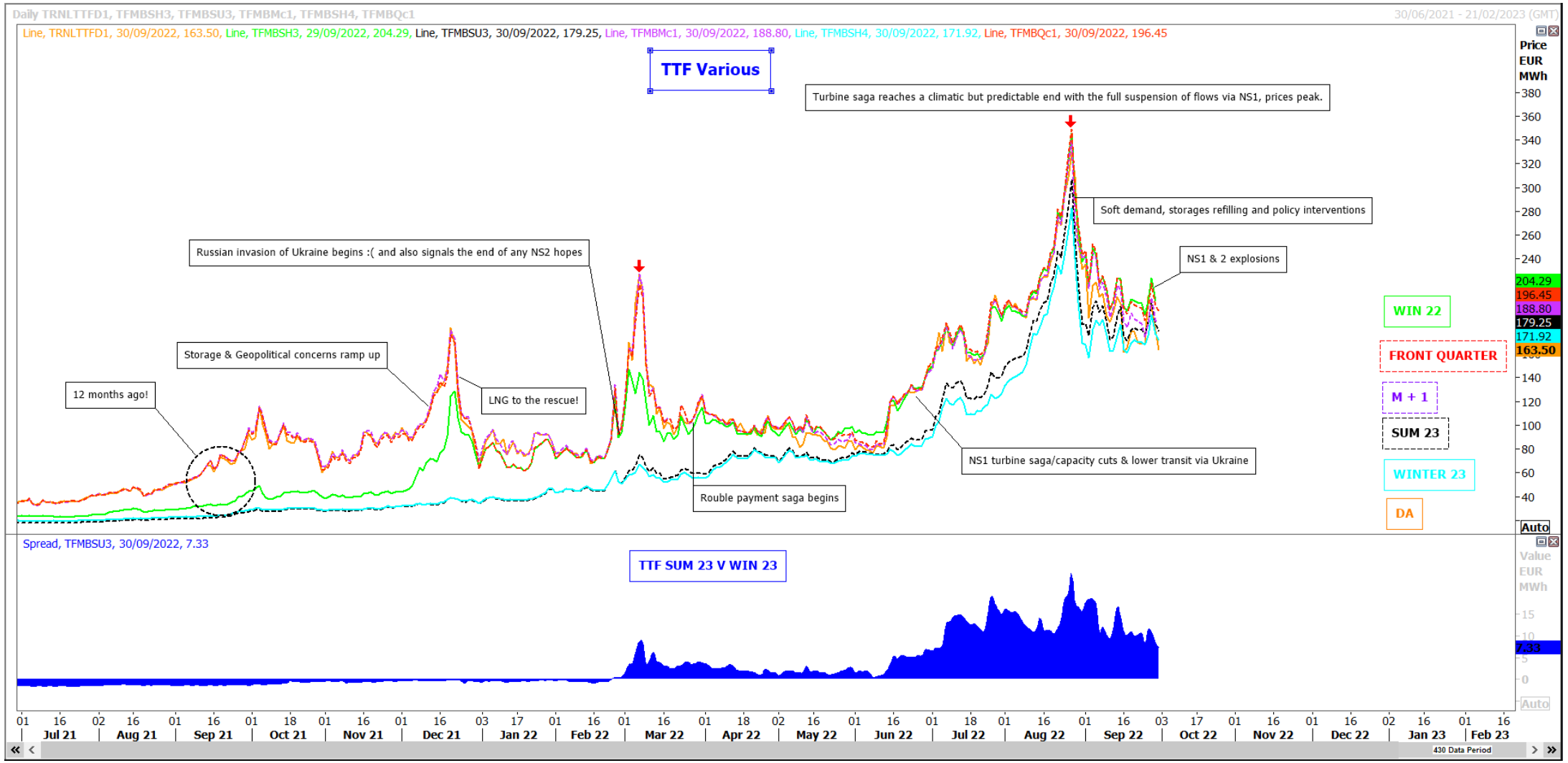
Gas Year 2021: What a year it has been. A price rally dominated by Russian supply concerns and geopolitical uncertainty.



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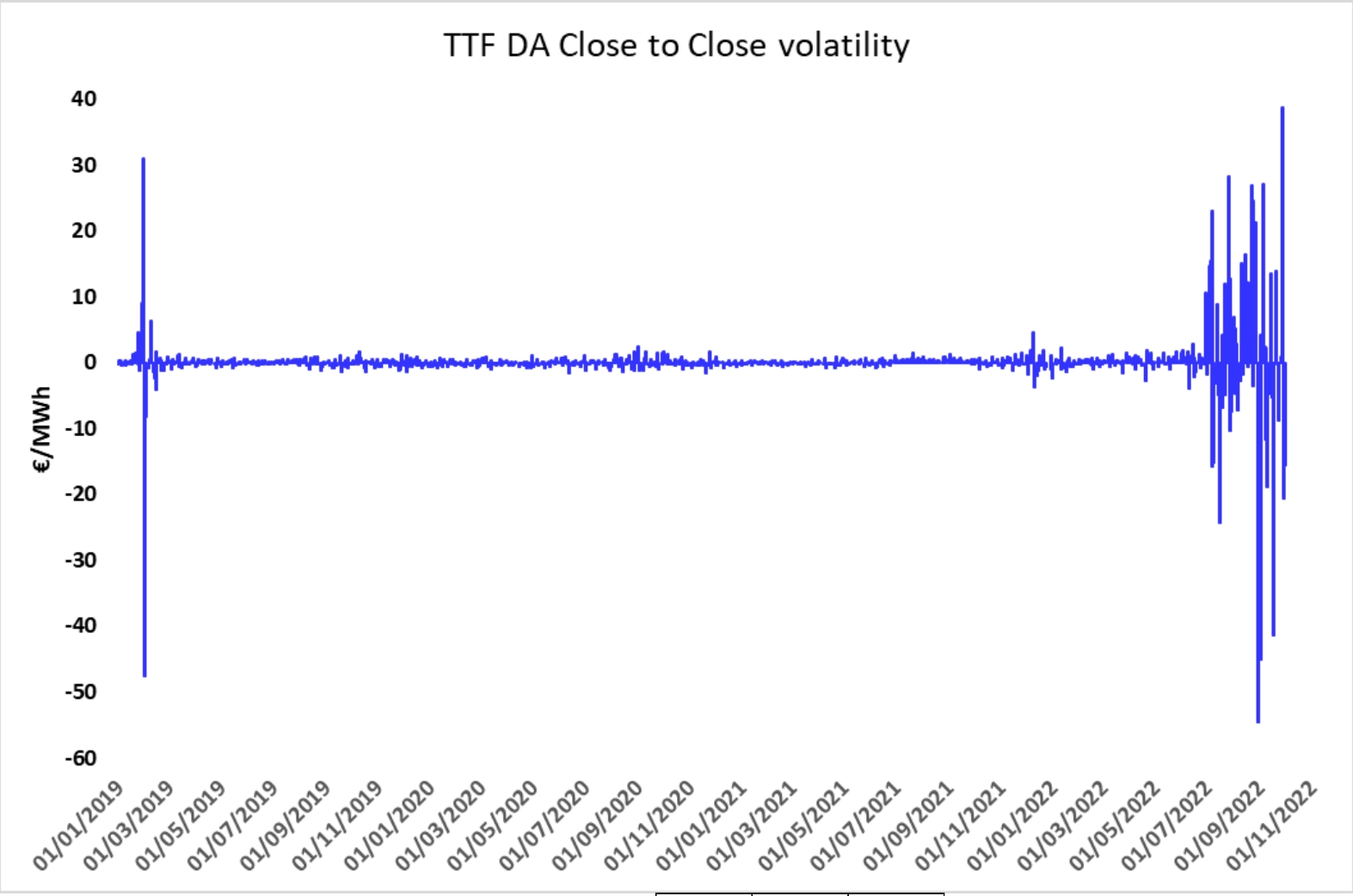
Volatility causing lower liquidity

Lower liquidity as a result of higher prices and rising margin costs. Extreme price swings and higher prices has seen liquidity fall and volatility increase.



	Average	High	Low
SUM 22 TTF DA €/MWh	**151**	**330**	**77**
SUM 21 TTF DA €/MWh	**37**	**93**	**19**

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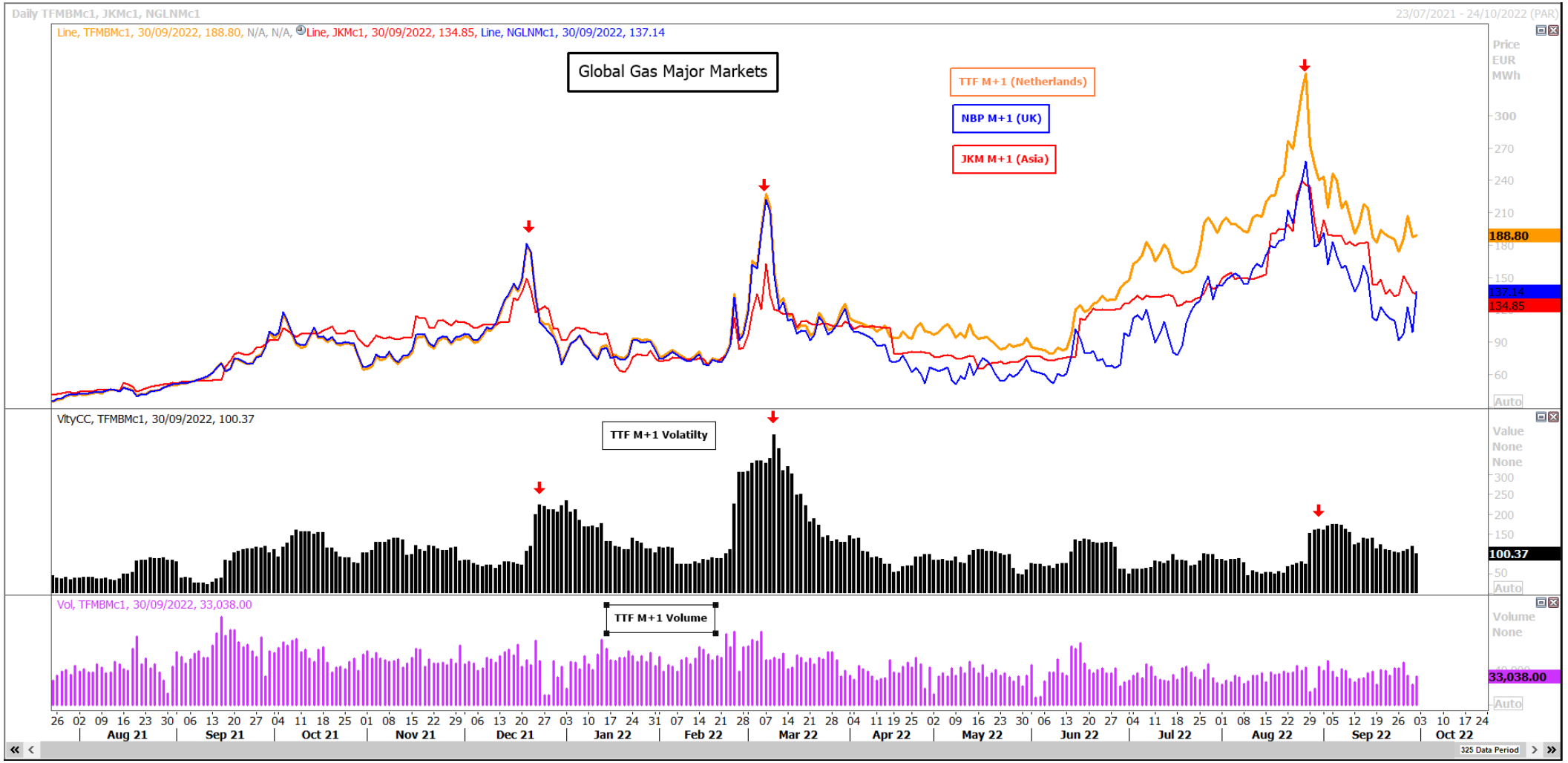
Volatility & Volume



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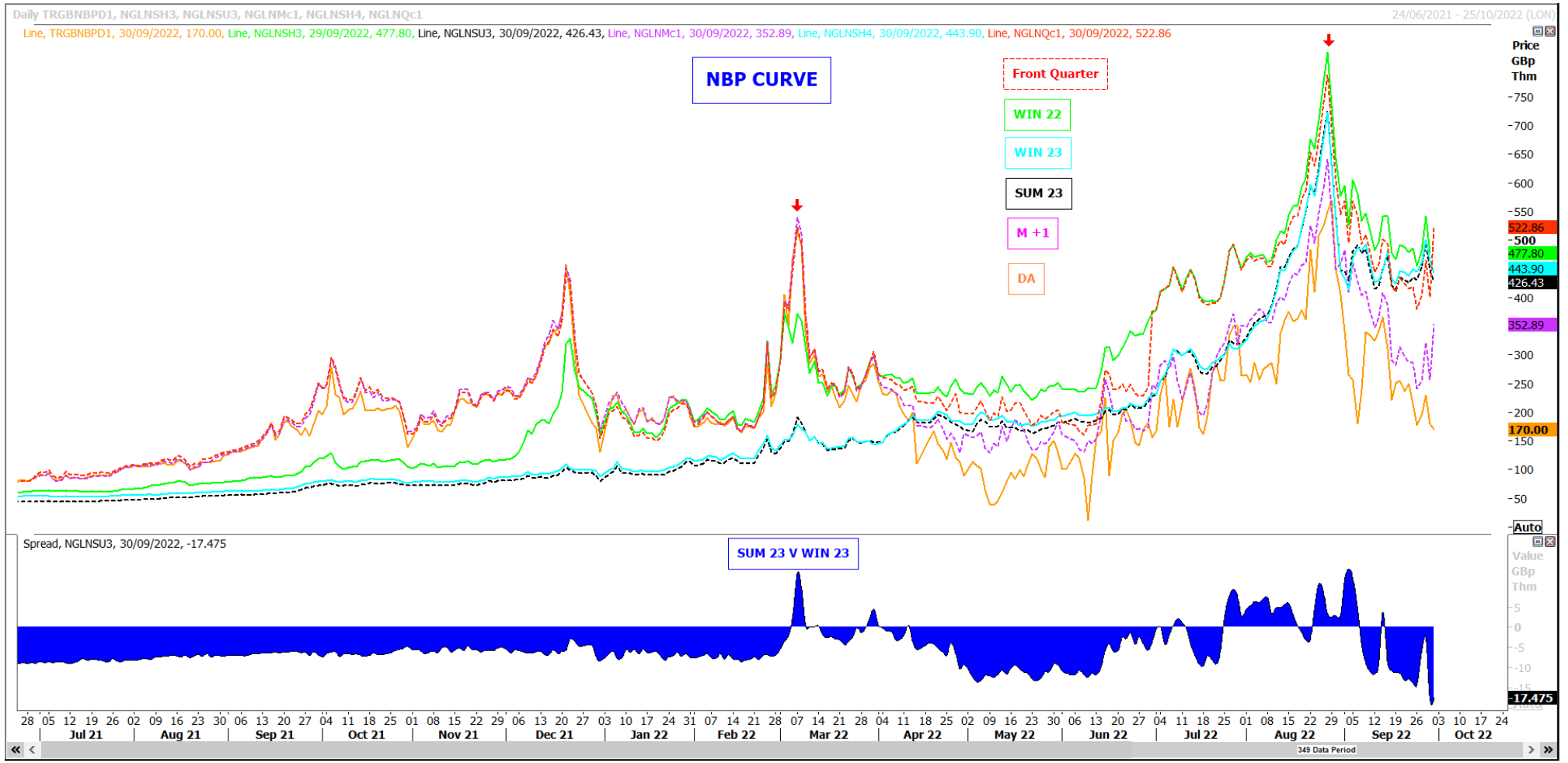
Gas Year 2021: What a year it has been. A price rally dominated by Russian supply concerns and geopolitical uncertainty.



	Average	High	Low
SUM 22 NBP DA	**217p/th**	**570p/th**	**12p/Th**
SUM 21 NBP DA	**93p/Th**	**203p/Th**	**50p/Th**

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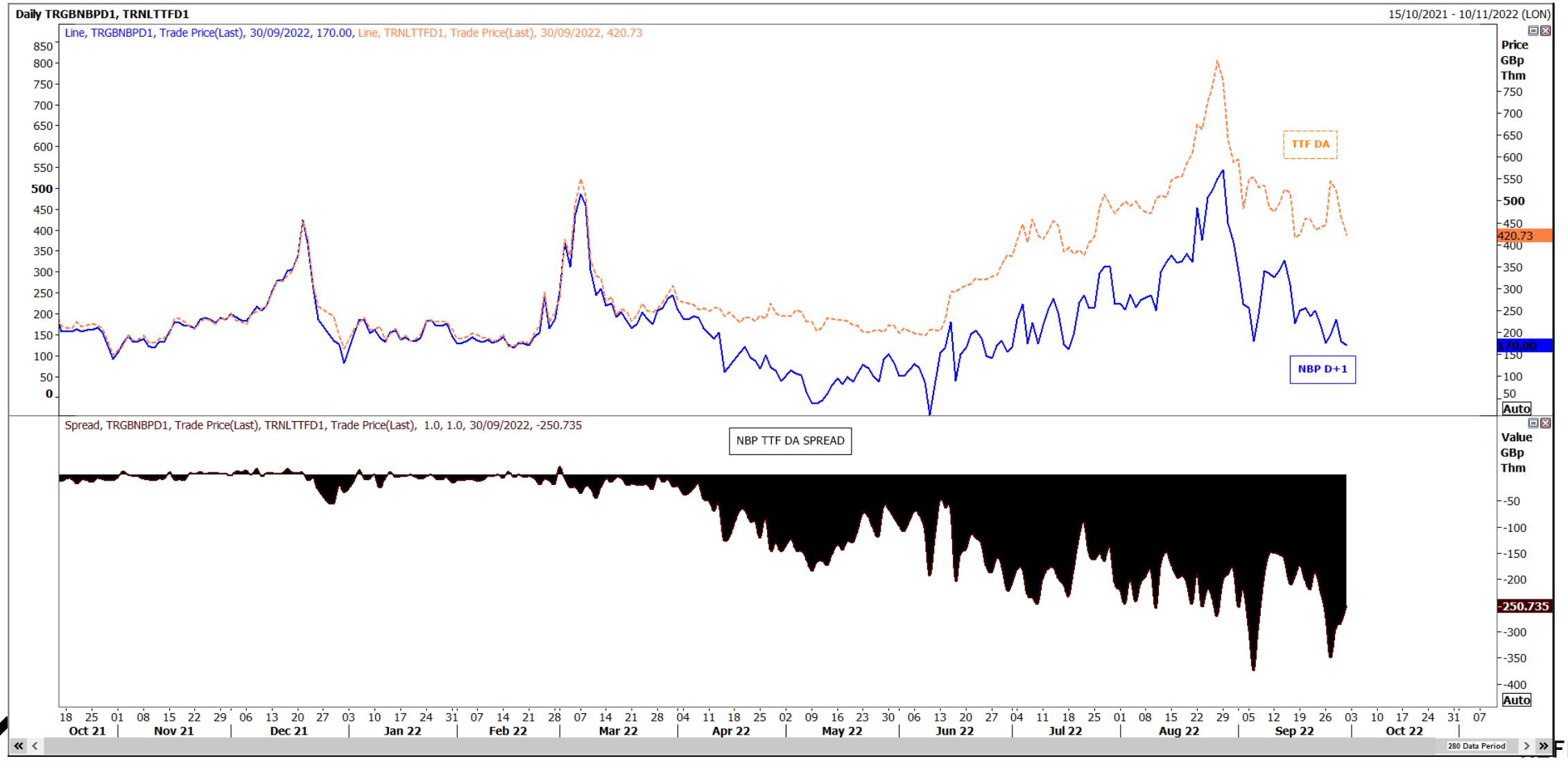
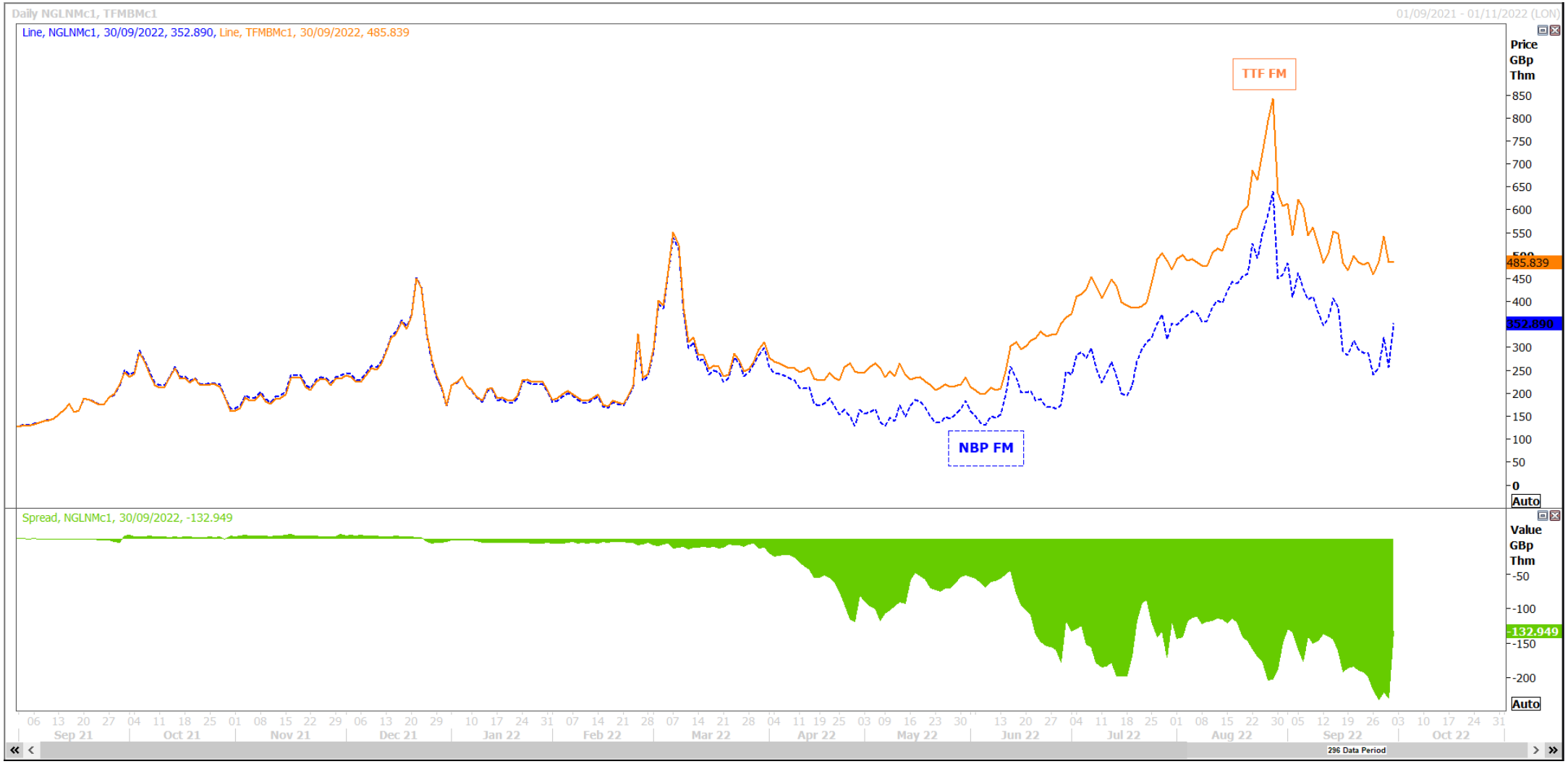
UK Exports expected to remain high driven by the untypical spread between NBP &TTF.



Same story on the NBP V TTF FM spread



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Looking at the fundamentals

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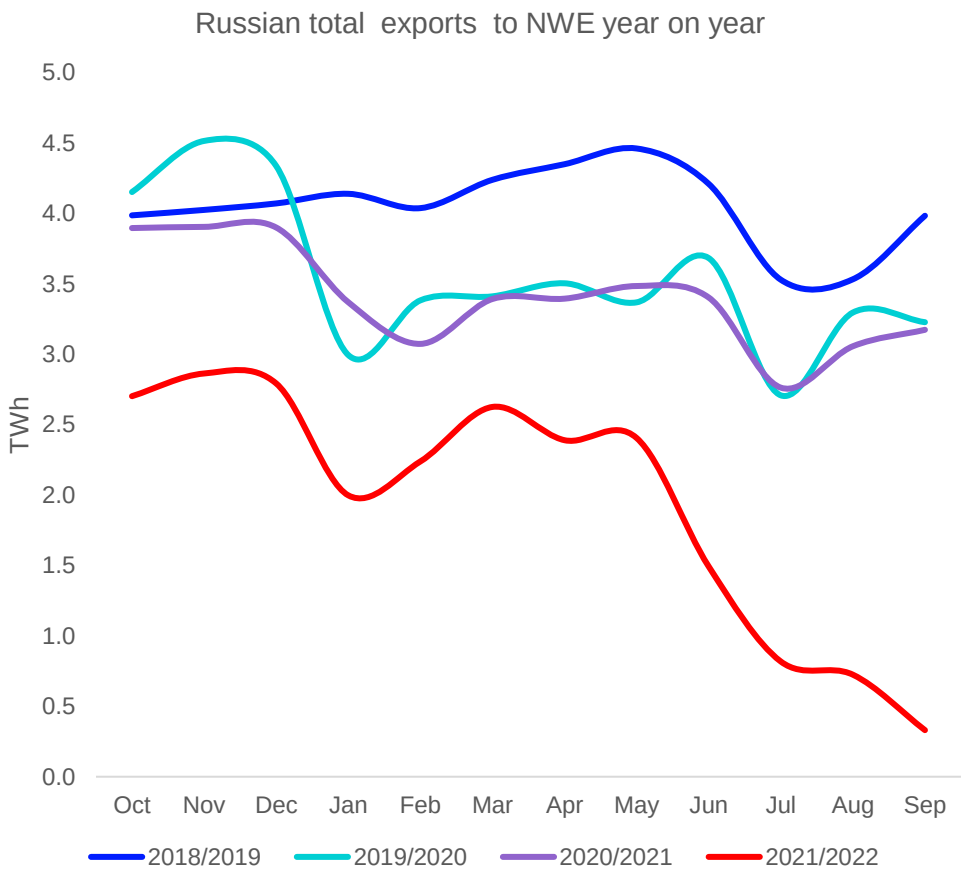
In war all means are good: Russian gas weapon



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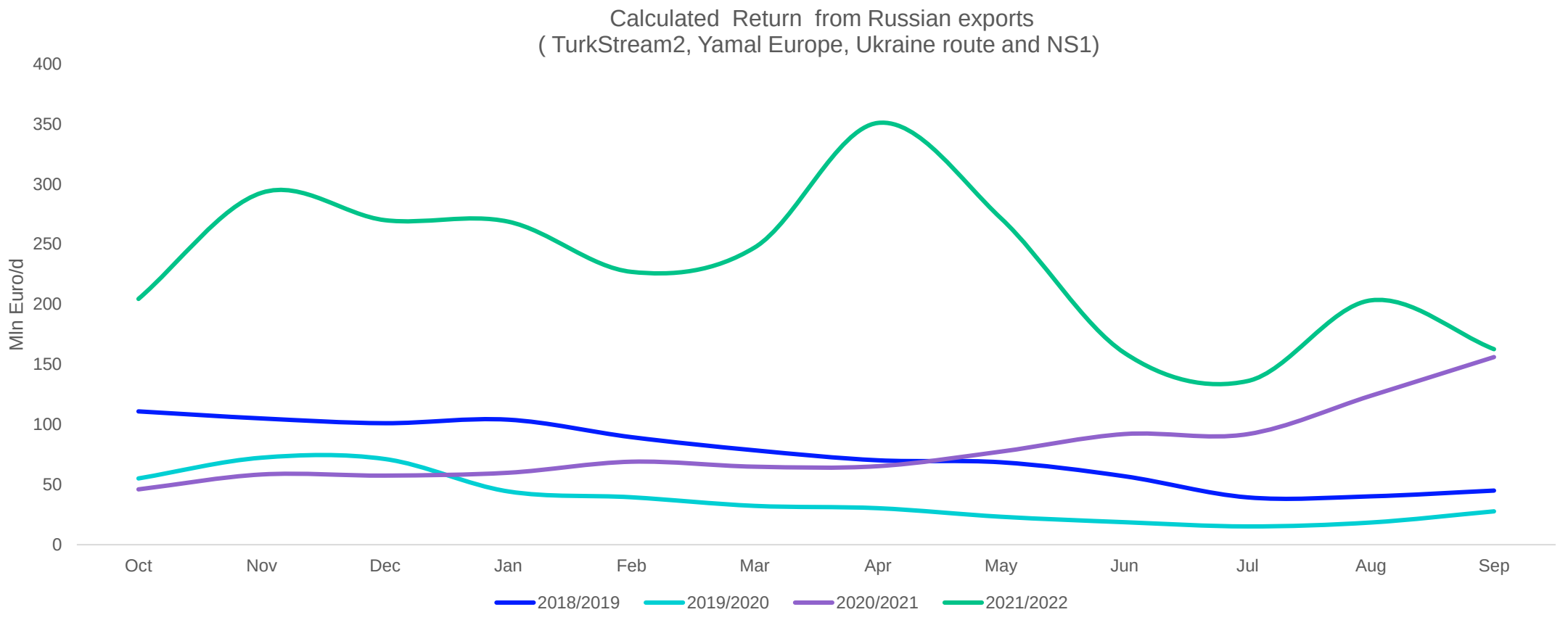
Record high earnings for Gazprom

In Gas Year 2021 Russian exports to Europe halved while sales return tripled. Calculated returns is calculated as total volumes multiplied by TTF FM index.



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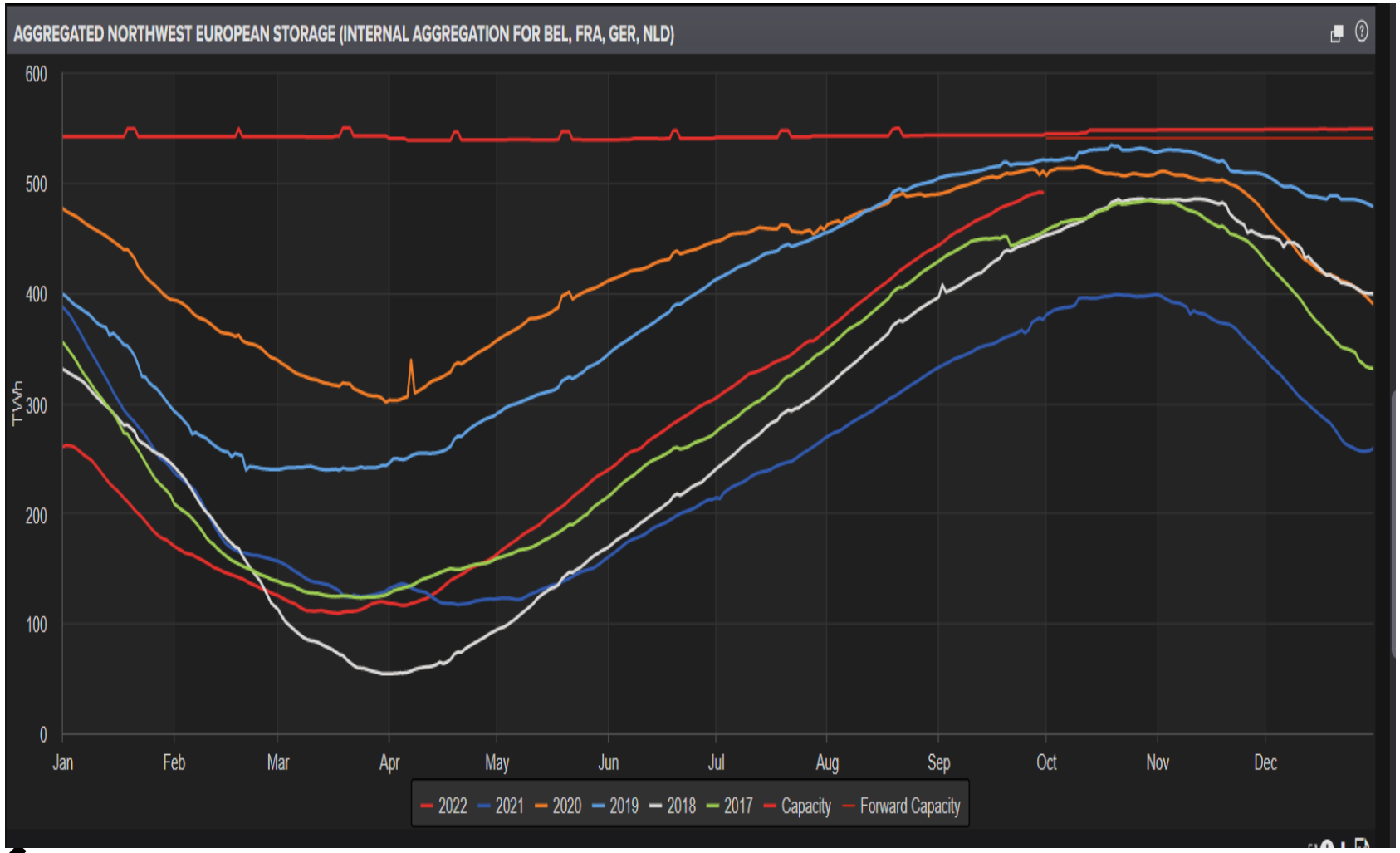
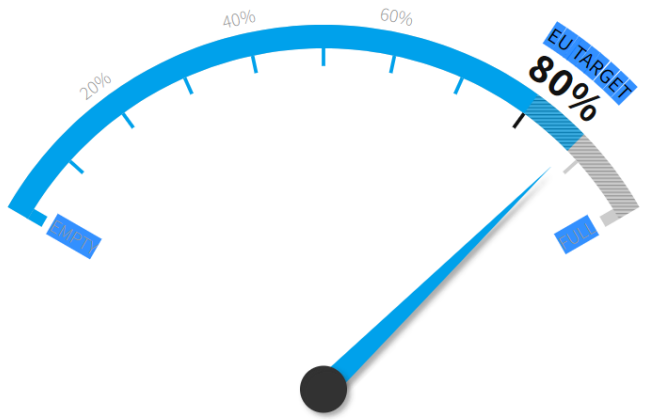
Entering the winter at a healthy storage level. But is it enough?

As per 1 October European inventories are filled at 88%, well above the 80% target for 1 November.

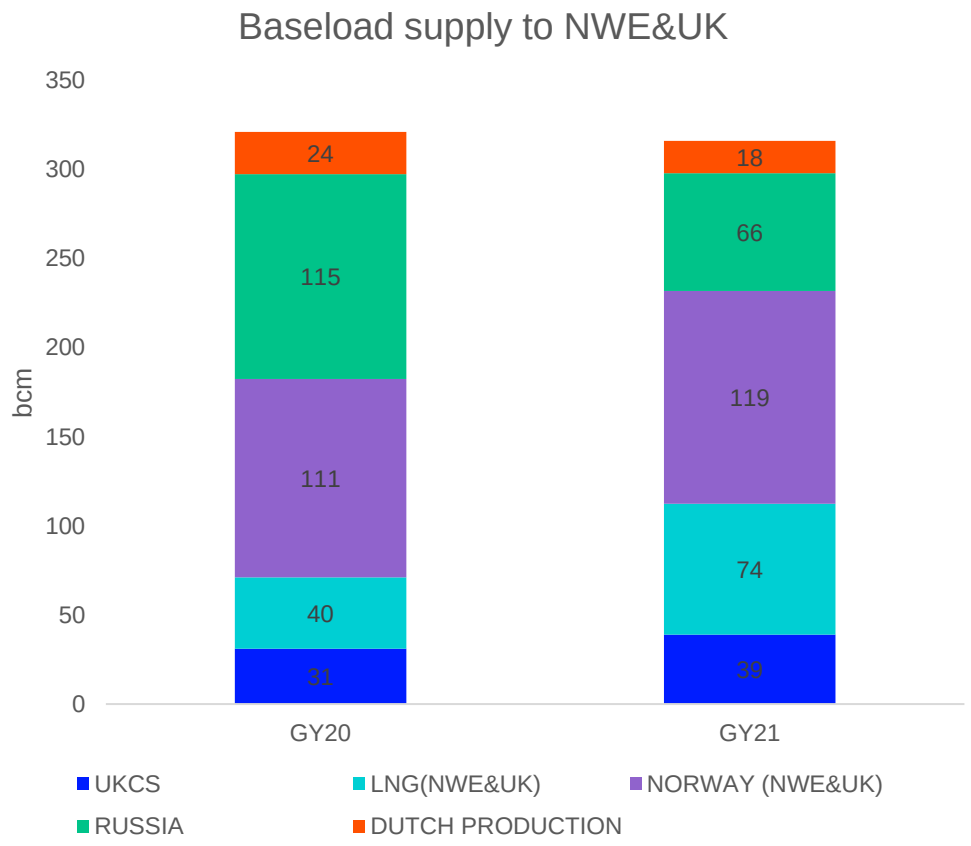


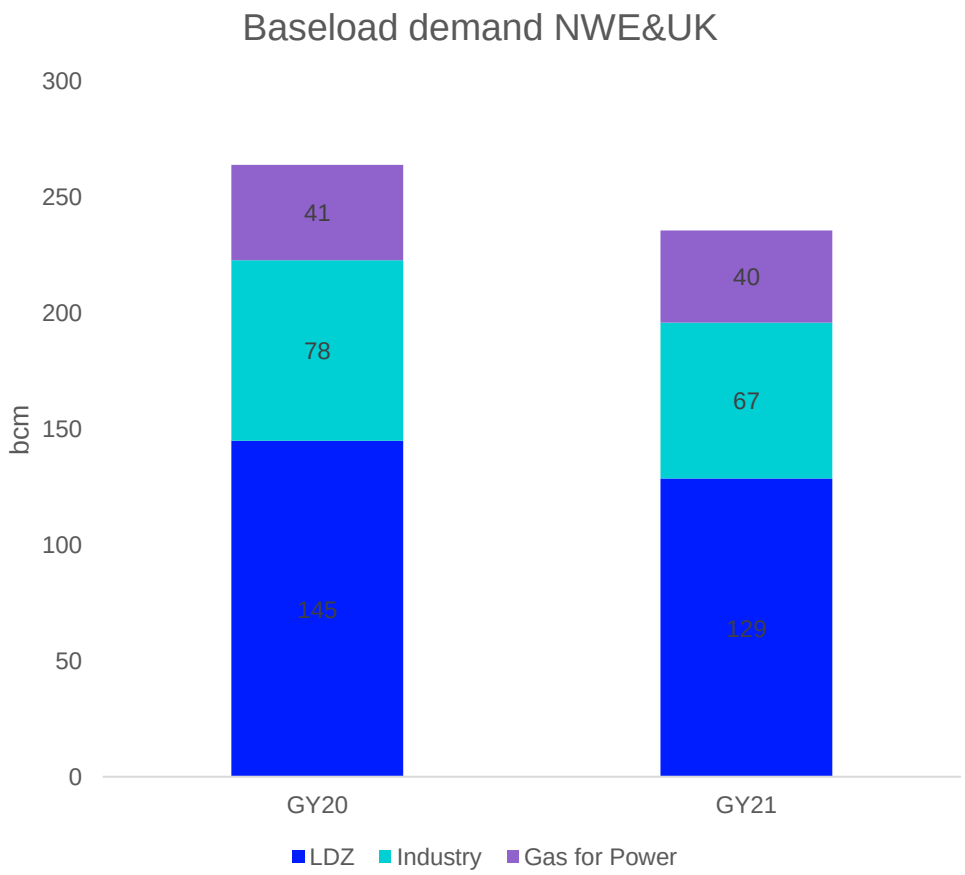


88.4% of EU gas storage is filled.

Additional LNG and demand disruption helped this year.

Without Russian gas supply Europe needs more of the same “medicine” .





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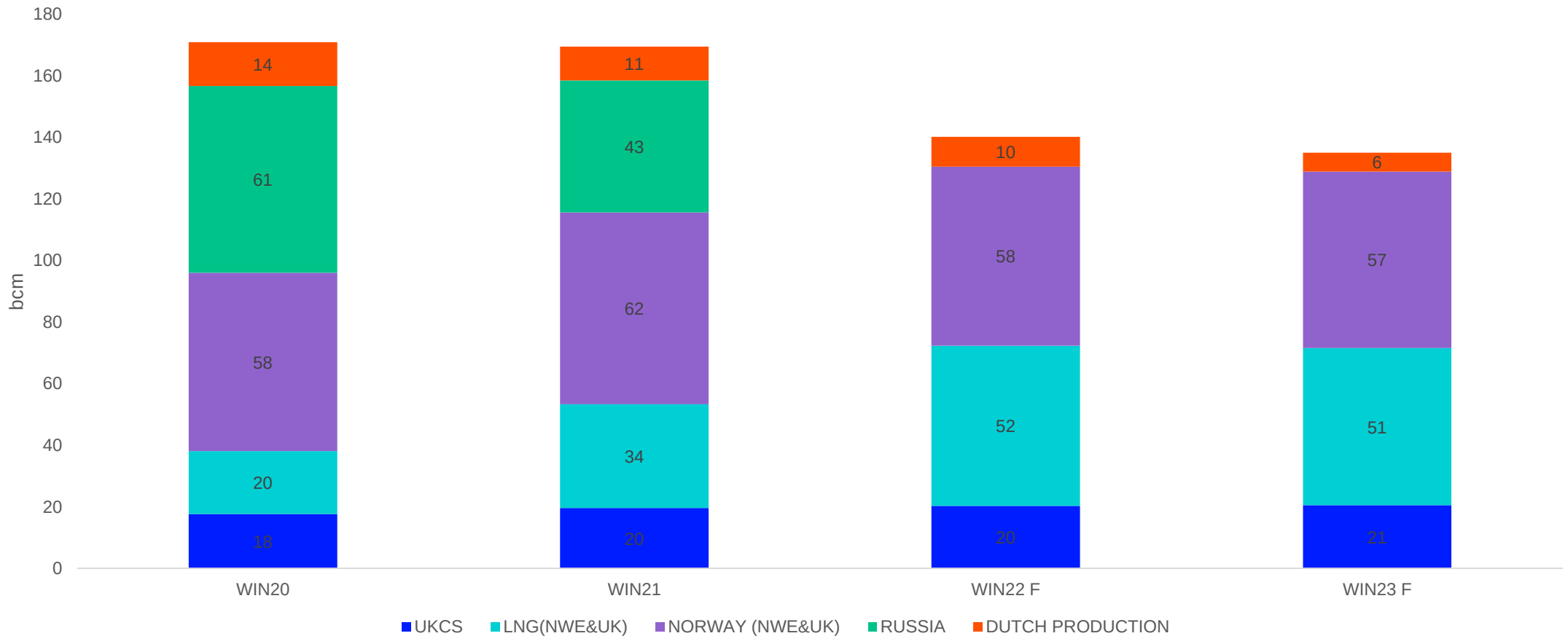
Supply Outlook Base Case: NWE unlikely to be able to substitute all Russian supply.



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LNG Winter Outlook: Sailing into the unknown

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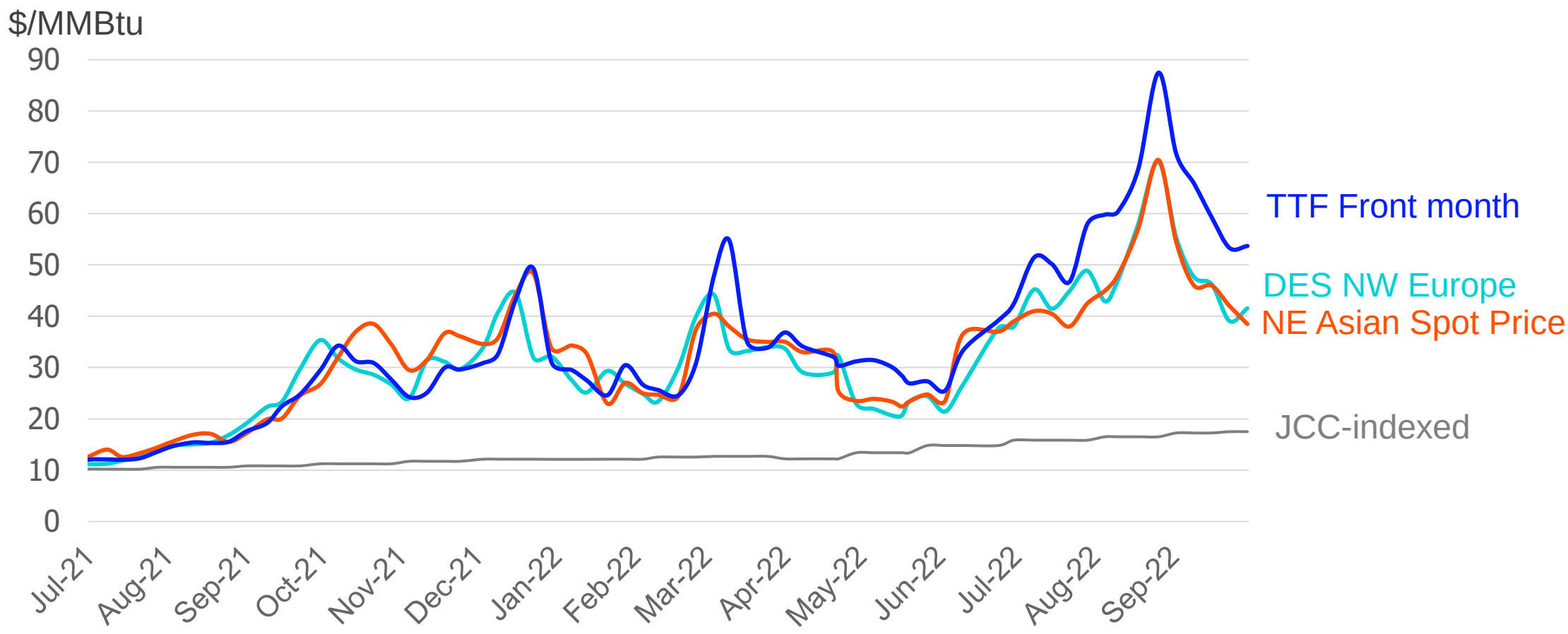
Northwest Europe – a premium market for uncommitted cargoes

DES Northwest Europe and Asian spot – dictates the arbitrage for uncommitted Atlantic cargoes



Source: Reuters News, ICE, Waterborne

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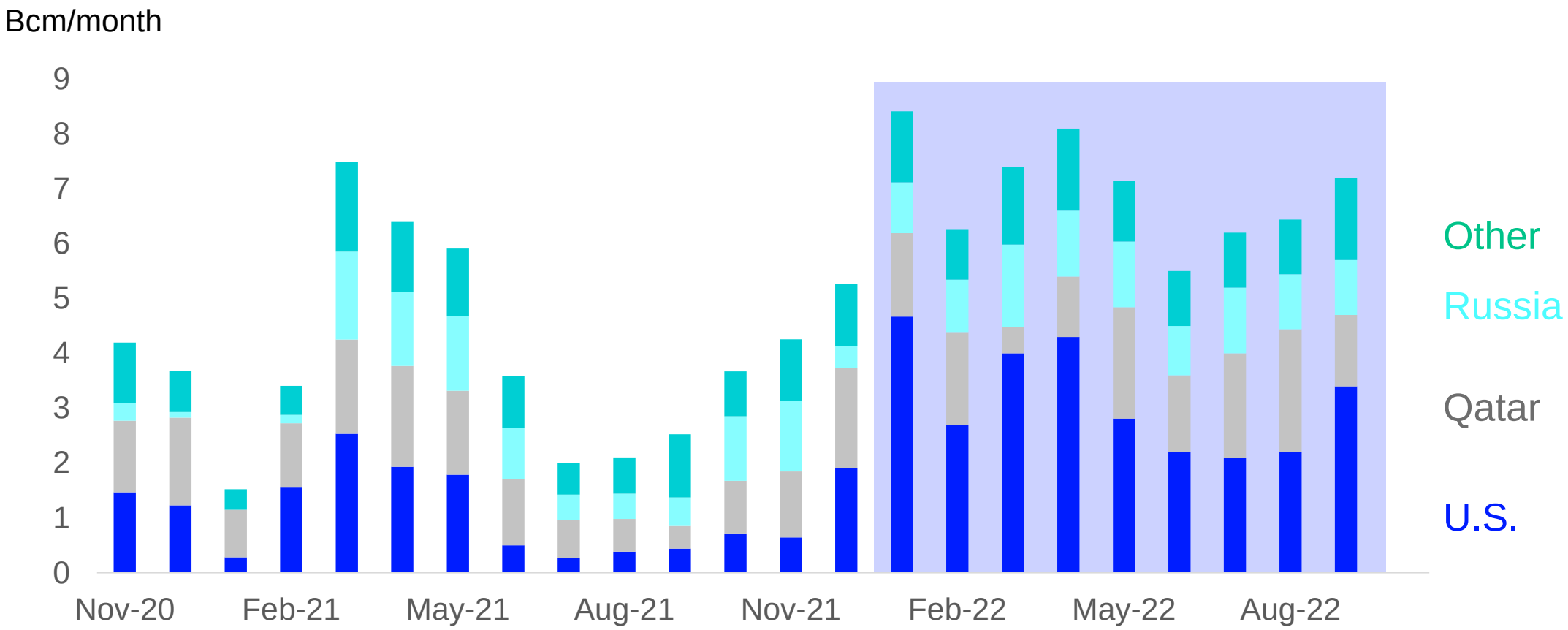
Northwest Europe – unprecedented surge in cargo arrivals!

Jan-Sept: NW Europe imports up by 91% yoy or ~30 bcm – total Europe by 66% yoy or 52 bcm



Source: Refinitiv, TSO

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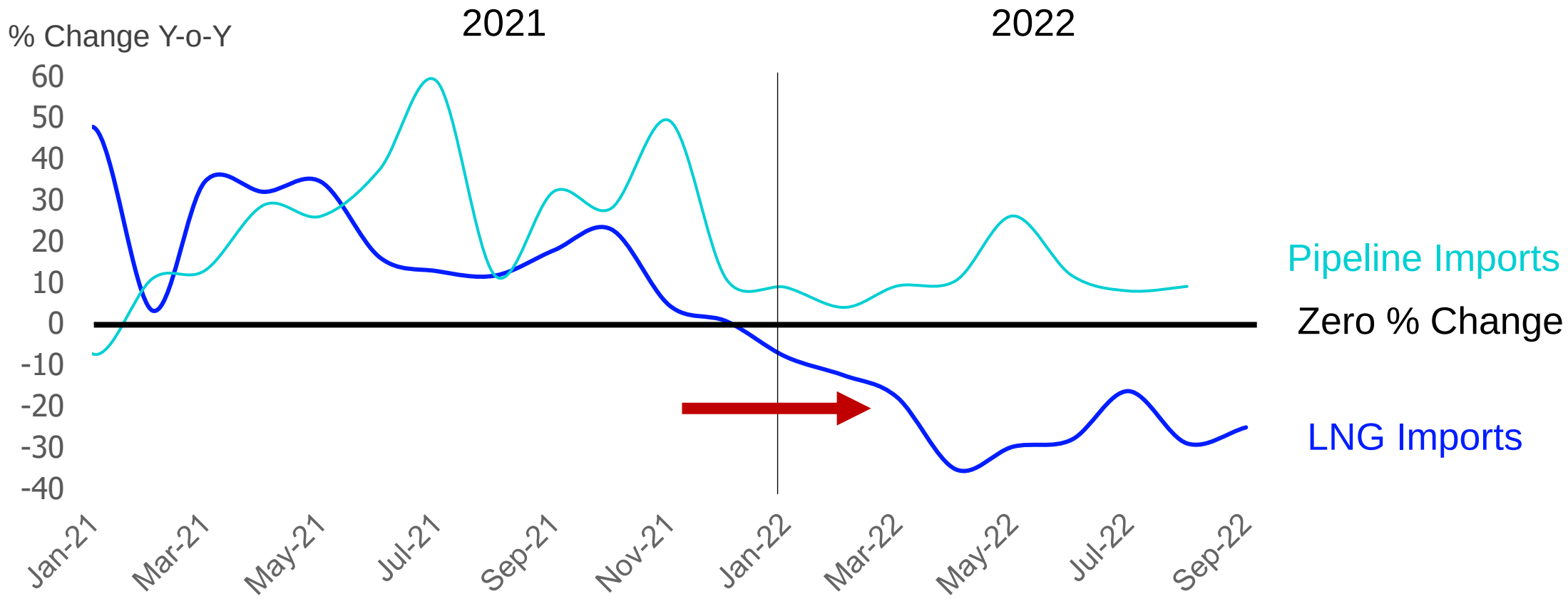
Chinese LNG imports - steep drop - led by a confluence of factors

Jan-Aug: LNG imports down 22% or 15.8 bcm



Source: Chinese Customs

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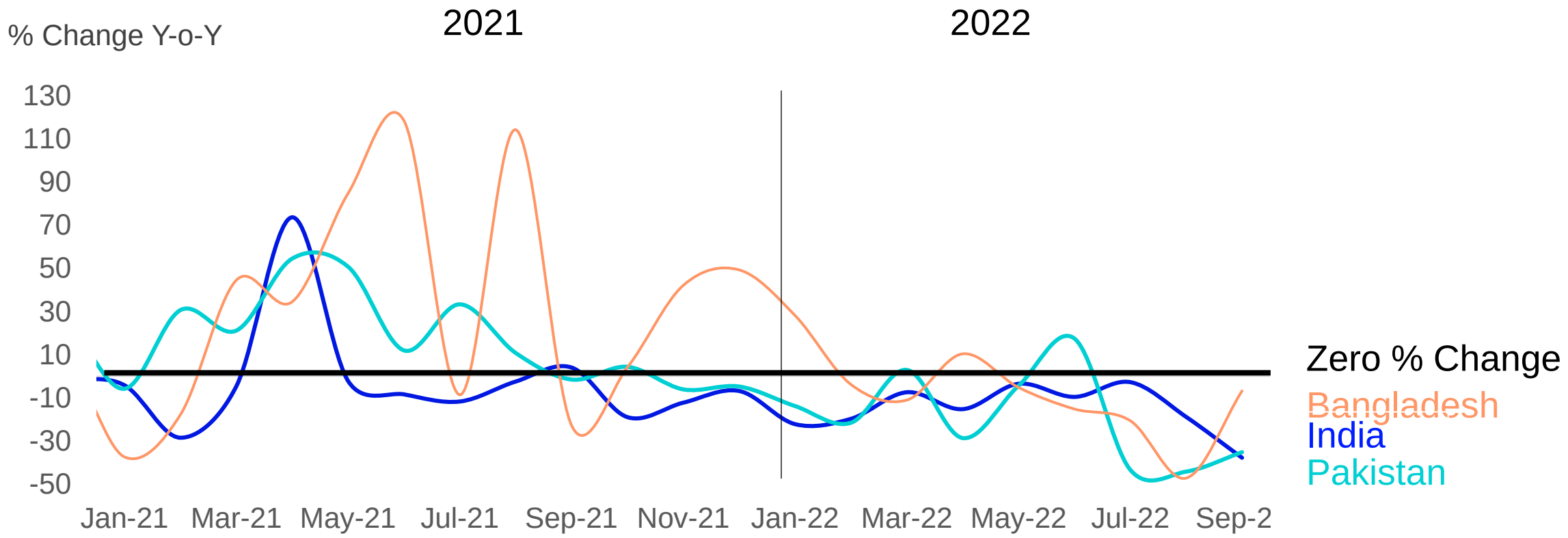
Demand destruction among several South Asian LNG importers

Jan-Sept: LNG imports to India, Pakistan & Bangladesh combined - down 15.7% yoy or 6 bcm



Source: PPACell, Refinitiv flows data

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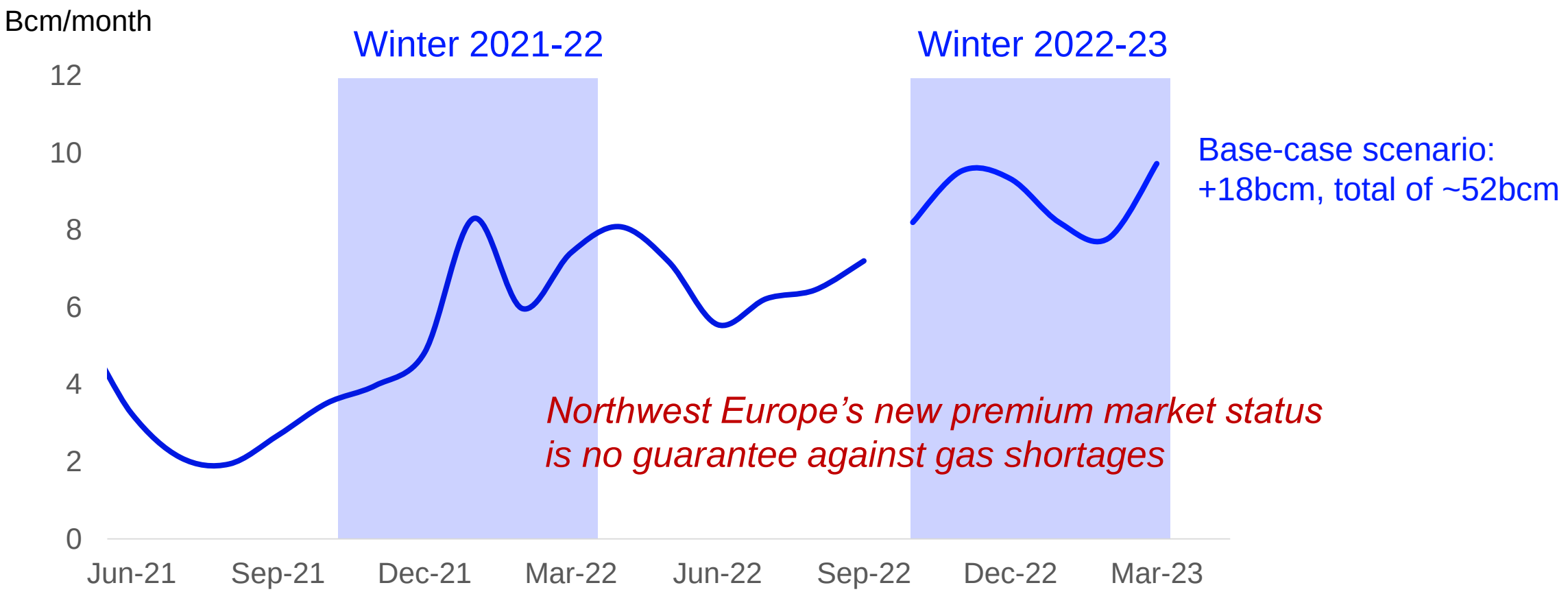
Cargo arrivals to NW Europe*: forecast for winter 2022-23

Base scenario – could see an increase of 18 bcm



Source: Refinitiv, TSO
* UK, Nld, Bel, Fra, Ger

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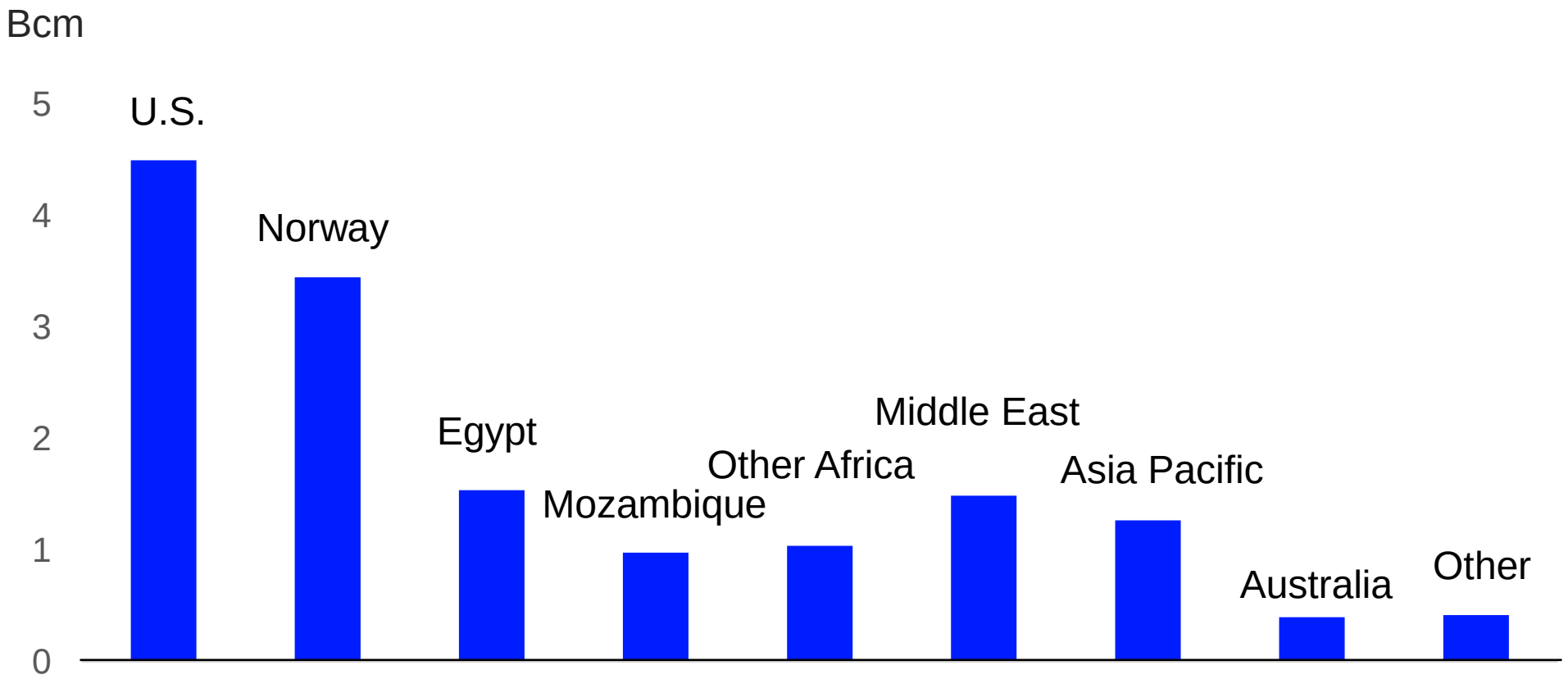
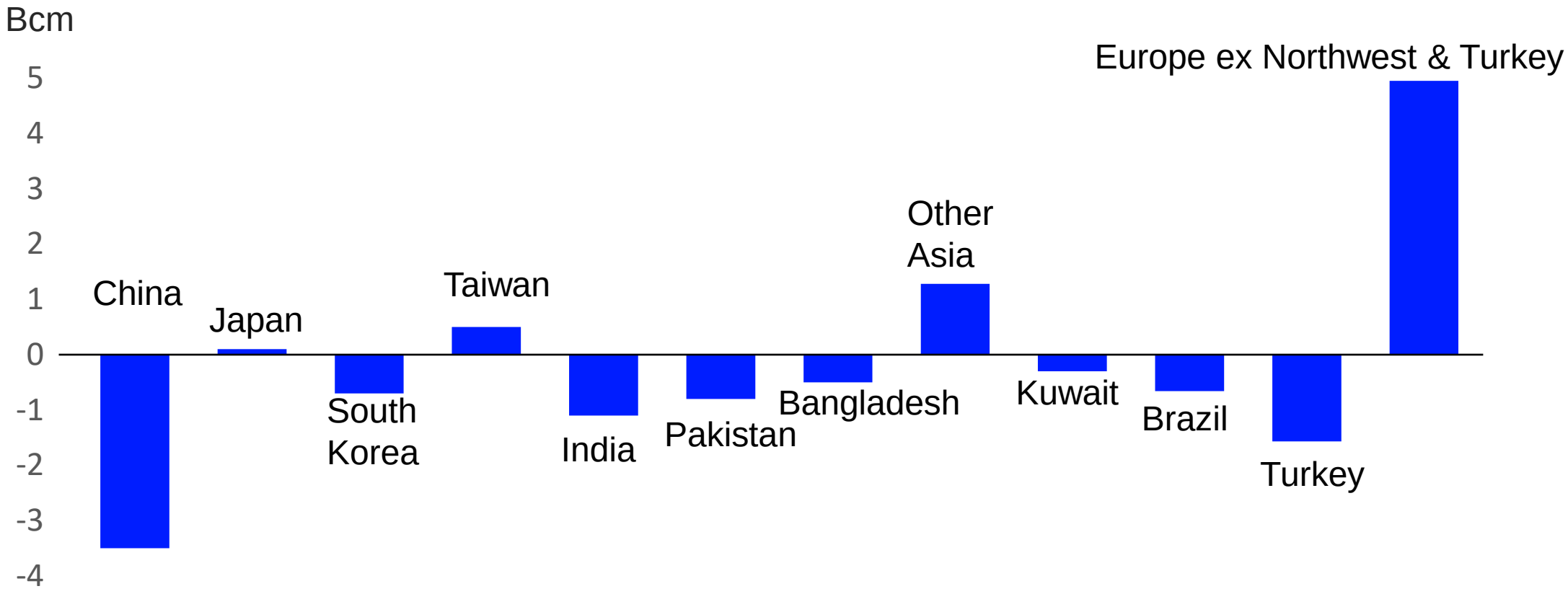
Winter supply outlook – expected growth of 15 bcm or 5.5% YoY



Source: Refinitiv

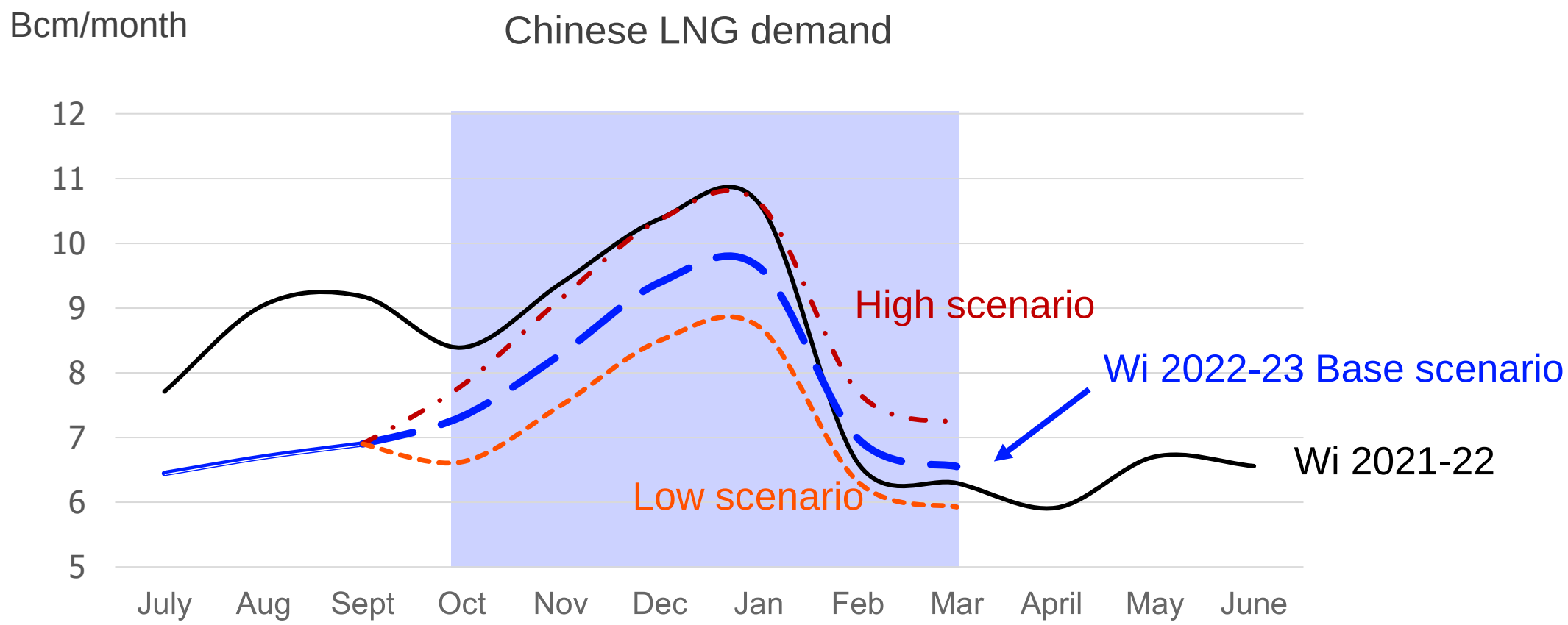
Winter demand outlook
Ex Northwest Europe - expect to see a decline of 3 bcm or -1% yoy



Source: Refinitiv

China – holds the key for European winter LNG

Oct - Mar: variation between low- and high scenario of almost 10bcm

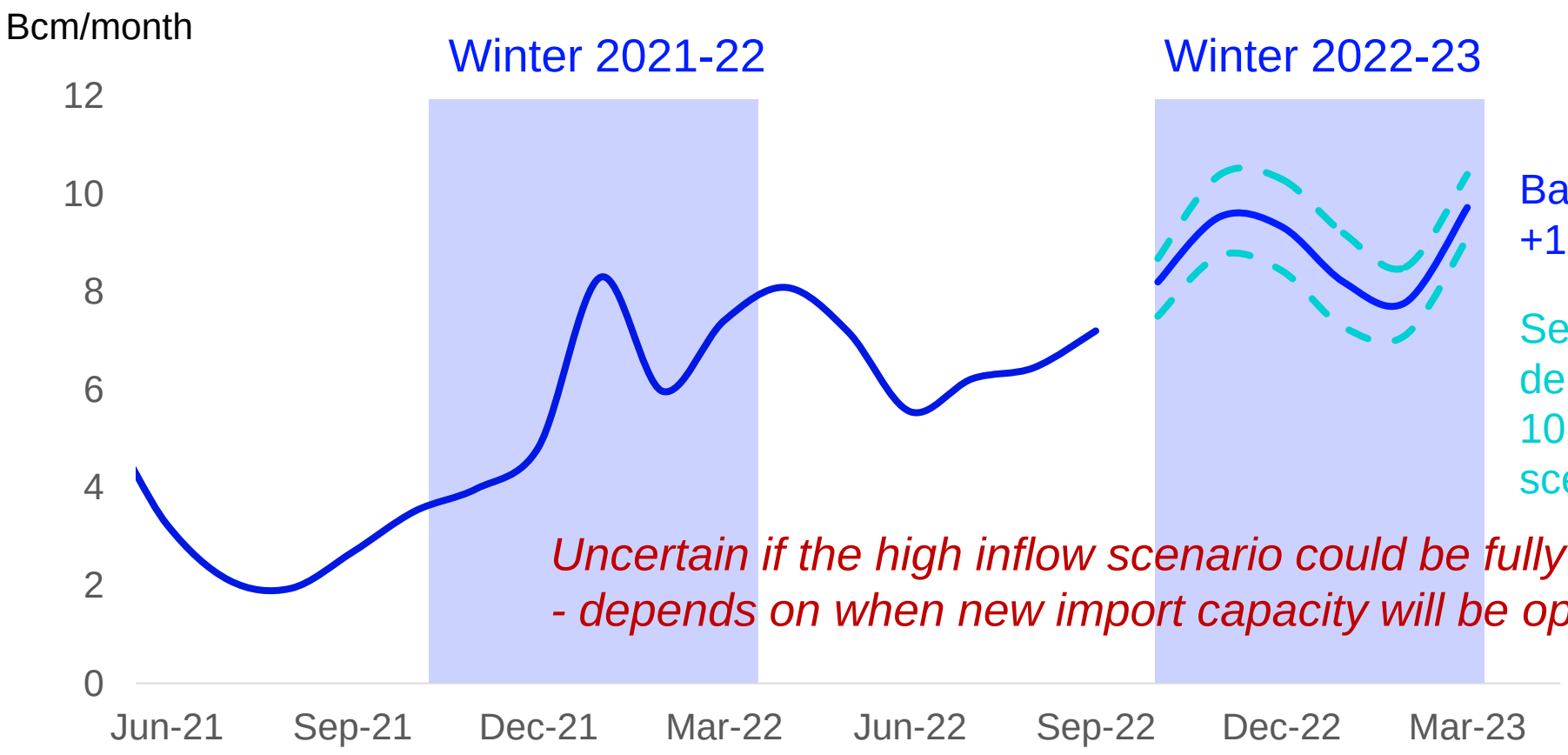


Source: Refinitiv, Chinese Customs

REFINITIV

Cargo arrivals to NW Europe: forecast for winter 2022-23

Base scenario – could see an increase of 18bcm



Base-case scenario:
+18bcm, total of ~52bcm

Sensitivities on Chinese LNG demand:
10bcm range - high and low scenario

Uncertain if the high inflow scenario could be fully accommodated - depends on when new import capacity will be operational

Source: Refinitiv, TSO

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And – beyond this winter: summer 23 & winter 2023-24?

Do not expect any material change in supply availability to NW Europe

- SUPPLY: growth to slow down from 5.5% growth to 3.2%
  The U.S. and Africa the main contributors

- DEMAND:
  - China: LNG imports to grow moderately
  - Japan & South Korea: declining imports as new nuclear reactors are coming online
  - Other Asia: some modest recovery in LNG demand
  - Europe ex Northwest: robust demand growth

Norway

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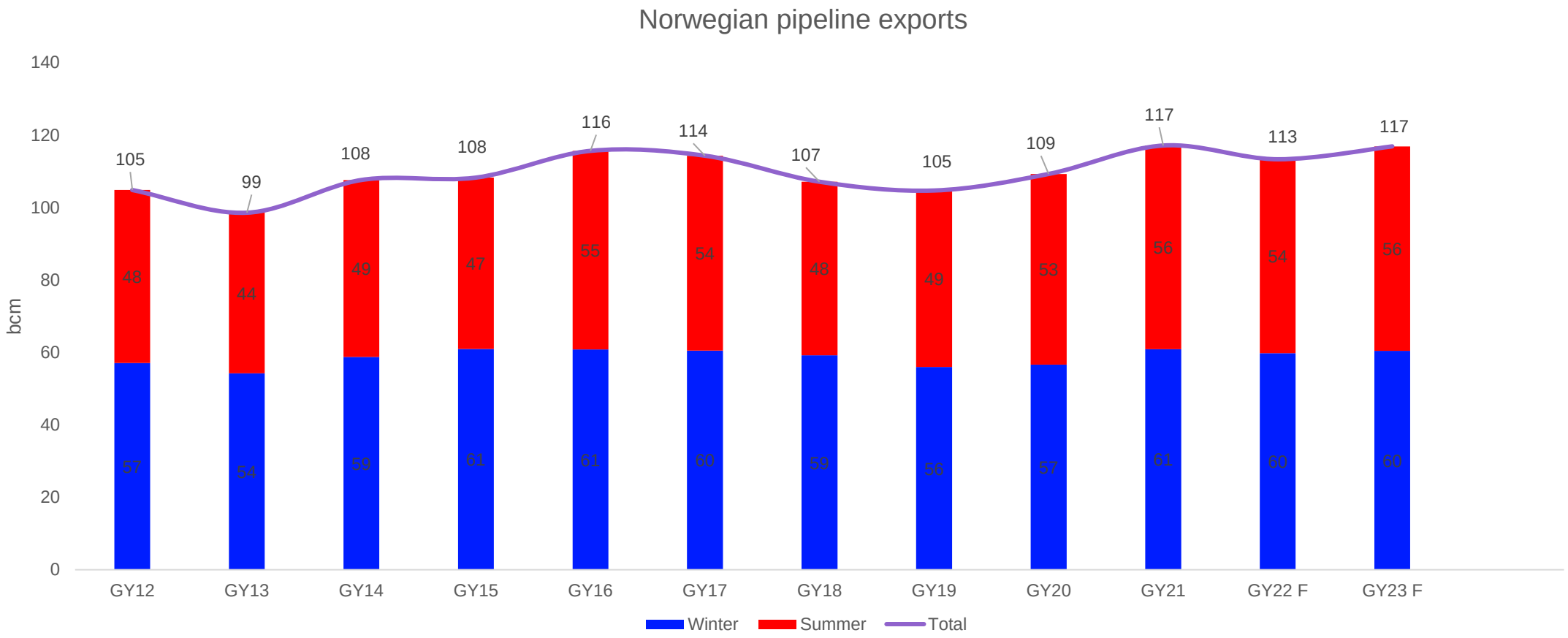
Norway is squeezing as much as possible. Hard to get more

WIN22: maturation of core fields continues, Dvalin (9mcm) can partly offset if starts as scheduled in Dec-22, but needs to ramp up first. SUM23: heavy maintenance schedule; For both GY22 and GY23, we assume flexible Troll and Oseberg maximising production.



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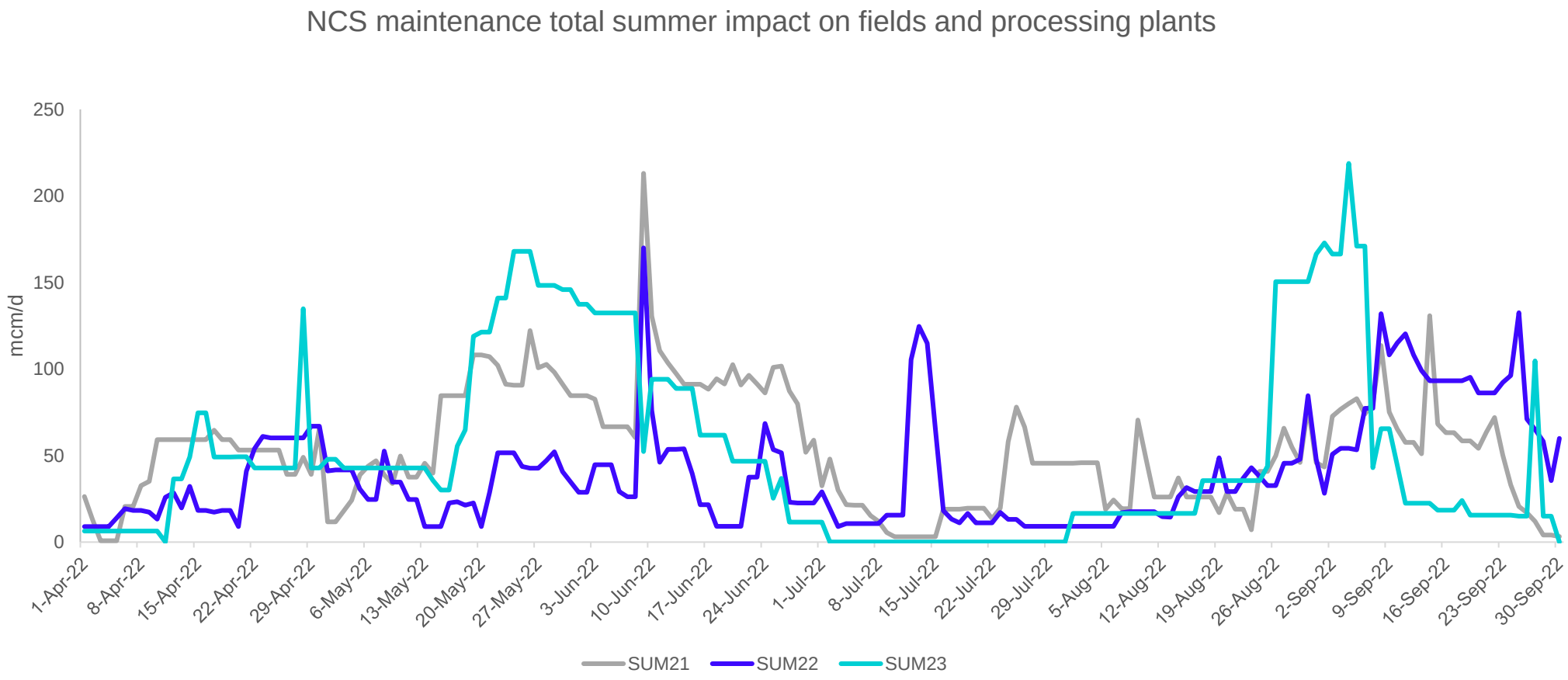
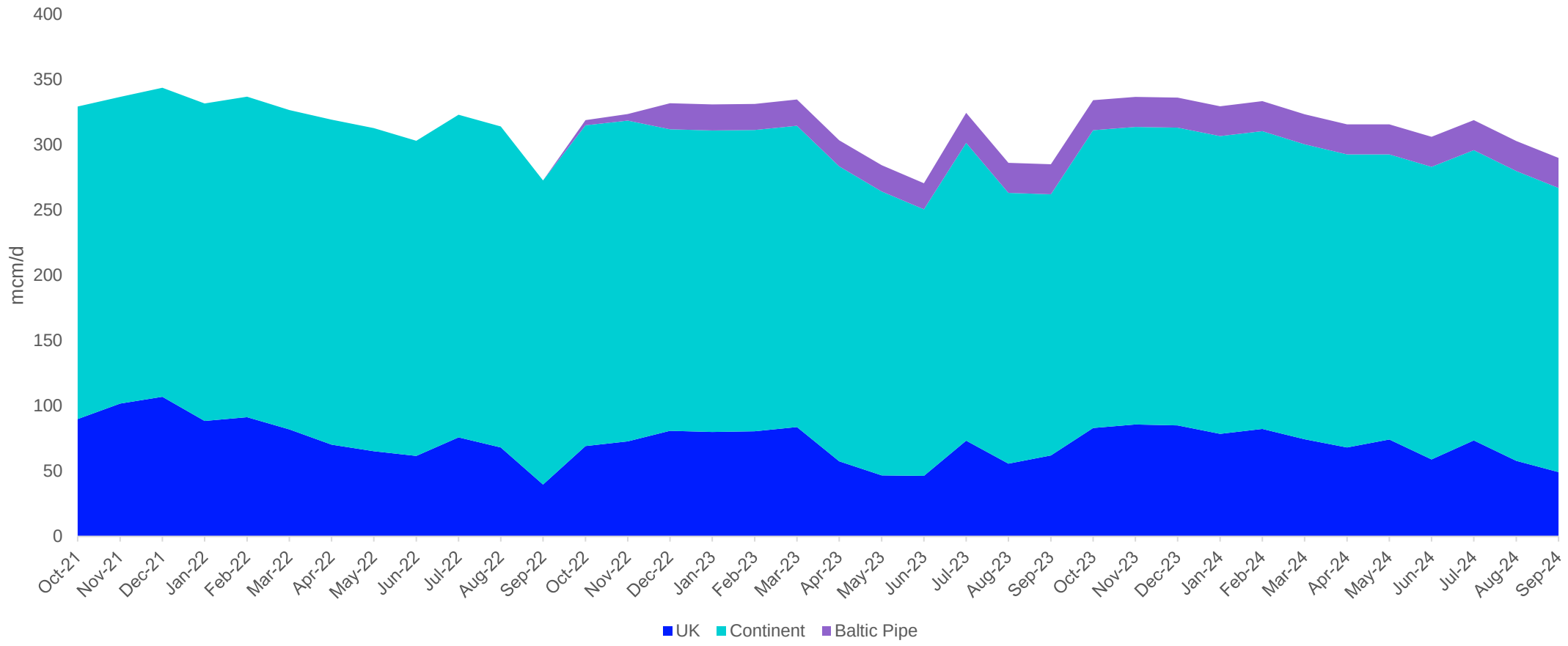
Heavy maintenance schedule for SUMMER 2023 in Norway



Baltic Pipe: redirecting Norwegian gas from the Continent



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Dutch Production

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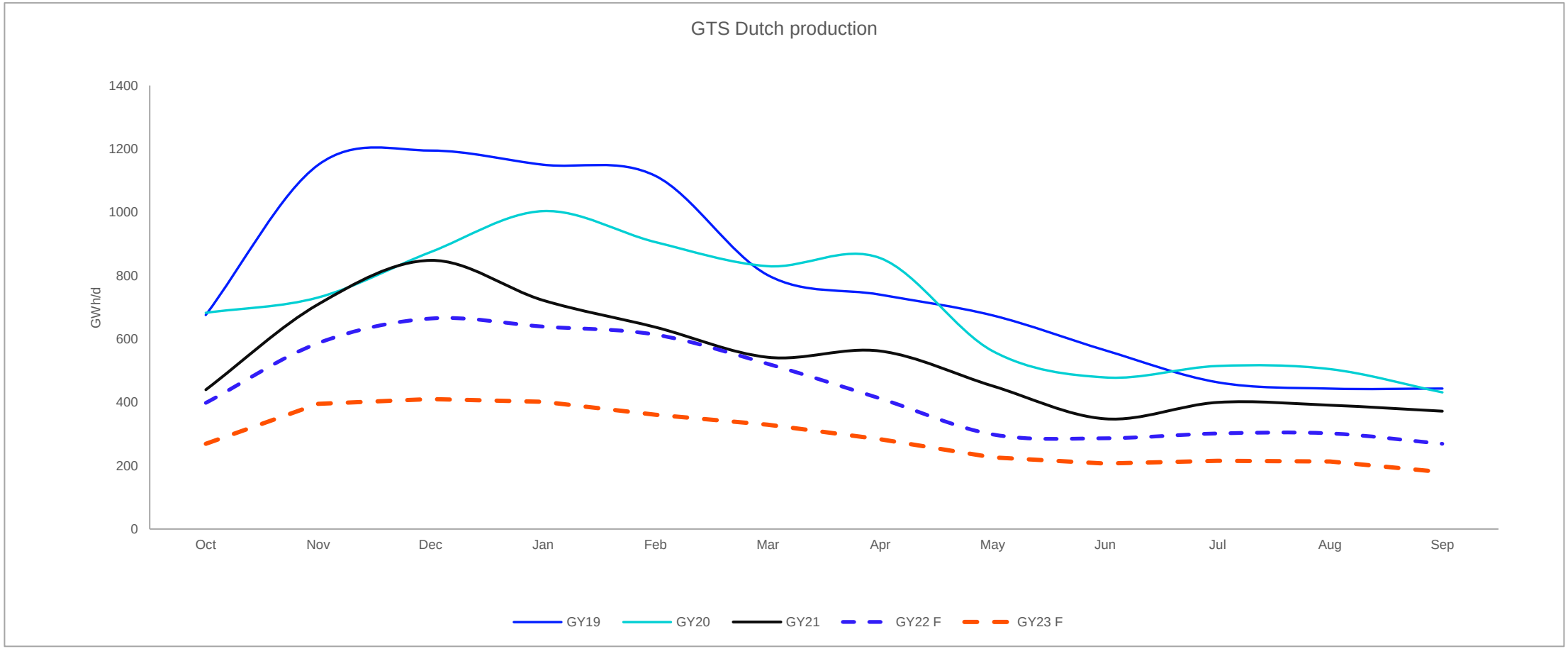
Dutch production continues to decline

Groningen quota for GY22 is 2.9bcm vs 4.5 bcm, other fields maturation continues. Delay in Zuidbroek would support majority of GY22 quota to produce in WIN22. No Groningen gas is expected in GY23



Demand: LDZ

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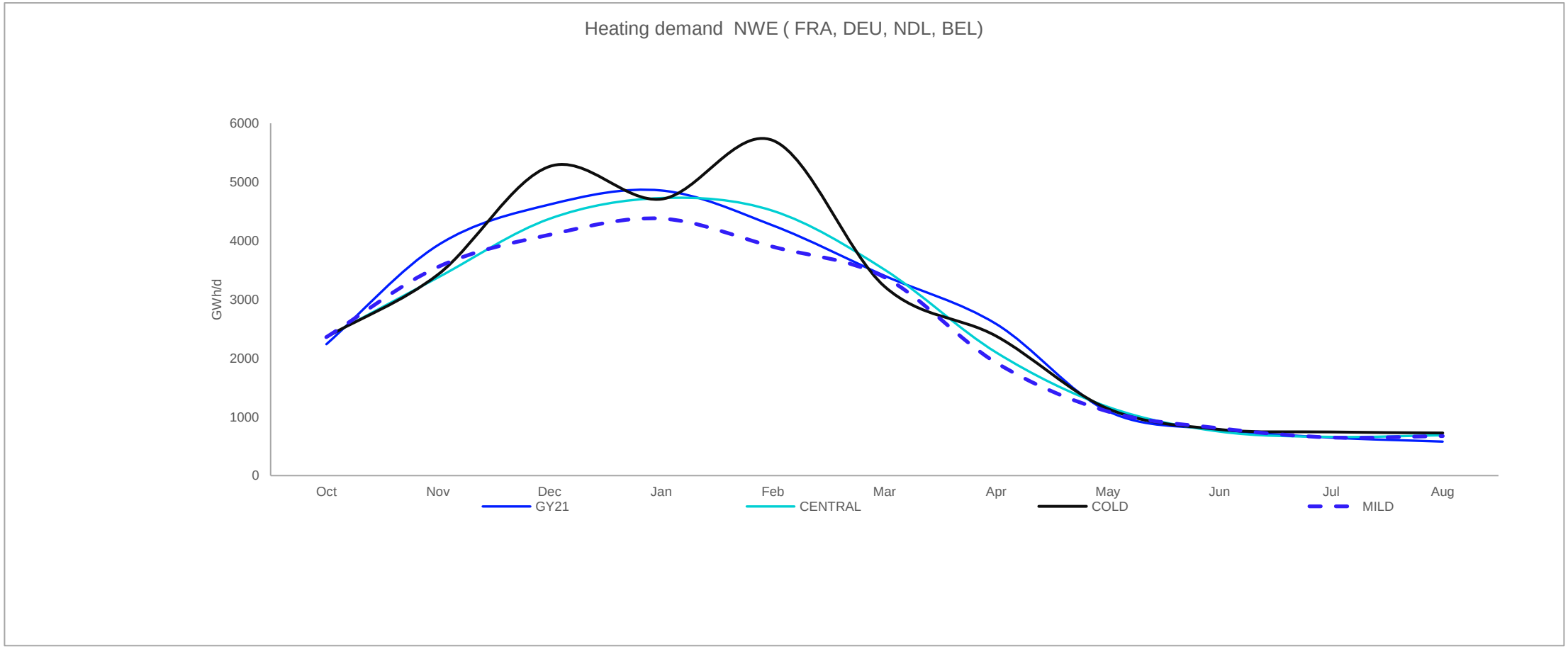
LDZ consumption in GY21 is the lowest over the last five years.

WIN21 was slightly warmer than WIN20. Total LDZ consumption in NWE is 5% down WIN21 on WIN20 and 3% down to average of last 5 years.



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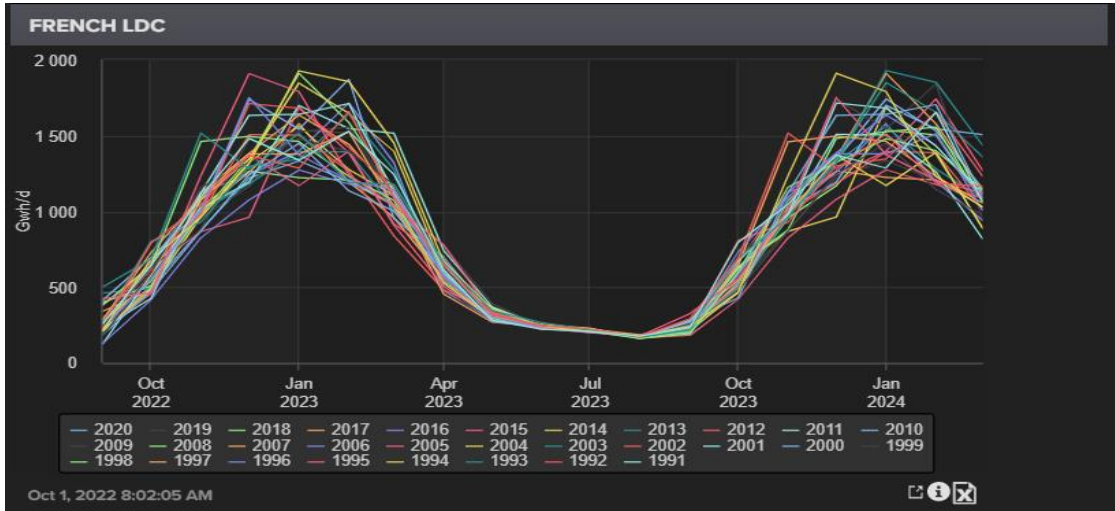
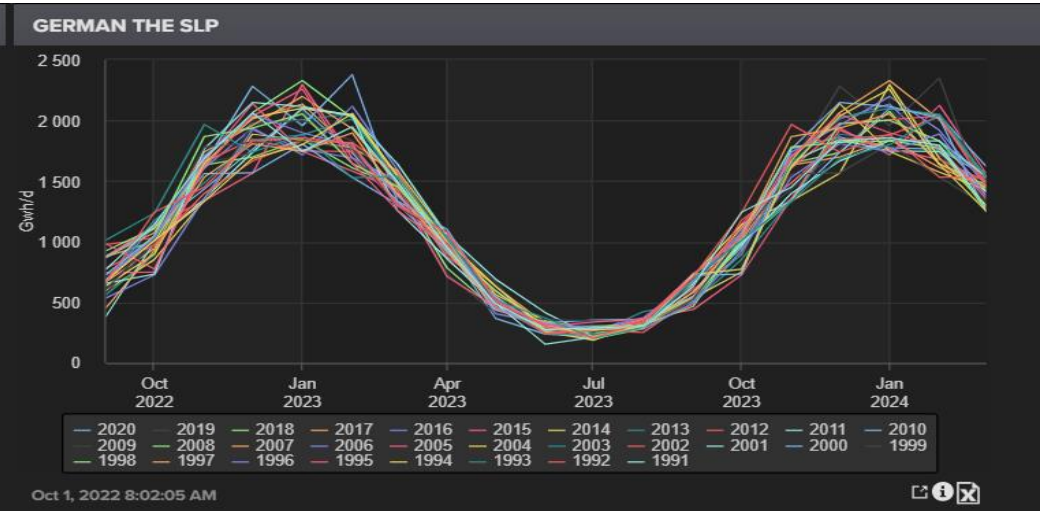
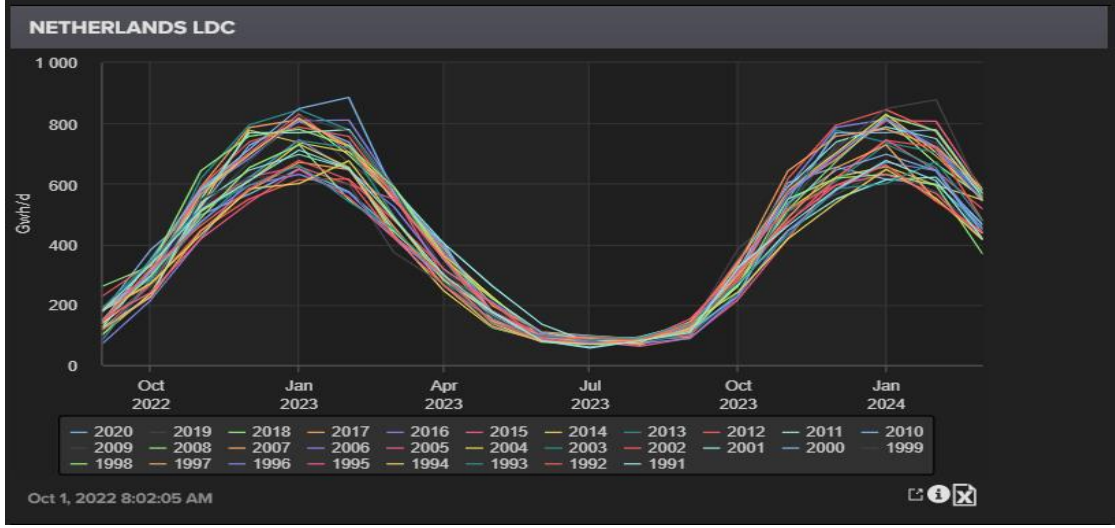
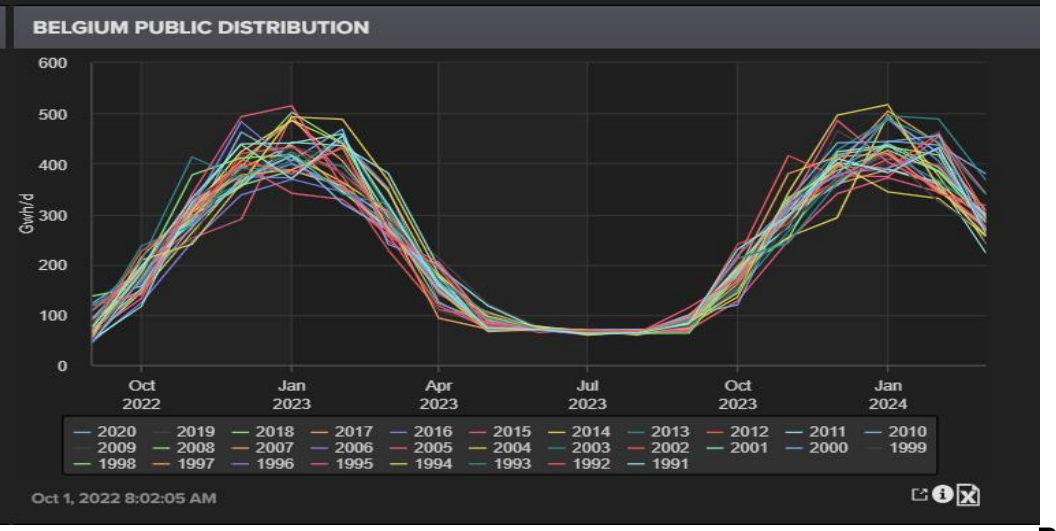
Weather is a core uncertainty and driver for Residential (LDZ) consumption









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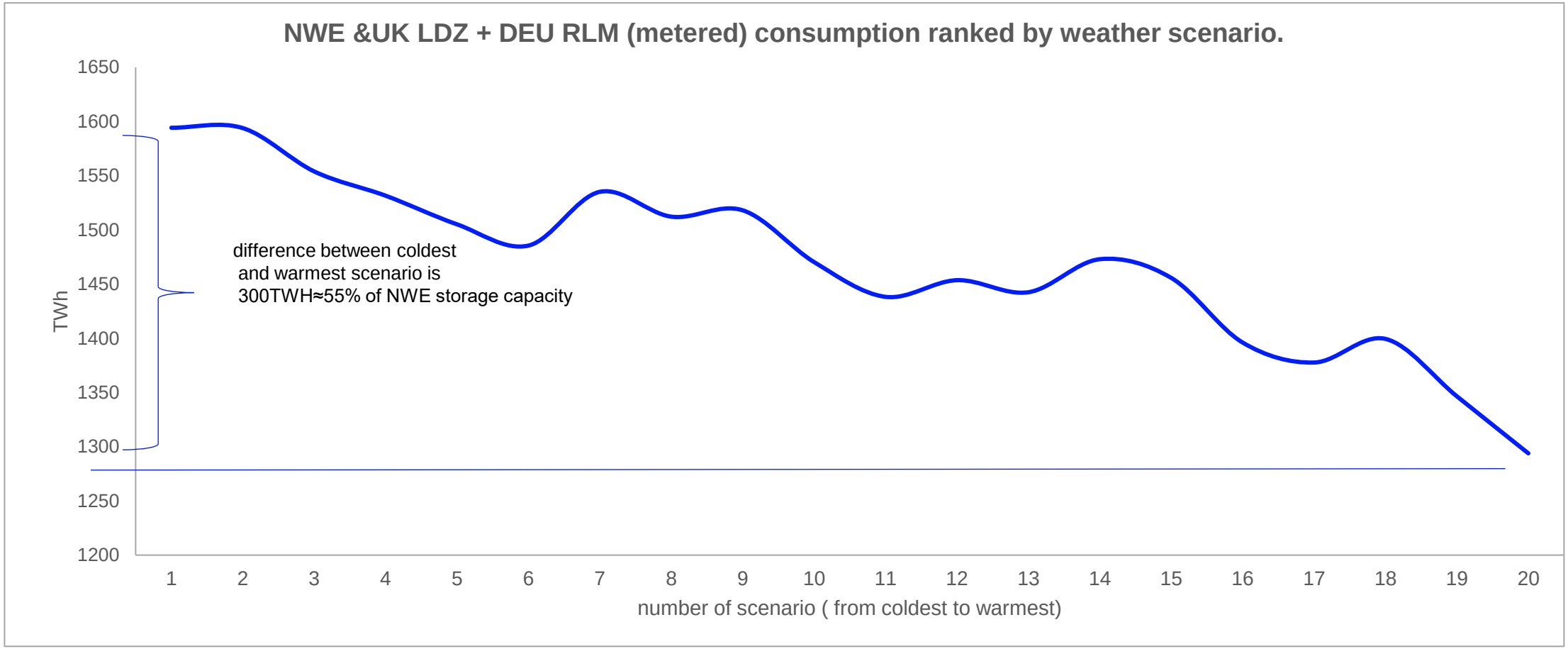
Heating (LDZ) consumption: weather is the core

We utilize 20 weather scenarios of actual weather 2001-2020.



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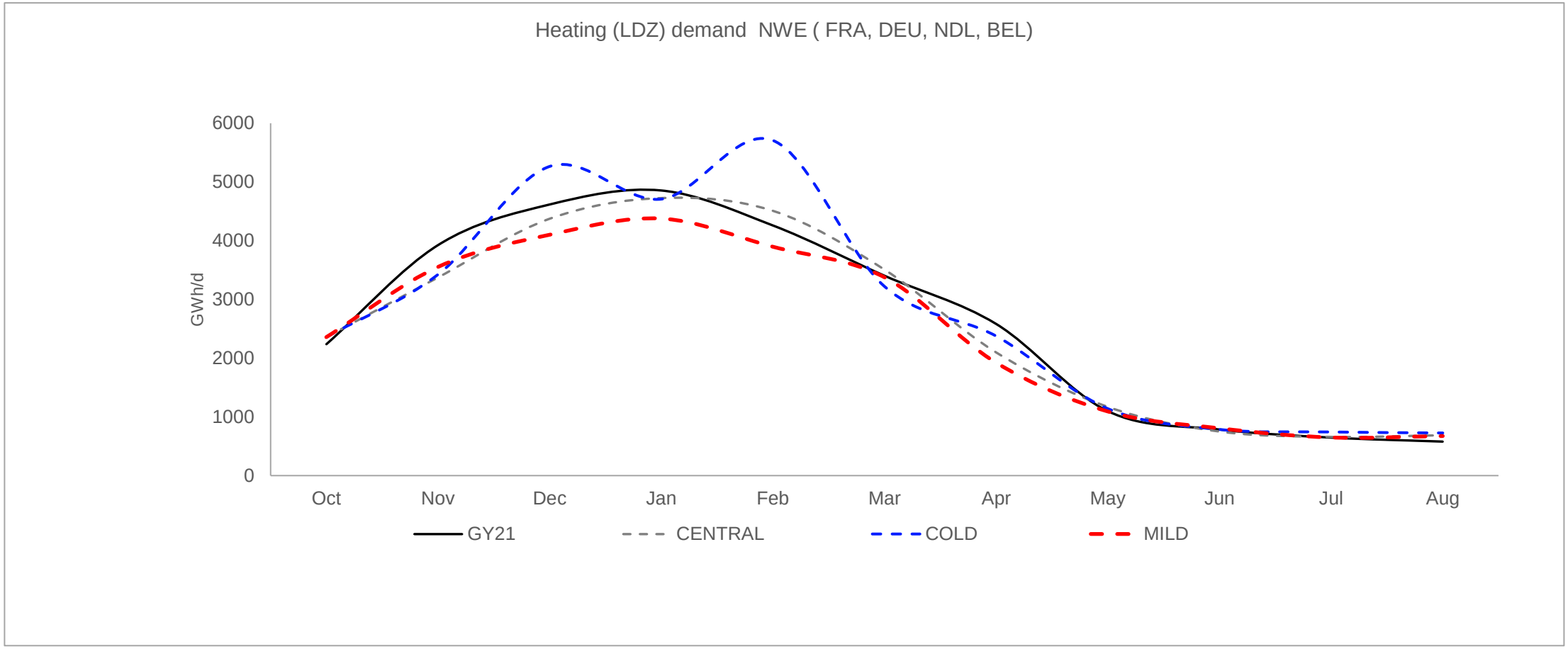
Focusing on three weather scenarios

Central: average of last 20 years synthetic consumption; **Cold** weather as of GY2010; **Mild** weather as of GY2018.

WIN22 F to WIN21: Central 2% down; Cold 5% up; Mild 7% down



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Demand :

Gas for power and Industry

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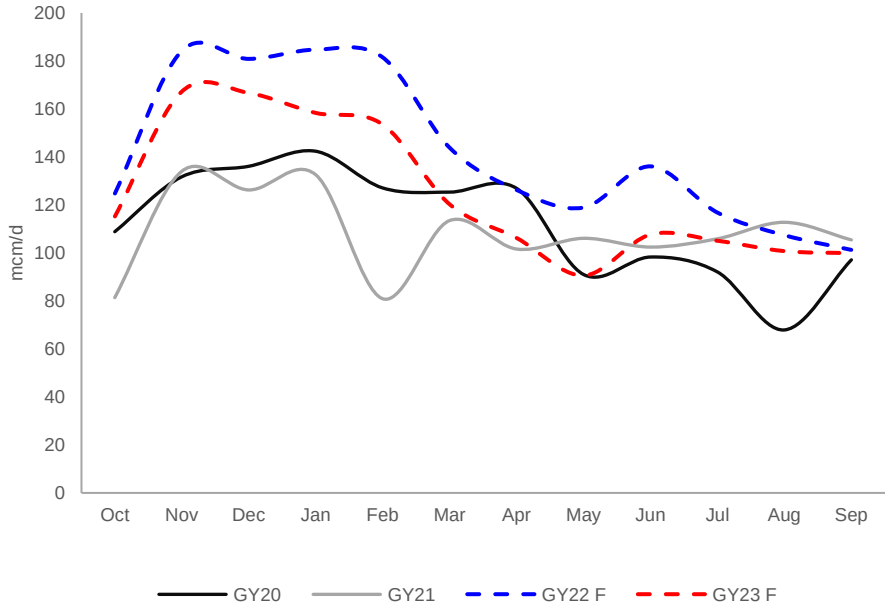
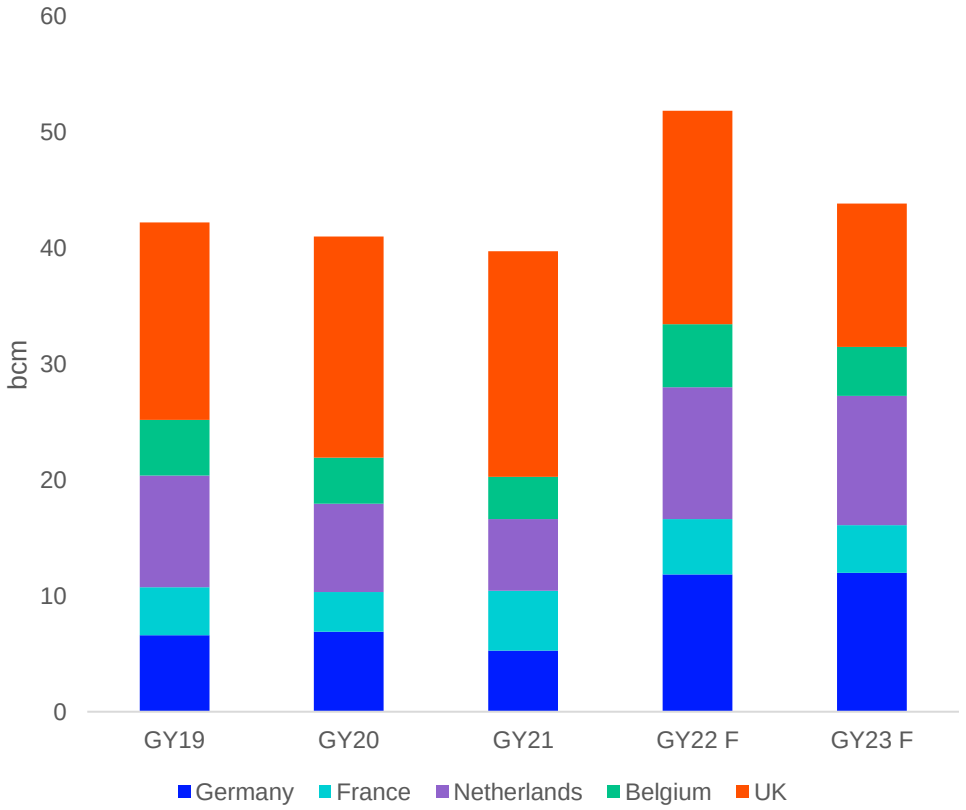
Forecast for strong increase in gas for power demand

Central forecast indicates a 30% increase in GY22 from GY21. Main reasons: Intermittent nuclear availability and low hydro inflow in France; Nuclear phaseouts in Germany (-4GW) and Belgium (-1GW). Our central forecast is based on 30 years average weather, the last two winters had healthy wind and no prolonged cold episodes.

Gas for power (NWE&UK)



Gas for power by country



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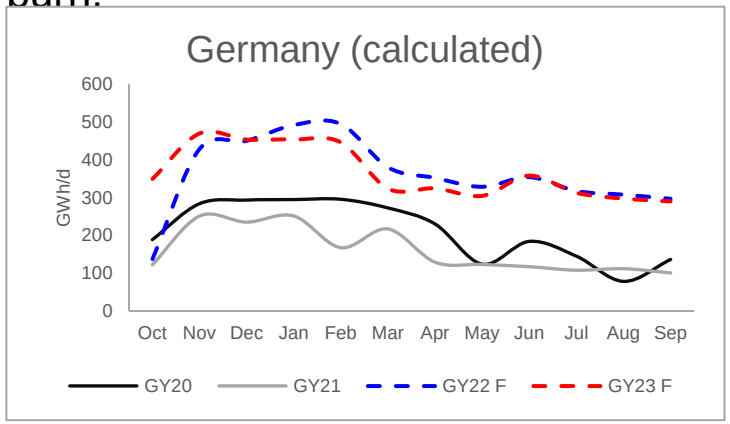
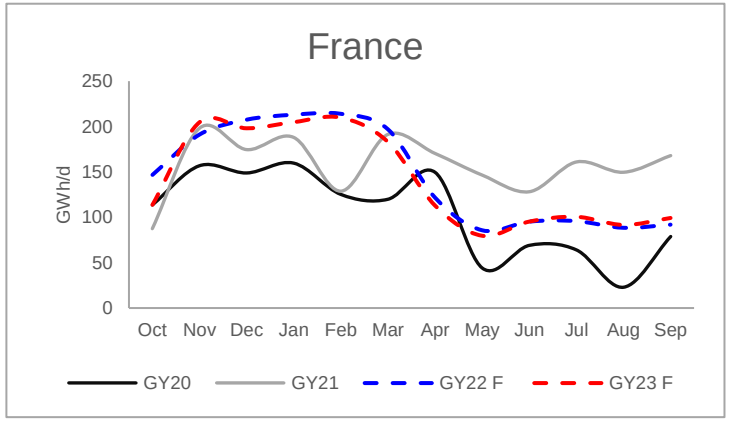
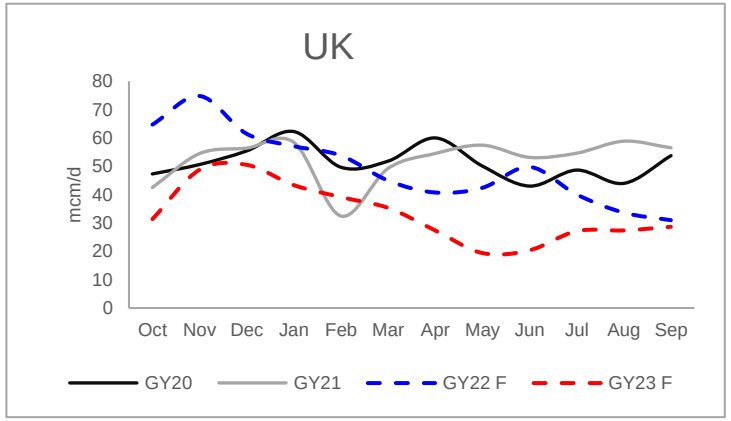
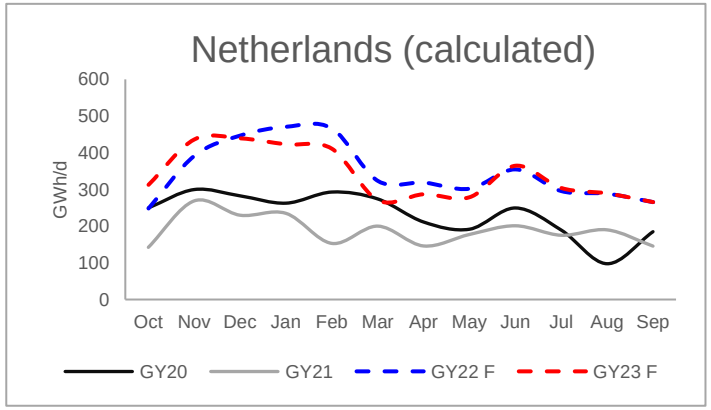
Gas for power forecast by country

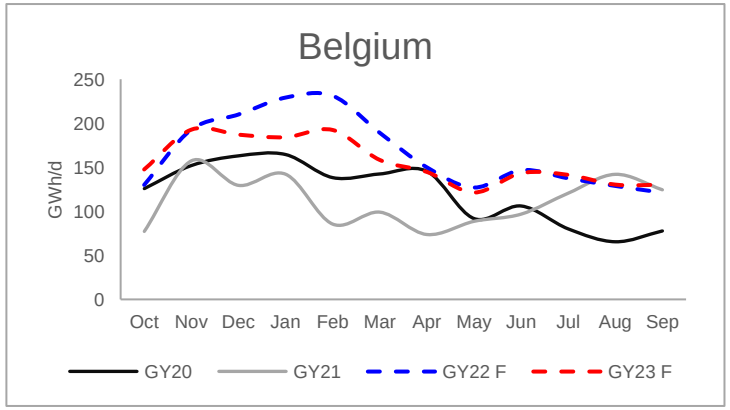
Belgium strong due to lower nuclear output falling, thereafter with increased renewable capacity and net power imports France nuclear intermittency a big uncertainty, down 10GW to 33GW this year, production forecast higher in 2023. UK forecast to be a net power exporter until June 23. German nuclear and coal exits provide short term upside, renewable capacity increases lowers future gas burn. Netherlands falling coal capacity and stronger power exports increase gas burn.





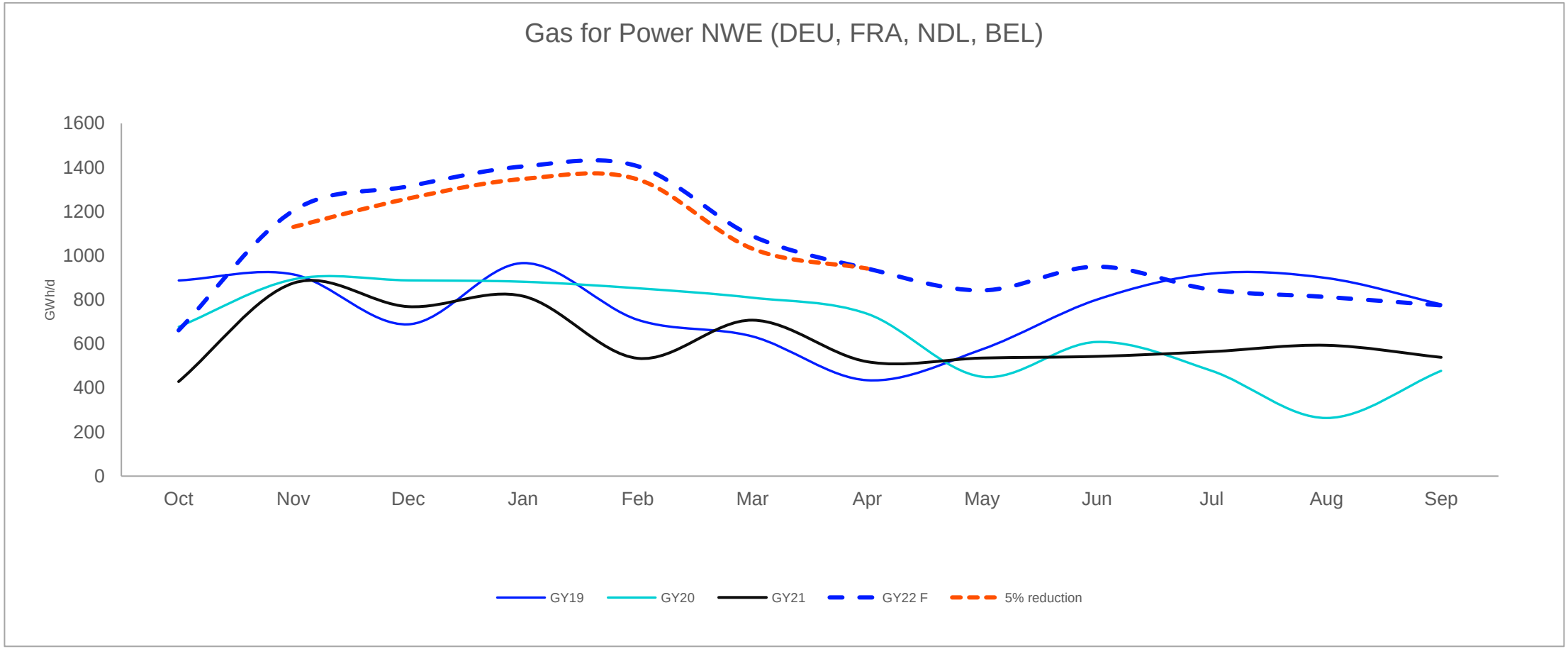






Emergency Intervention Scenario: Cutting power demand by 5% during 10% of selected peak price hours.

Low impact on gas for power demand.



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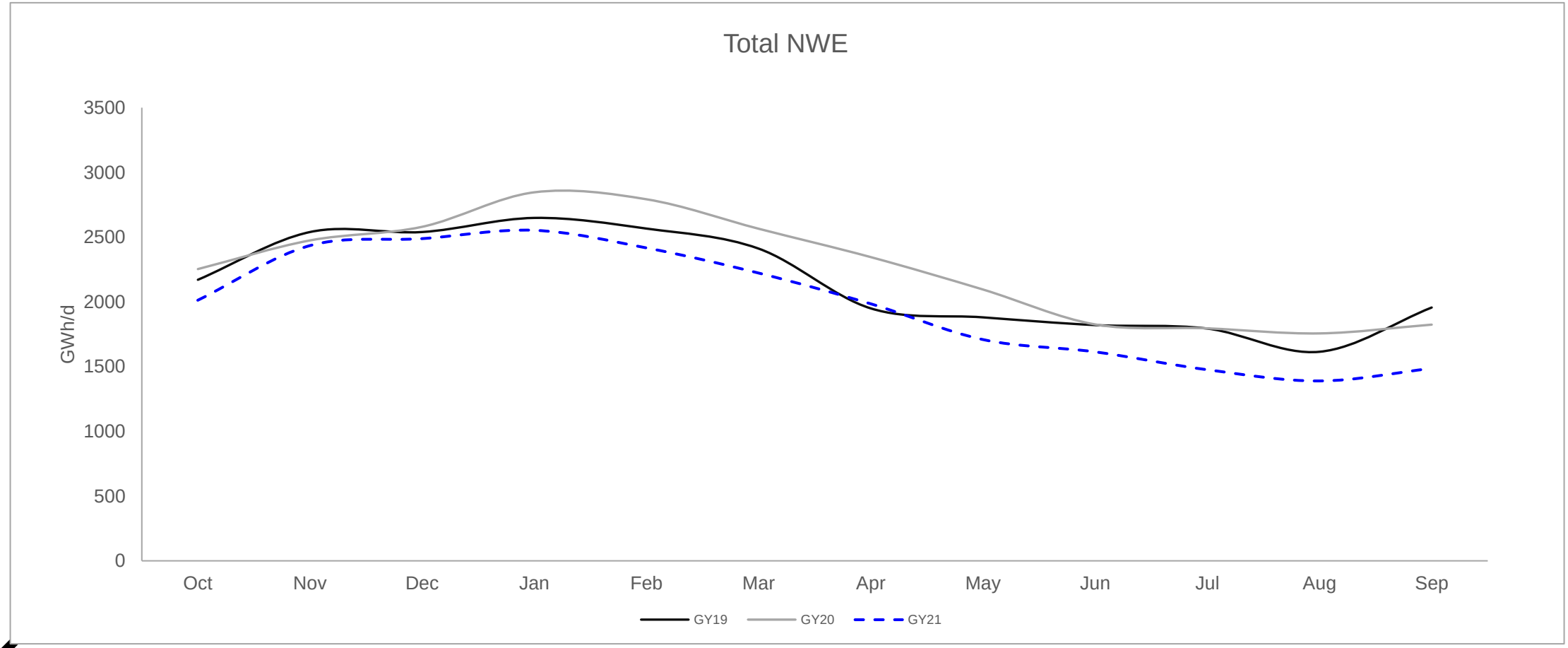
Main demand disruption is visible in industry, particularly the last few months of this summer.

SUM22 on SUM21 drop in total industrial demand across NWE is 17%. Steel, chemicals, paper and ceramic industries hardest hit. Mittal shuttered 3 plants in Germany one in France. Ammonia production also impacted over 5 facilities inc Yara sites in France and the Netherlands. High prices, falling Global GDP output & inflationary pressures continue to impact production.



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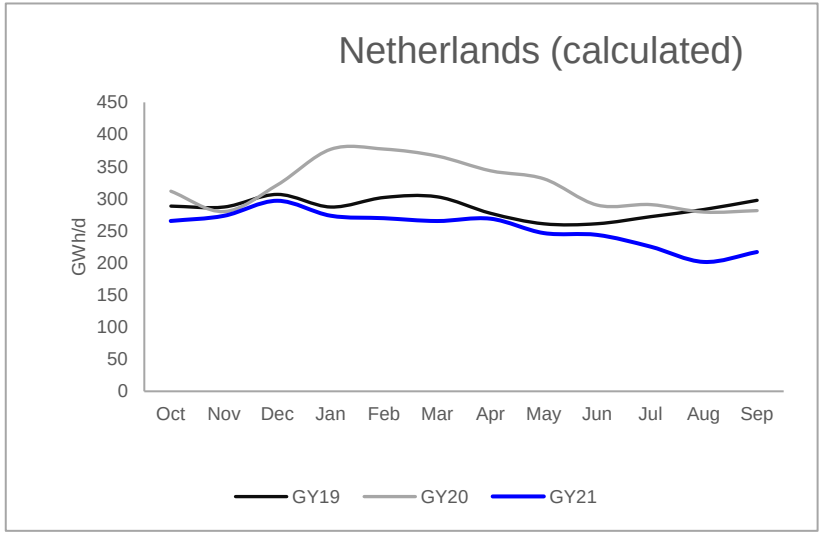
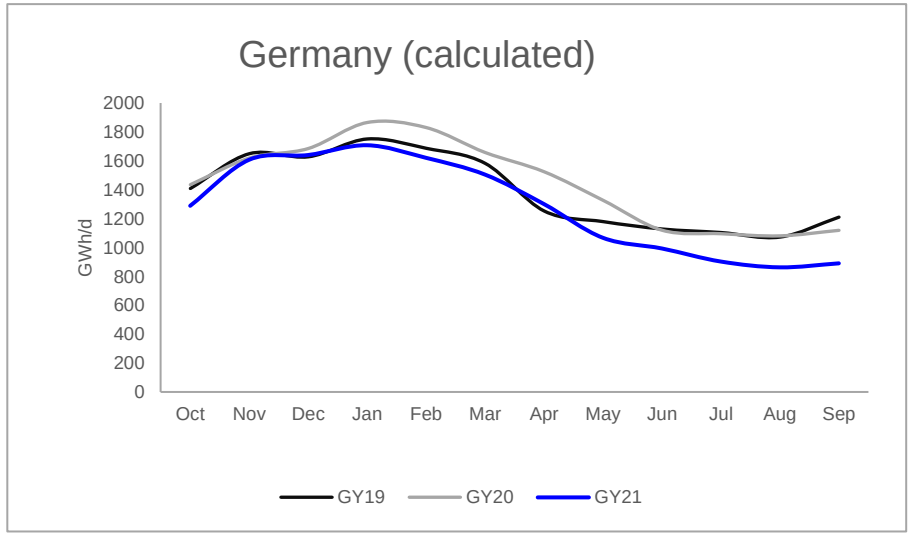
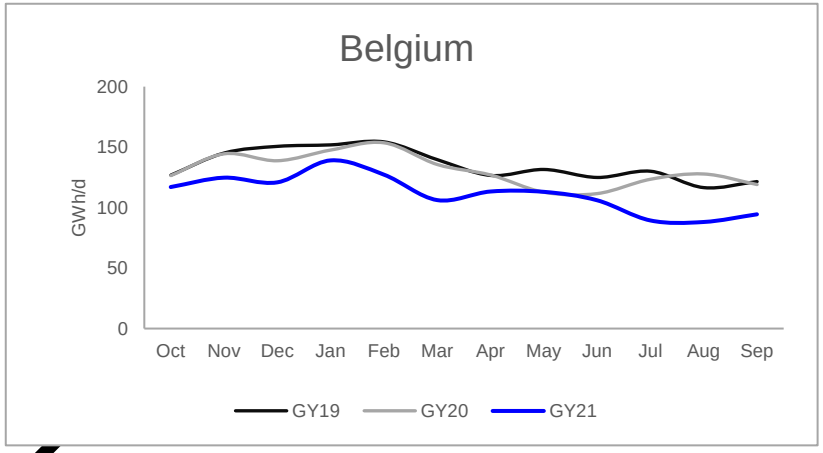
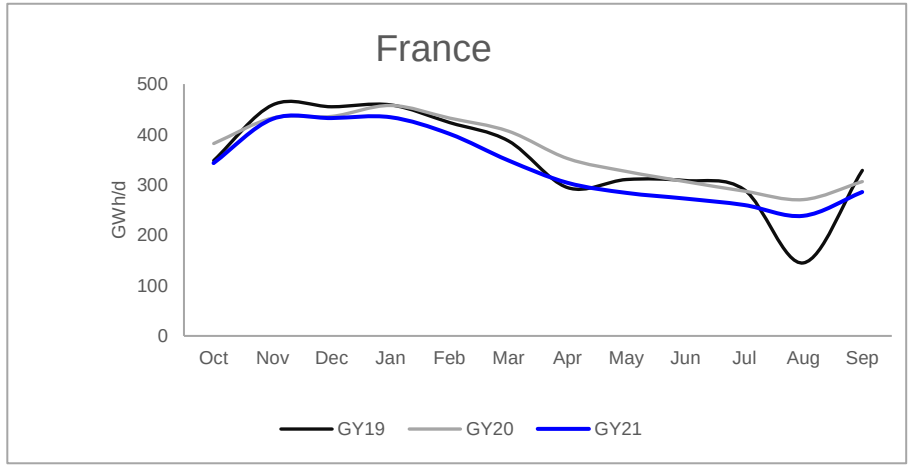
Industrial gas demand by country

The strongest industrial demand disruption summer on summer is the Netherlands (22%); Germany (17%), Belgium 14% France (11%).









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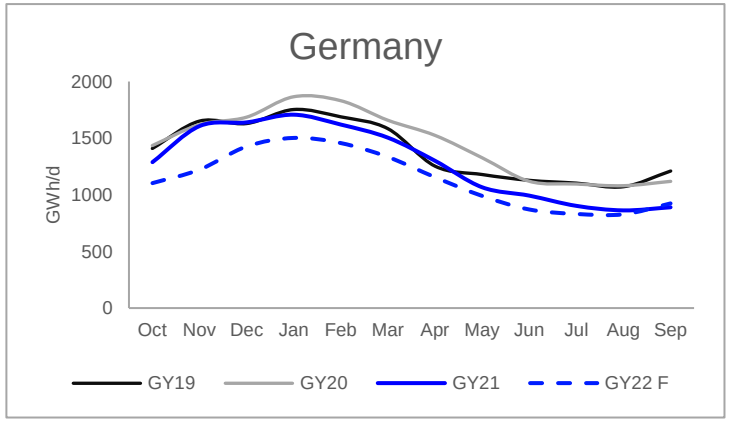
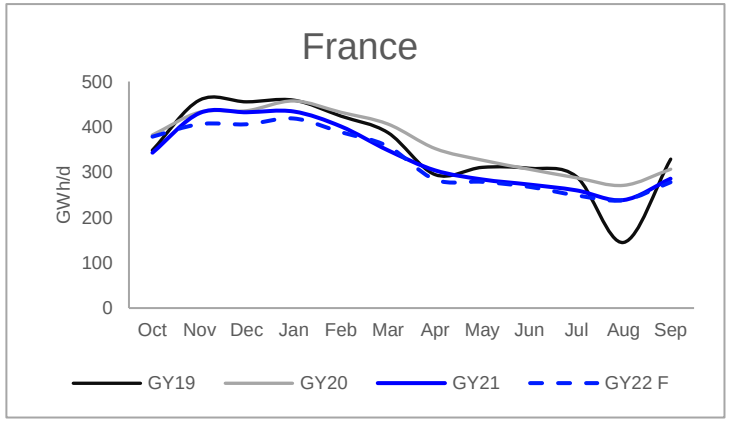
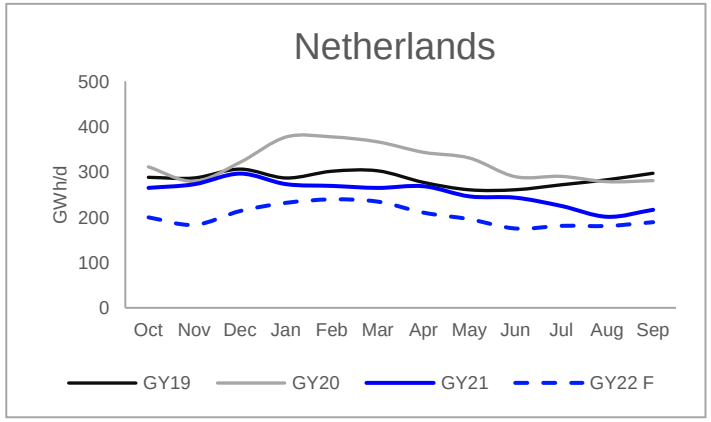
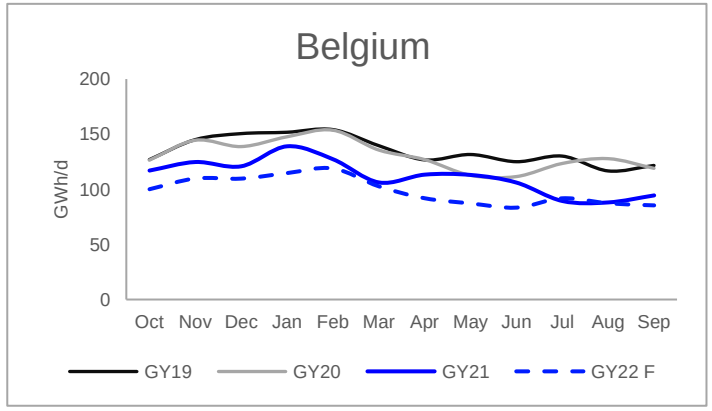
Normally stable Industrial consumption is in uncertain territory

Uncertainty is large, there is a potential for more disruption, but we apply the observed reduction. Base case: deducts from average of GY19 and GY20 250GWh/d for Germany; 100Gwh/d for Netherlands; 35GWh/d for Belgium; 40GWh/d for France









Storage is a key barometer

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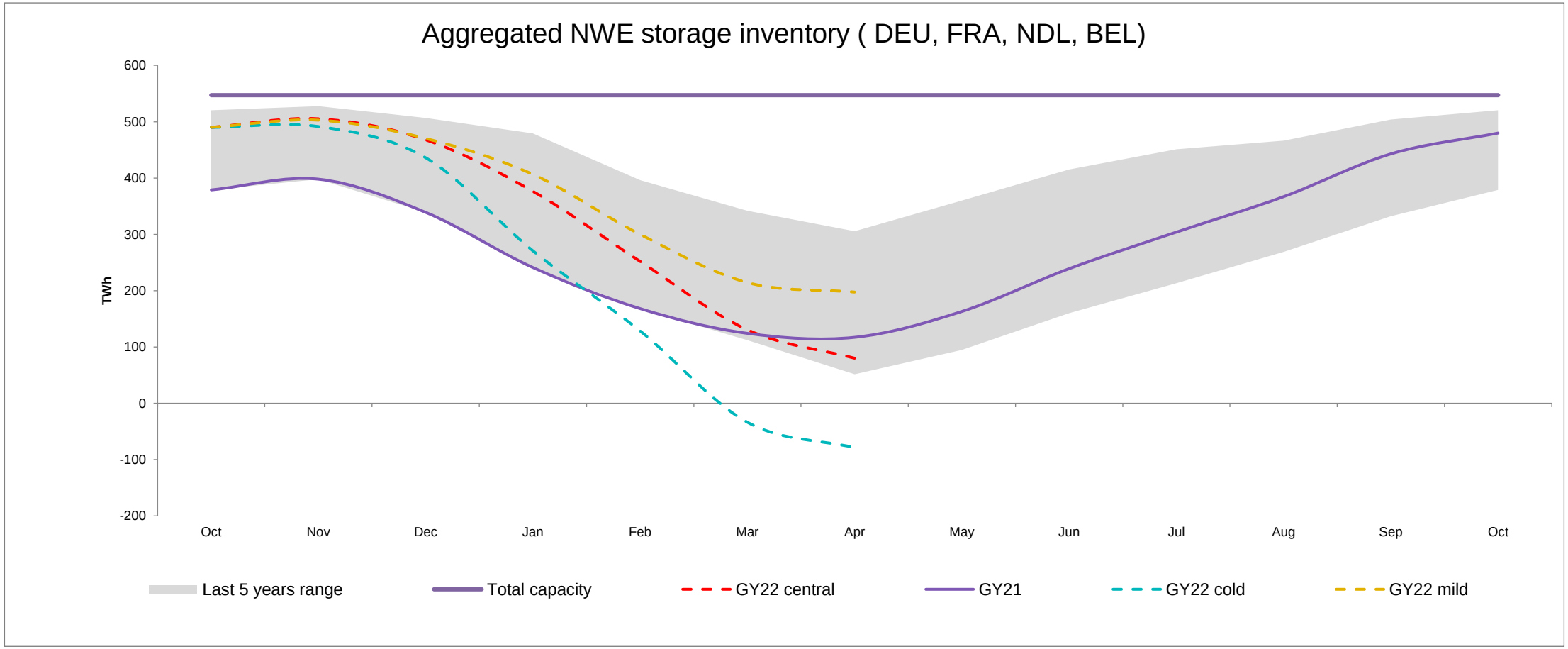
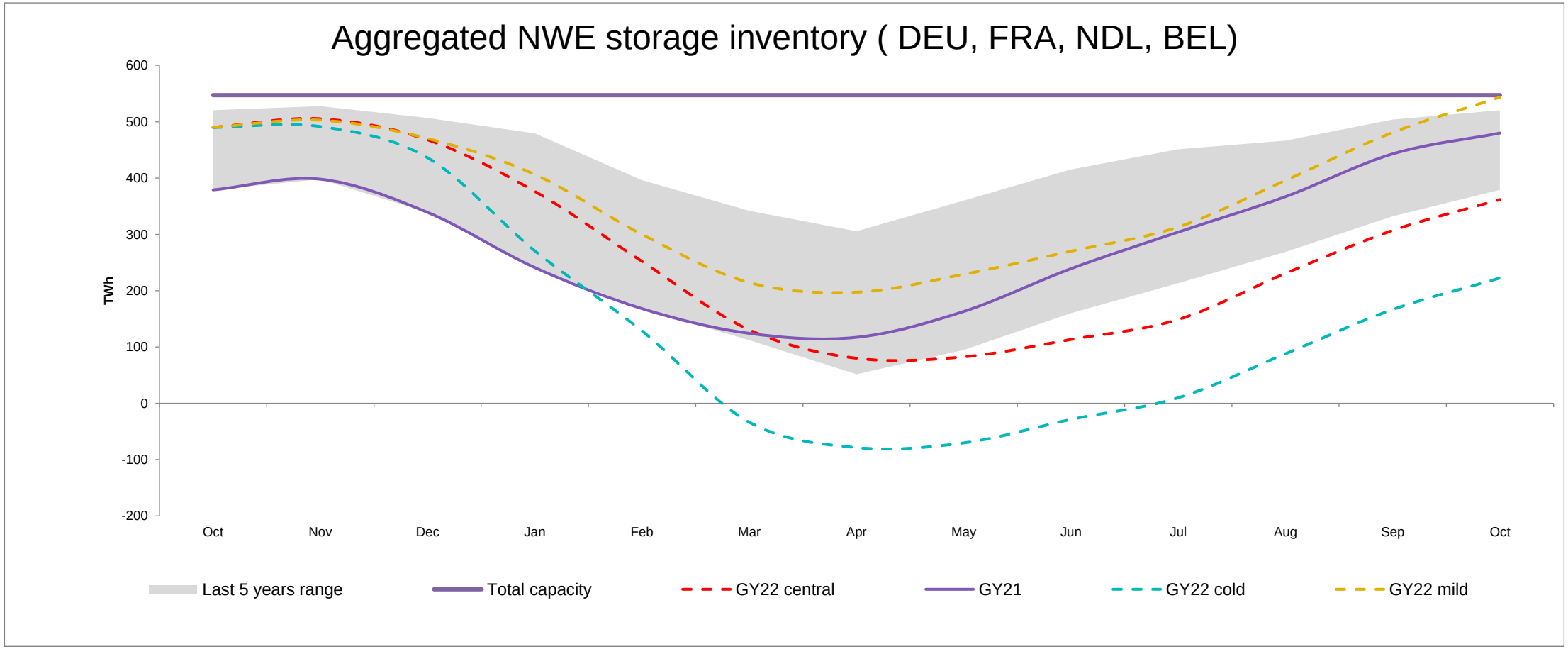
Central scenario: Close to record storage levels by the end of the season.



Source: Reuters News, ICE

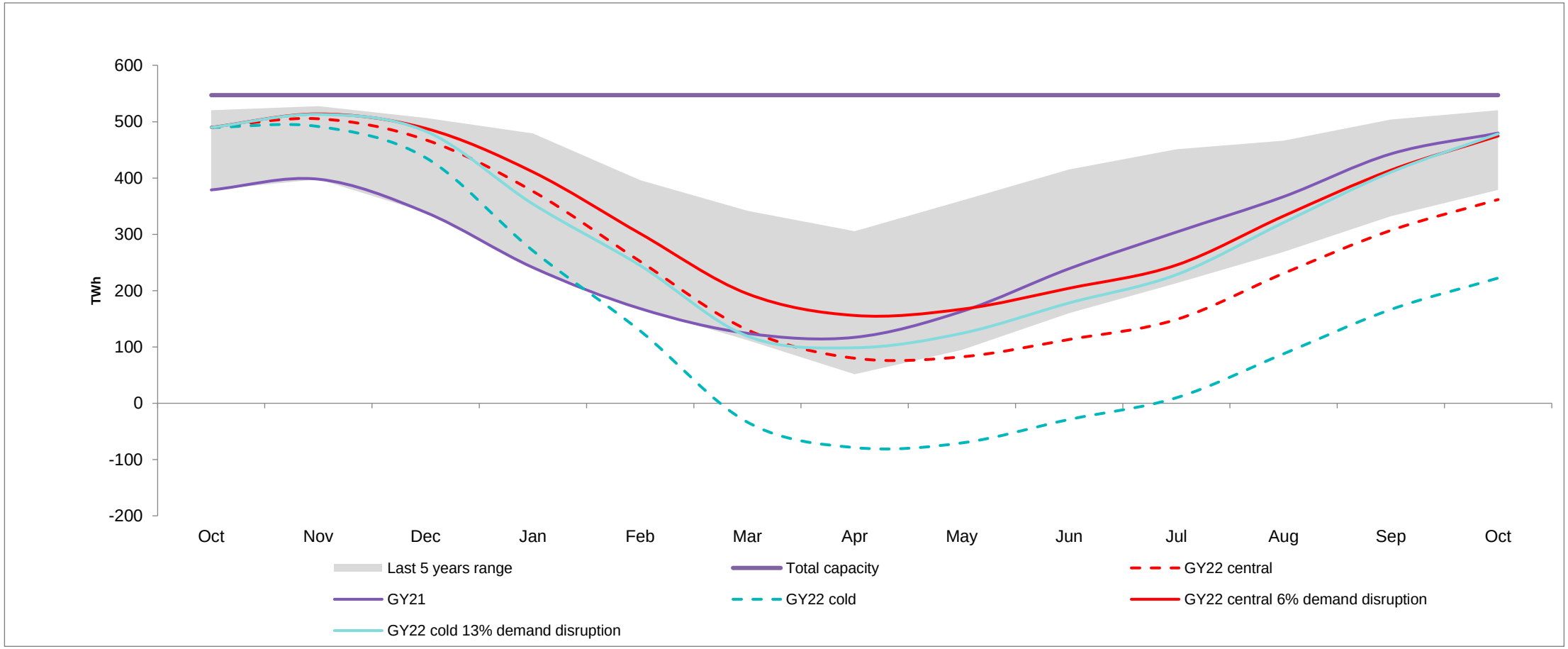
Pray for a mild winter or more demand disruption

Unless winter is mild. Even if we manage through this winter, we need to manage through the summer and a winter again….This should keep prices elevated.



Sensitivity: How much demand disruption do we need?

In our balance 6% of additional demand reduction across GY22 in Central scenario would bring storages to the comfortable level. For Cold scenario this requires 13% of demand reduction.



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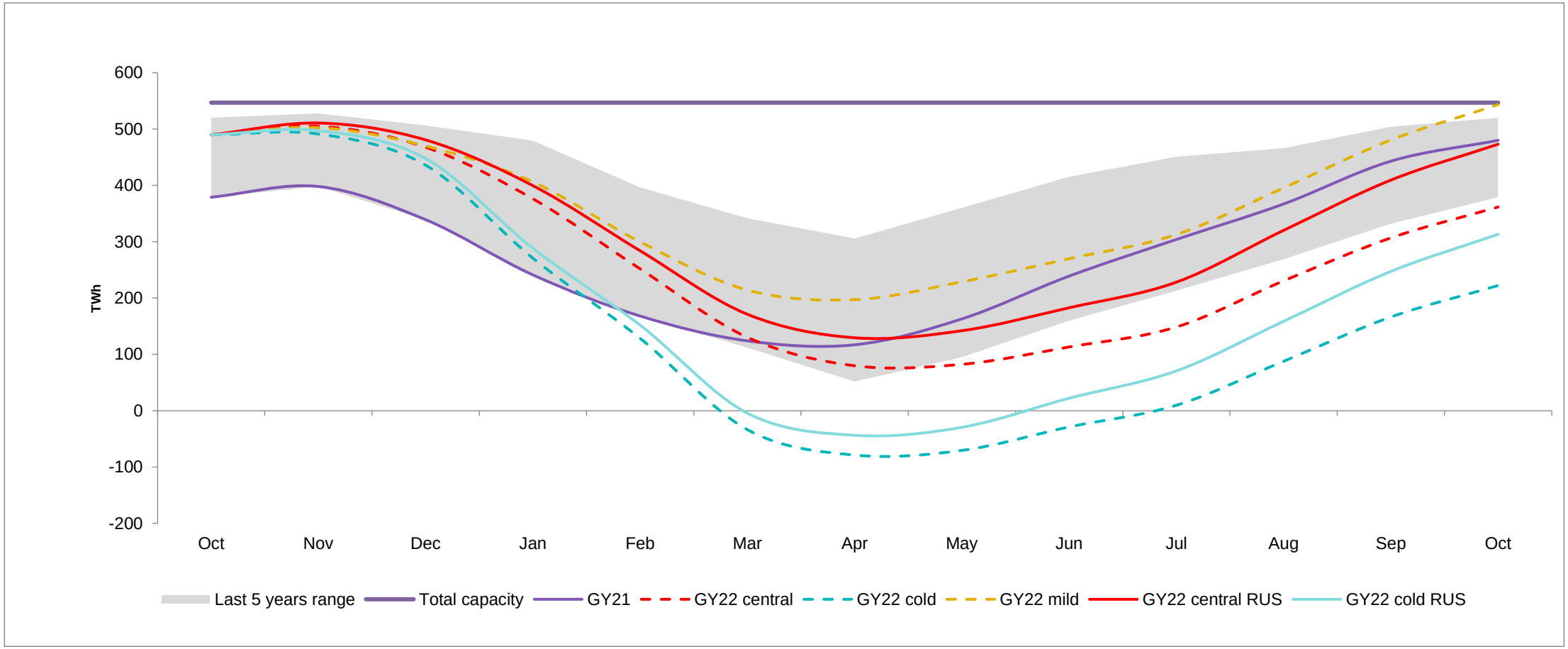
Sensitivity: If Russian supply continues via Velke Kapusany at current 395GWh/d (undisrupted to Italy)

Better for the Central scenario, but does not help if the winter is cold.



Source: Reuters News, ICE

Conclusion

- Without Russian gas European market will remain extremely tight for at least next two years.
- LNG is largely the main source of additional supply to offset Russian volumes.
- Strong increase in regasification capacity in NWE should help bringing more LNG to the region, but will not be able to offset Russian supply fully
- Unless winter is mild, there is a need for demand disruption to balance European market during GY22.
- In the outcome of the cold winter there is a risk for a gas shortage.

Risks

- Return of China to the LNG spot market.
- French nuclear concerns, lower renewable generation.
- A beast from the east scenario.
- Extended production outages (infrastructure damage) in Europe and any disruption to US LNG exports

Source: Reuters News, ICE