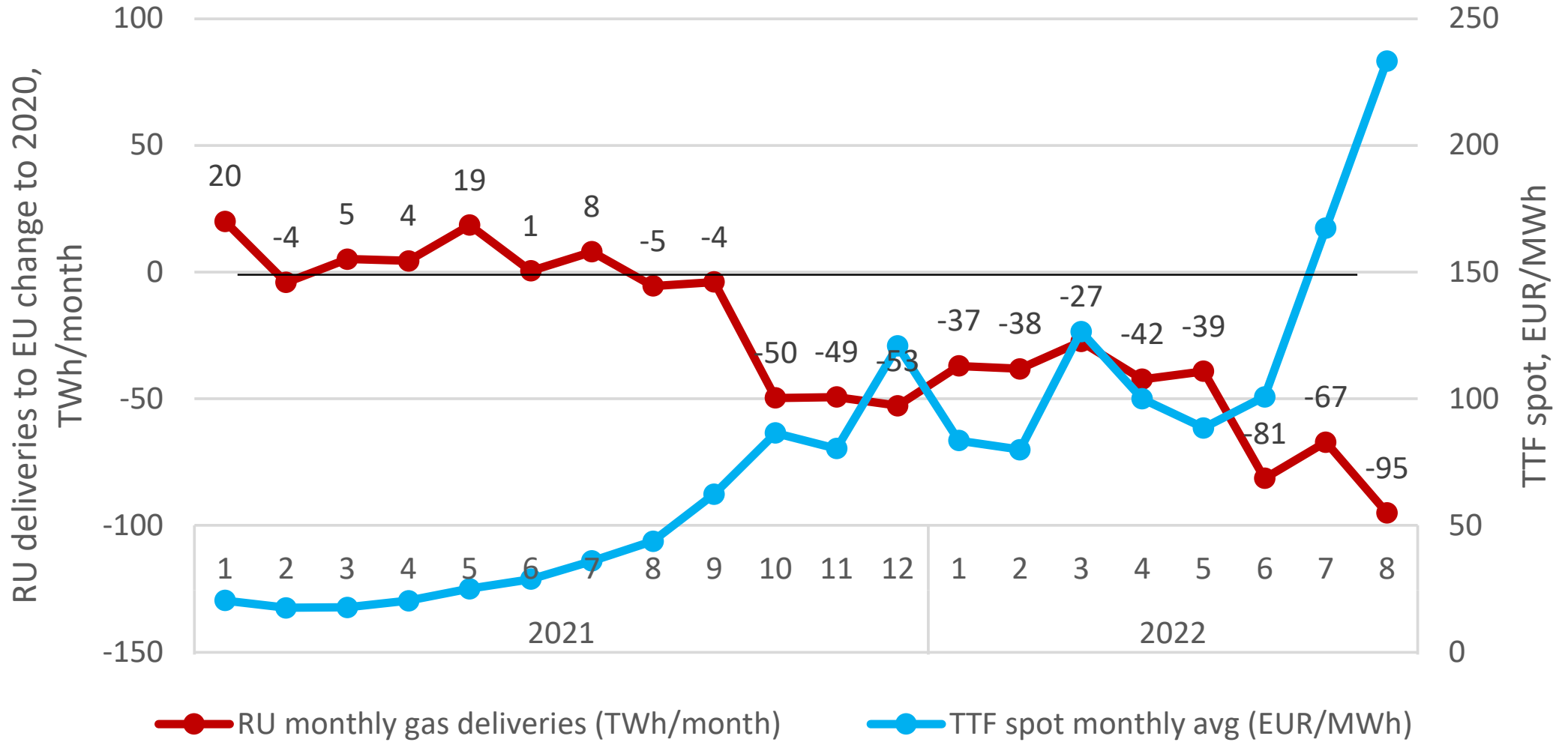


Short, mid and long-term costs of phasing out Russian gas in CEE

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*Gas phase-out - A blessing or threat for decarbonisation
Regional energy policy forum
Budapest, BMC*

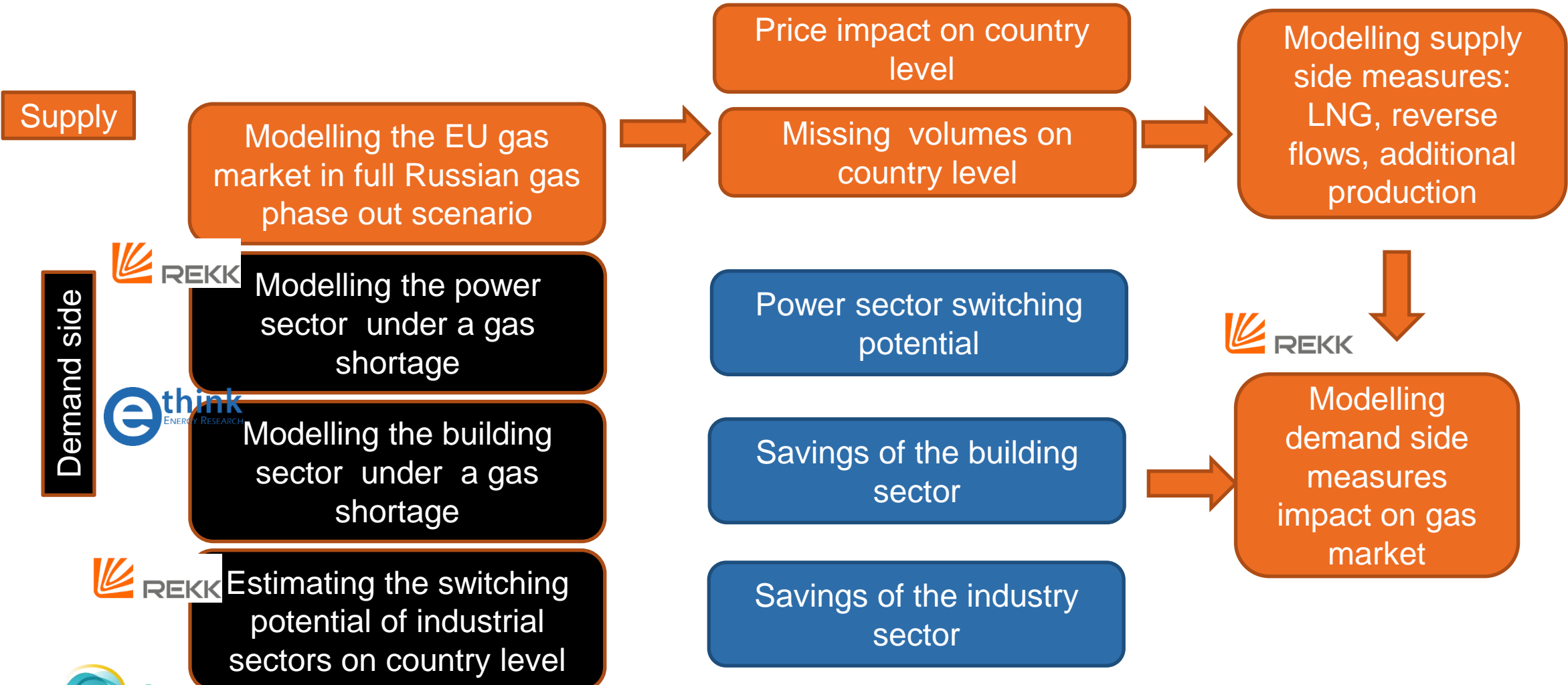
We have a problem...



Prospects of phasing out Russian gas

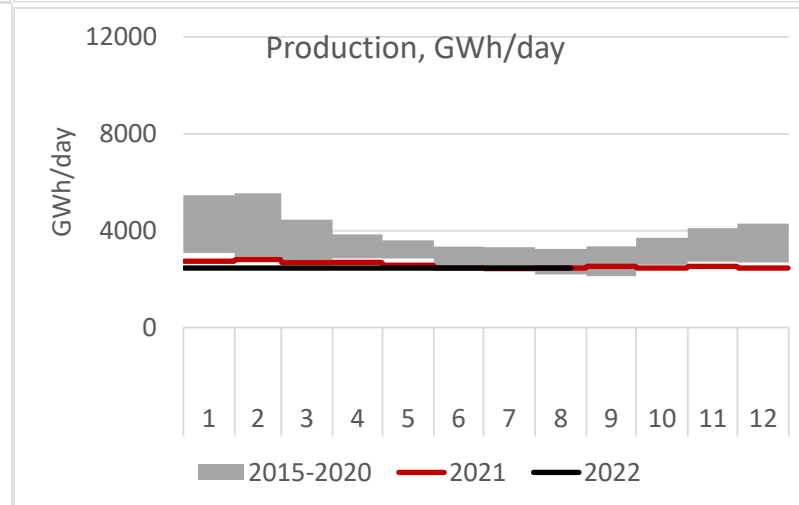
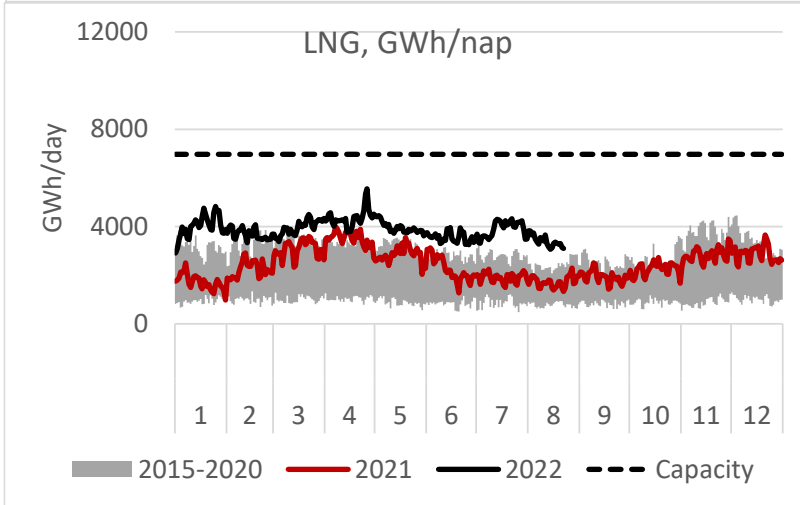
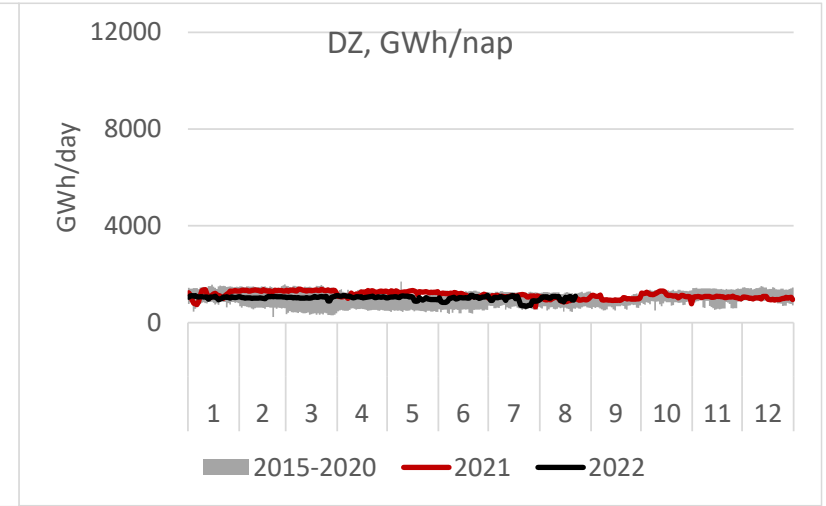
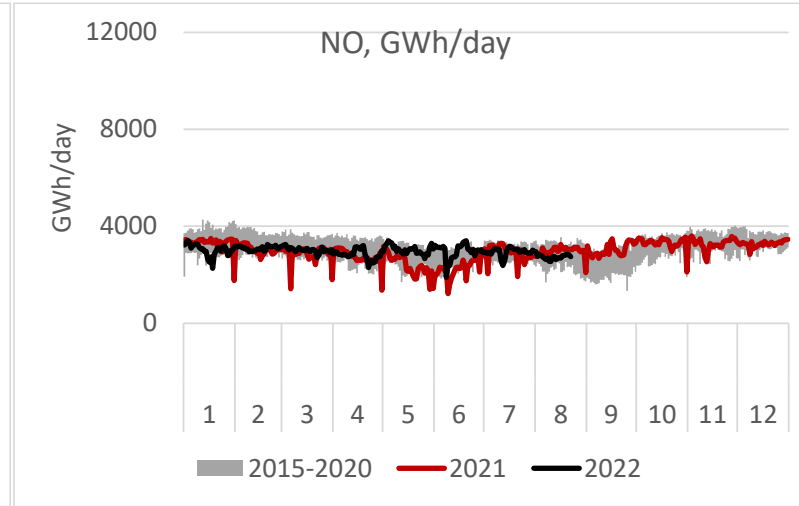
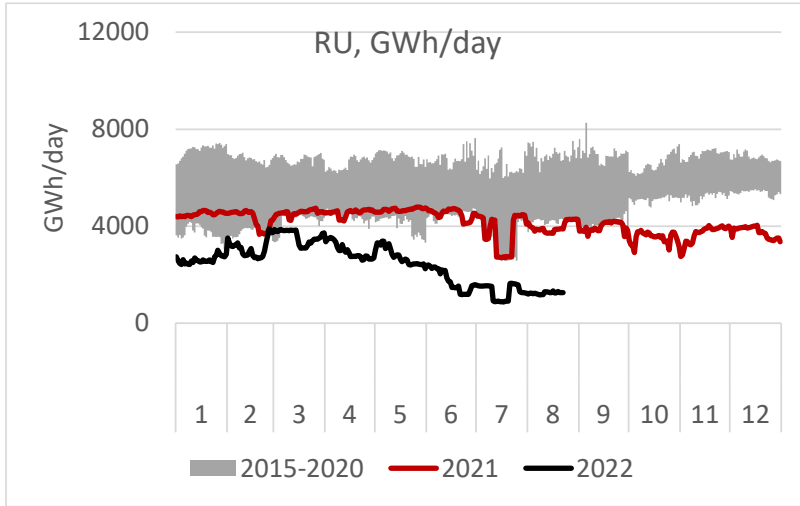
- What will happen if no Russian gas reaches Europe? How can Europe react and what is the effect on prices? How much can European measures mitigate price effects?
- How to answer this question > energy market modelling
- REKK (BCE) and E-Think (TU Wien) was commissioned by ECF to model the effects of stopping gas deliveries and the options of Europe to replace Russian gas
 - Supply options
 - Demand side options
- Methodology:
 - Building sector modelling
 - Power&heat sector modelling
 - Gas market modelling

Methodology framework for gas market modelling



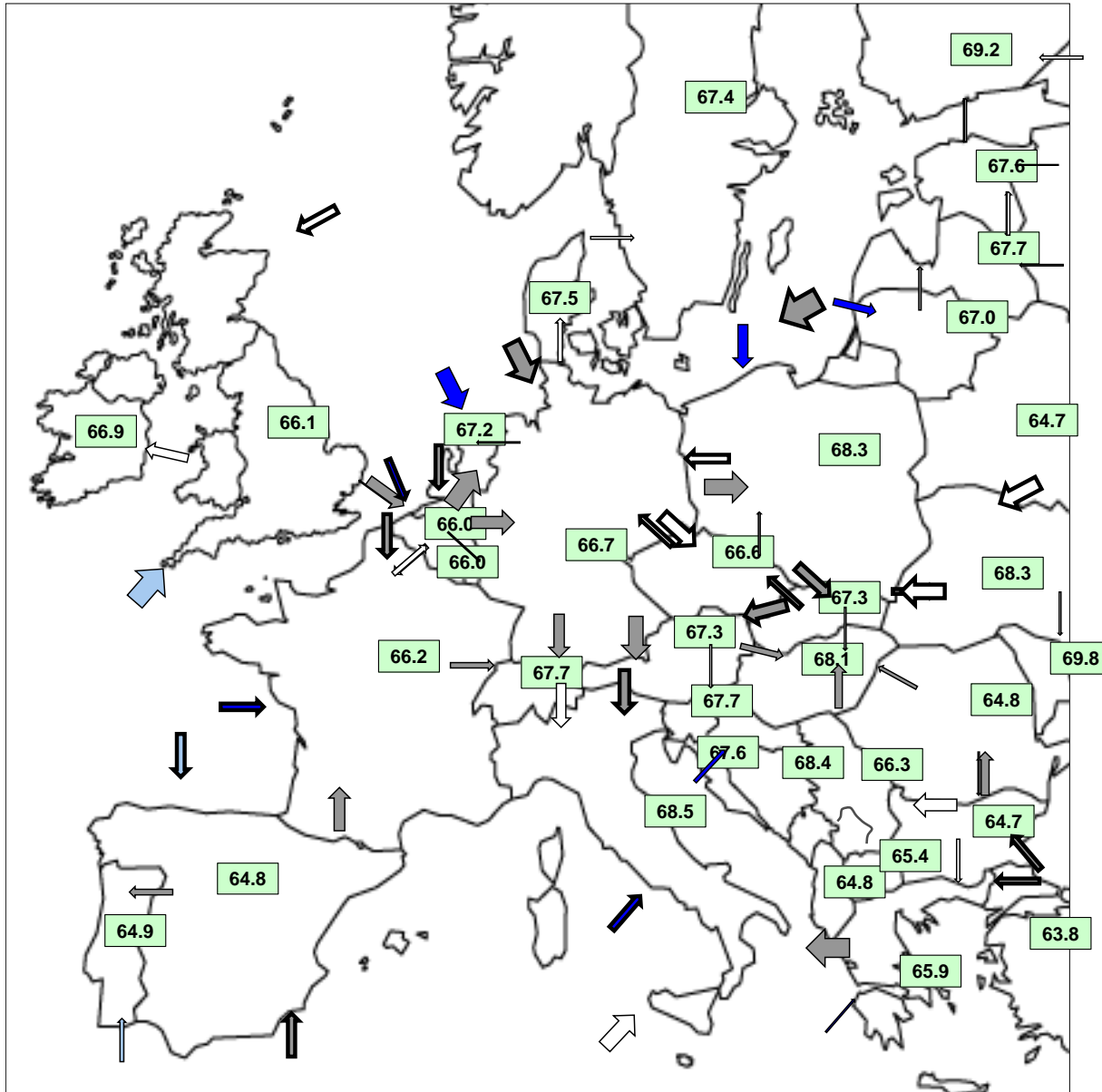
MODELLING THE EU GAS MARKET IN A RUSSIAN GAS PHASE OUT SCENARIO

Sources of European (EU27+UK) gas supply: pipeline, LNG and production



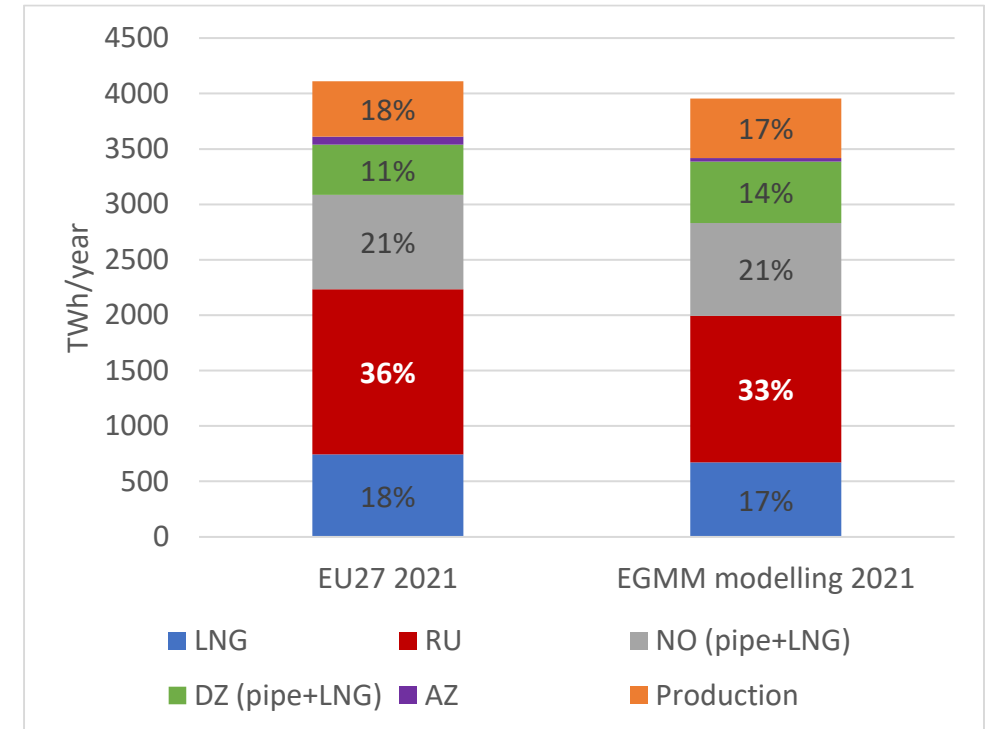
- Russian deliveries are at 1/3 of previous years, stopped via NS and Yamal
- Spare flexible capacity in LNG regasification
- Some spare flexible capacity in NO and DZ pipeline
- Declining production, some fields may come online for a short term

Modelling reference 2021



- Reference scenario was calibrated to the 2021 European gas market demand and supply structure, capacity and use of infrastructure, and price environment.
- Price levels are around 65-70 EUR/MWh, indicative of H2 2021
- High Asian demand and tight LNG market is assumed.

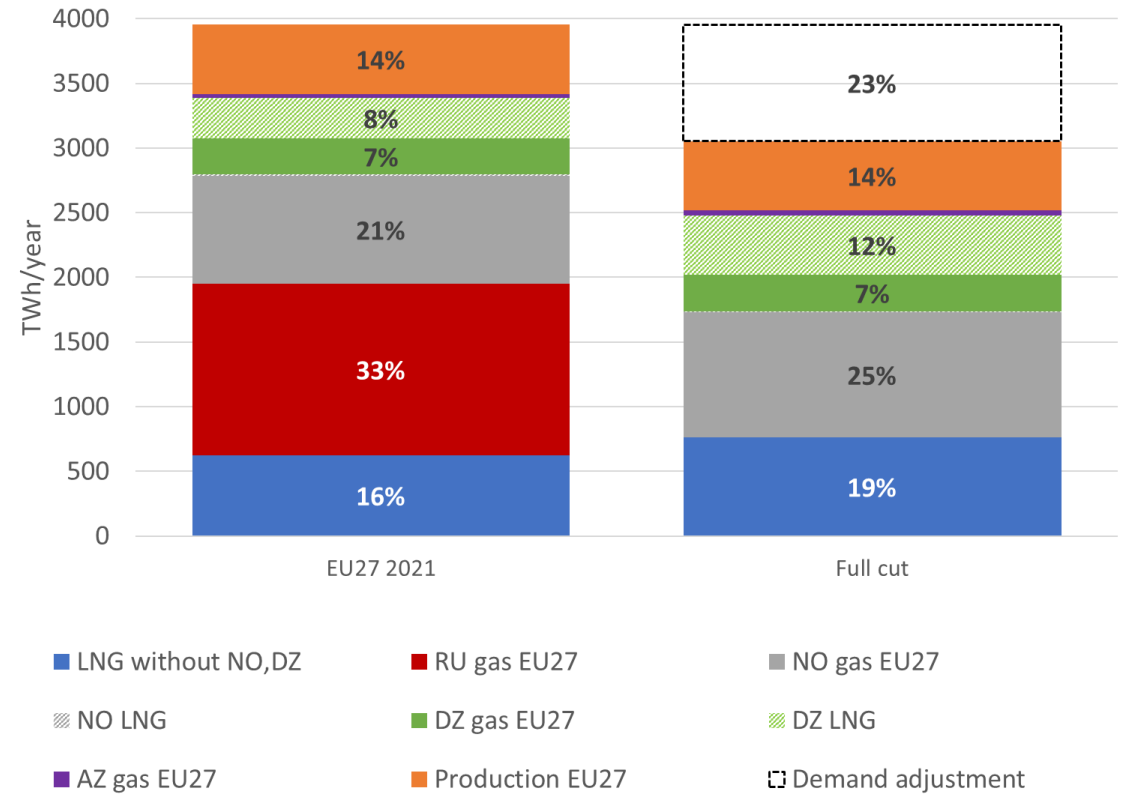
Supply structure in our 2021 reference compared to fact data



Russian supply cut

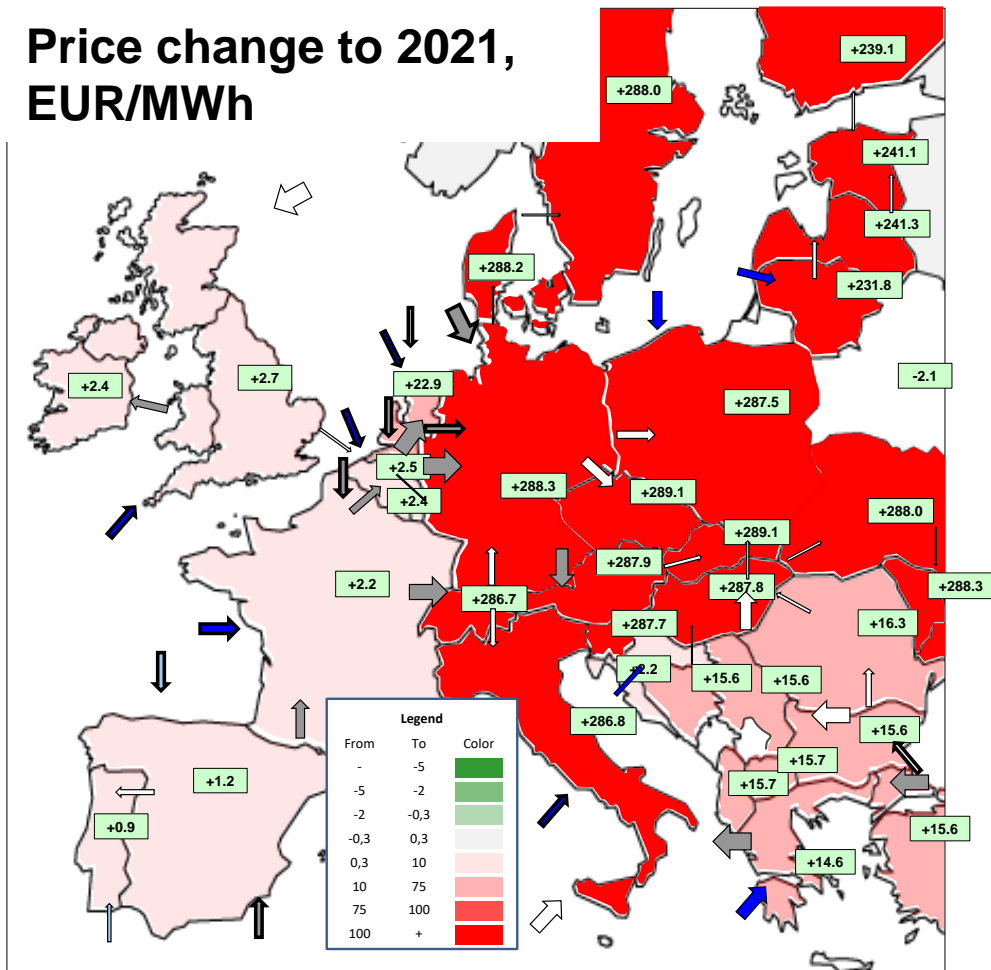
Under a full cut of Russian gas import scenario, 900 TWh or 23% of current demand adjustment would be required

Study aims to assess how supply- and demand side measures can alleviate tight supply



Note on demand adjustment: The modelled scenarios assume very limited demand elasticity for the industry (0.01) and the household sectors (0.05) but allow more responsiveness for the power sector (0.15) across all countries

Full Russian cut without further measures (Full cut)



-902
TWh/yr

EU27 demand adjustment compared to 2021

1226
TWh/yr

LNG supply to EU27 (incl. NO, DZ)

+290
€/MWh

Price change in CEE compared to 2021

+149%

EU 27 gas bill compared to 2021

- Similar price zones would emerge based on ability to access to LNG and global markets.
- LNG inflow cannot increase further with existing infrastructure (E.g. Spain-France bottlenecks).

IMPACT OF SUPPLY - AND DEMAND SIDE MEASURES

Supply side measures: LNG terminals, pipelines, production

- Step 1 - all infrastructure which could be realised **by this winter**
 - Polish-Lithuanian interconnector (GIPL) – commissioned 1 May 2022
 - Baltic Pipe, which will allow transporting of gas from Norway to the Danish and Polish market, - planned 1 Oct 2022
 - IGB connecting Bulgaria and Greece – in place since August 2022
 - Croatian-Slovenian interconnector to resolve internal bottlenecks and enable the LNG flows into the interior parts of Europe – partly implemented since Jan 2019 ongoing extension
- Step 2 - additional infrastructure to be commissioned **within one year**
 - 3 LNG terminals in Germany: FSRUs which can be re-directed to other markets (e.g. South America) and create no stranded assets on the long term – planned 2023
 - Reverse flow on UK-NL and FR-DE pipelines – not on the agenda before the crisis
 - Reverse flow on Trans-Balkan pipeline system from Bulgaria to Ukraine – partly implemented, additional capacity planned but no date yet
- Step 3 - Additional natural gas production in the NL, DK, and increased biogas and biomethane in DE. (+79 TWh/year)

Demand side measures: saving gas in buildings, fuel switch in power sector

Buildings

- Measures modelled:
 - Heating indoors to lower temperature (1.5 degrees Celsius)
 - Reduction of thermal transmittance of windows
 - Reduction of ventilation losses
 - Switching to alternative solid fuel boilers (if in place)
- Combined gas saving in an average winter is 277 TWh, while in a cold winter 93 TWh

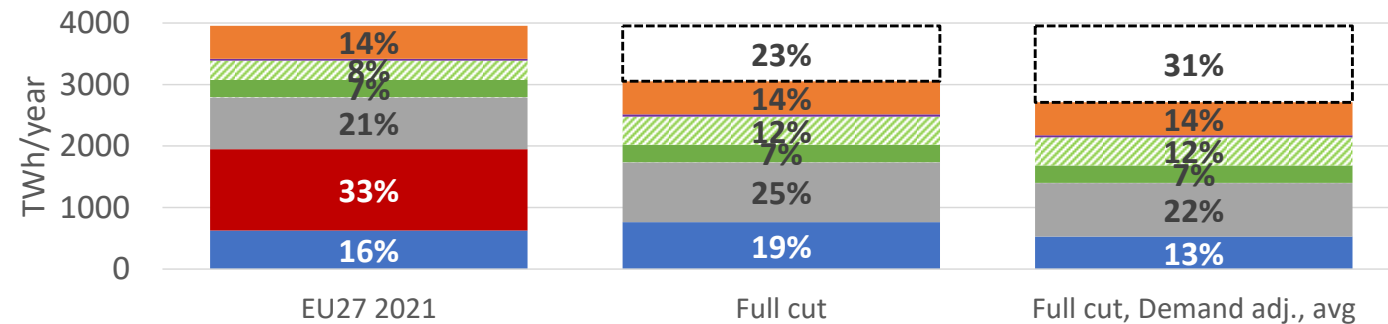
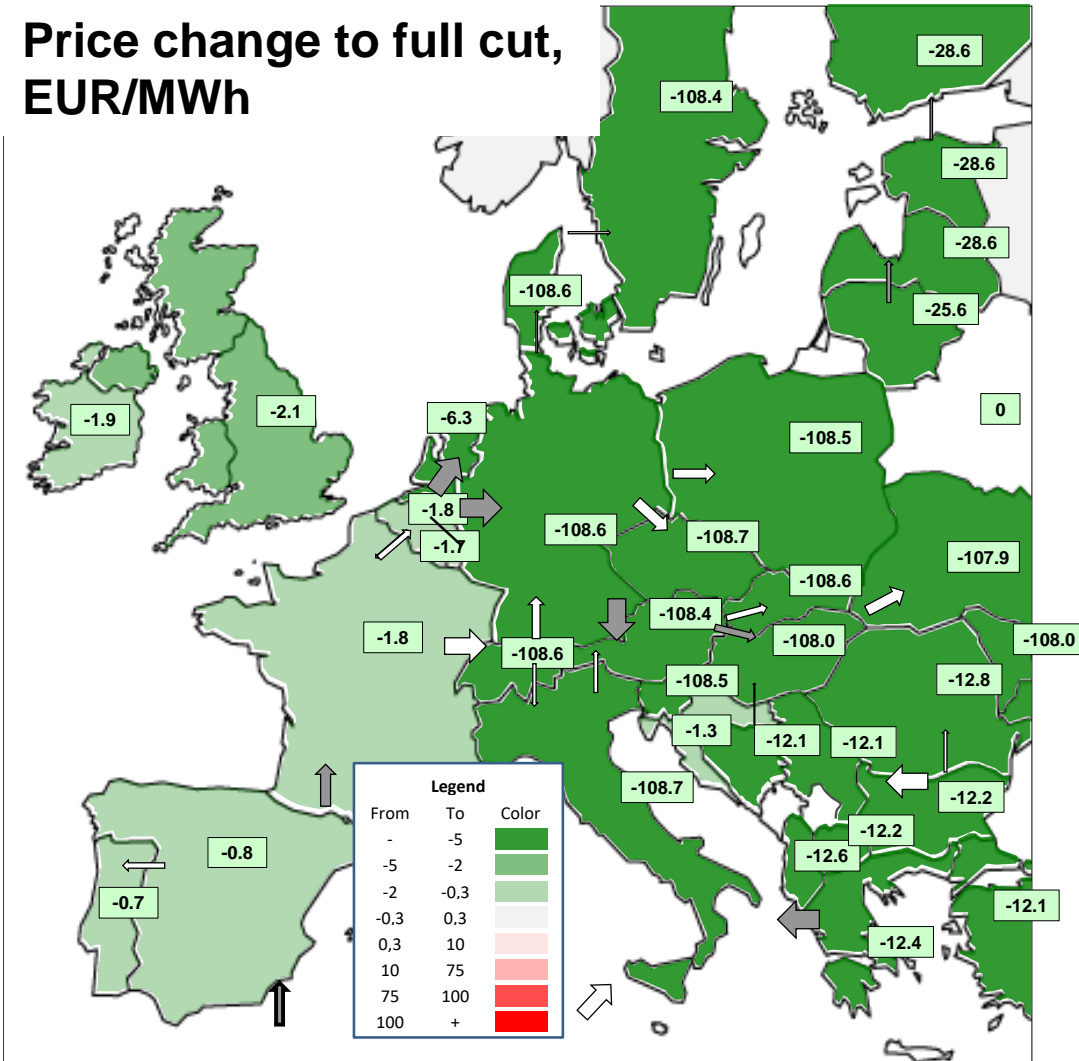
Power sector

- Measures modelled:
 - What is the minimum gas-fired capacity needed? Gas only used if no other solution to satisfy demand
 - Assuming cold winter and average winter as well as 50% and 87% availability of coal-fired plants (in 2021 availability of these plants was close to 90%).
- Results:
 - Modelled utilisation of coal-fired plants in the core scenario was 62% (in 2021 the average utilisation rate of coal-fired plants was around 40% in the EU).
 - Overall gas consumption reduction is 713 TWh in an average winter, and 683 TWh in a cold winter.
- In an average winter, all the missing supply can be saved
- In a cold winter, additional measures are needed

	EU27 Reduction, TWh/year	
	50% coal av.	87% coal av.
	Avg winter	
Building	277	277
Power	564	713
Total	841	990
Cold winter		
Building	93	93
Power	514	683
Total	608	776

Effects of building and power sector demand reduction, average winter, 87% coal plant availability in Full cut

Price change to full cut, EUR/MWh



- LNG without NO,DZ
- RU gas EU27
- NO gas EU27
- DZ gas EU27
- DZ LNG
- Production EU27
- Demand adjustment

+180 €/MWh Price change to 2021

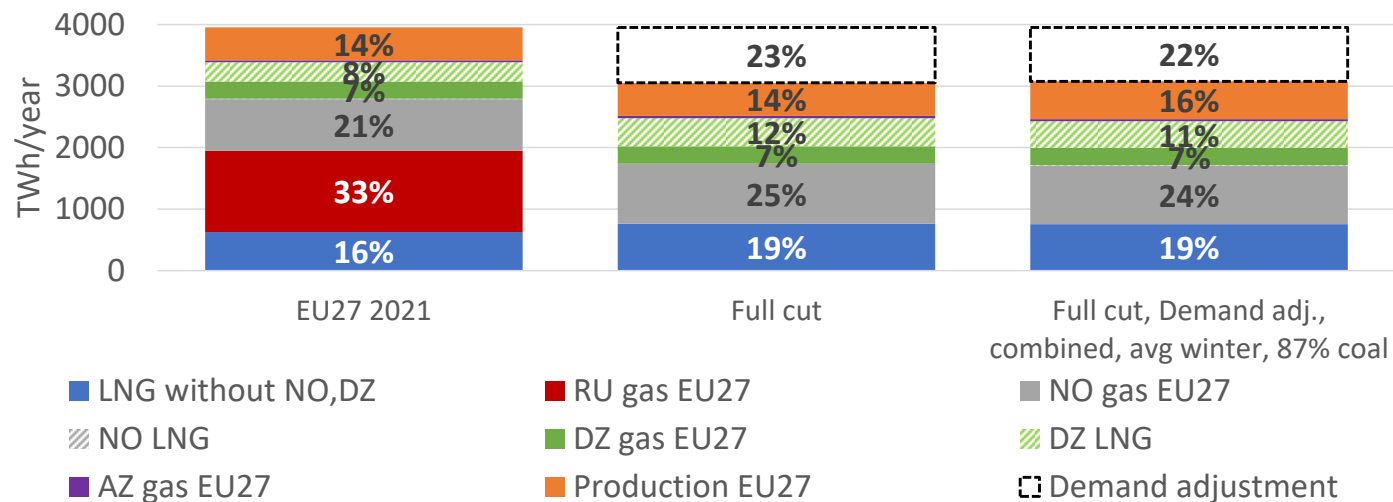
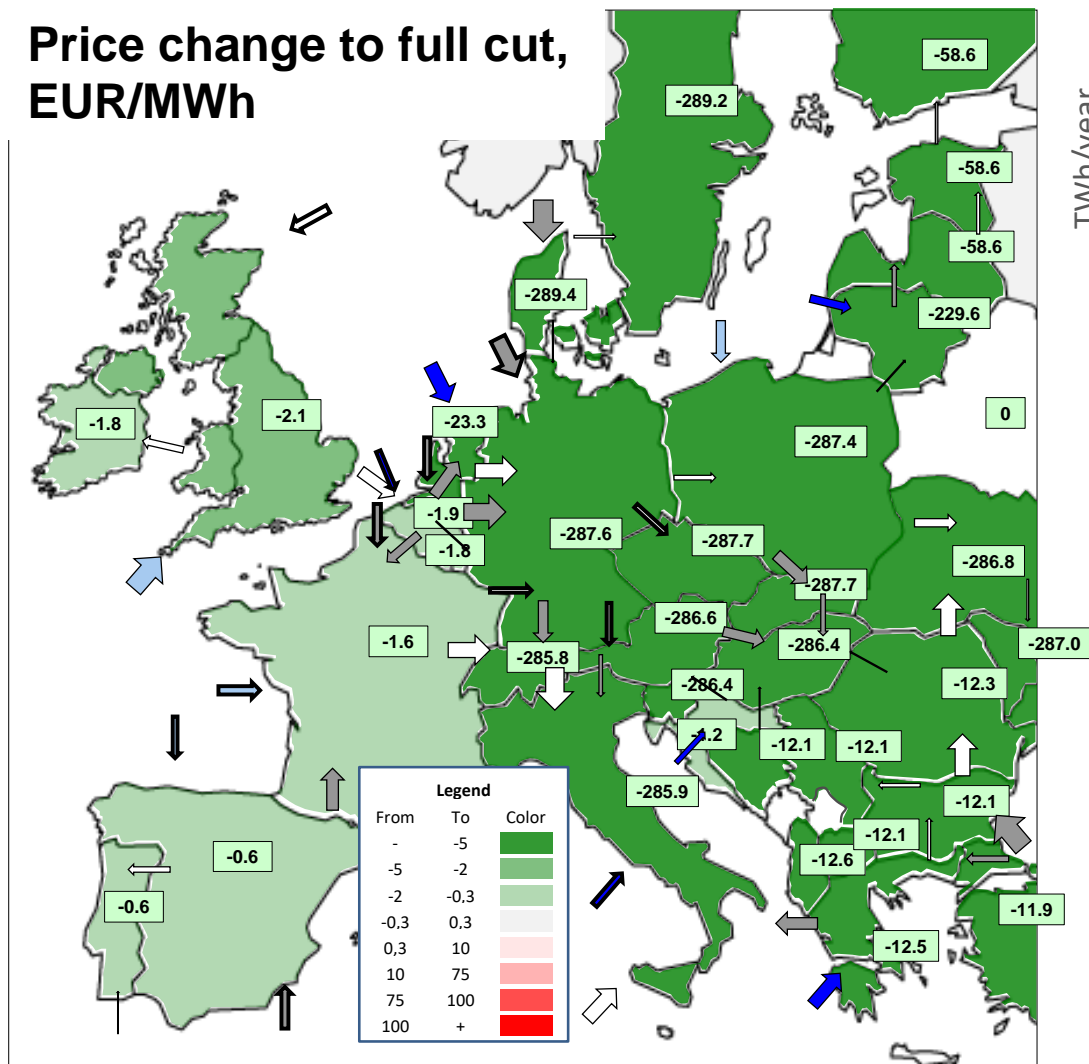
-109 €/MWh Price change due to measure

+71% EU 27 gas bill to 2021

-31% EU27 gas bill due to measure

Effects of building and power sector demand reduction and combined measures, average winter, 87% coal plant availability in Full cut

Price change to full cut, EUR/MWh



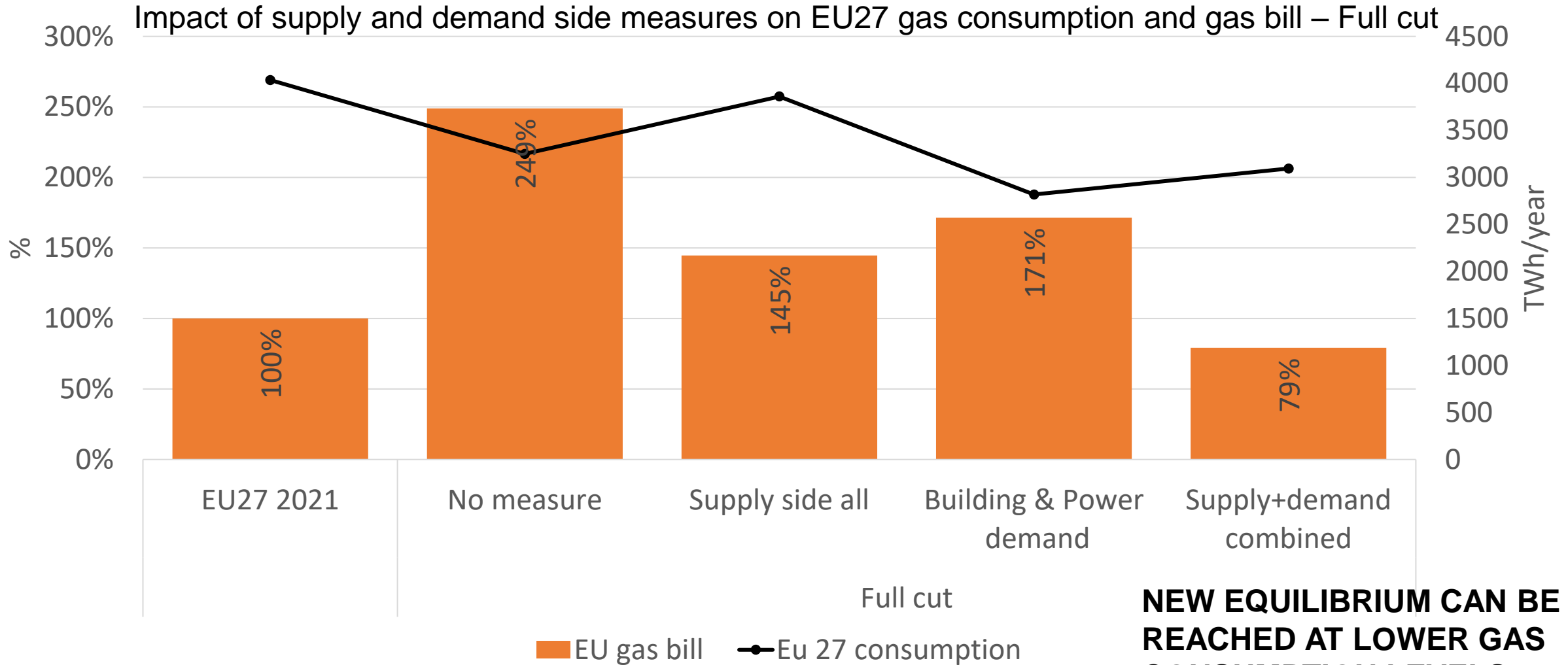
+1 €/MWh Price change to 2021

-288 €/MWh Price change due to measure

-21% EU 27 gas bill to 2021

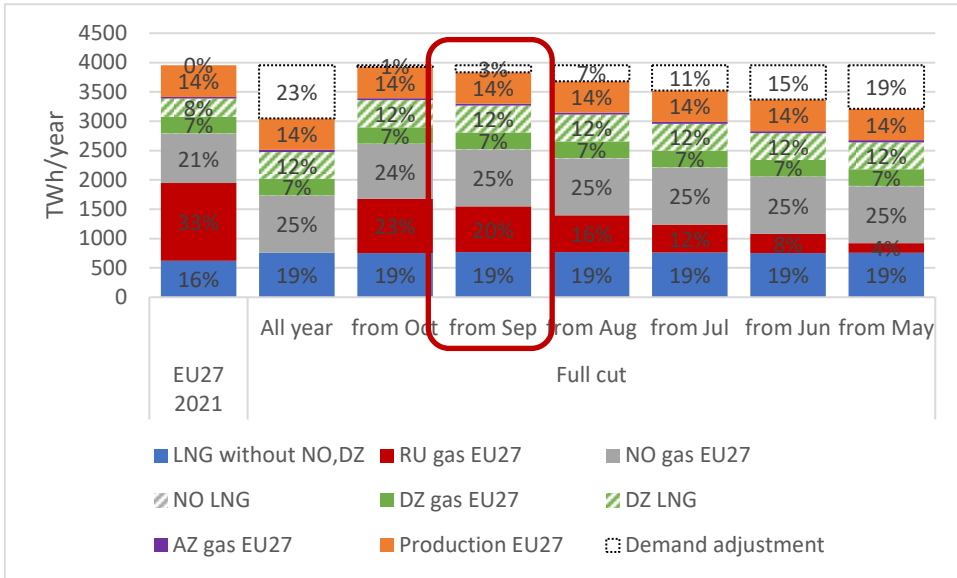
-68% EU27 gas bill due to measure

Supply & demand measures combined can alleviate the full Russian gas cut

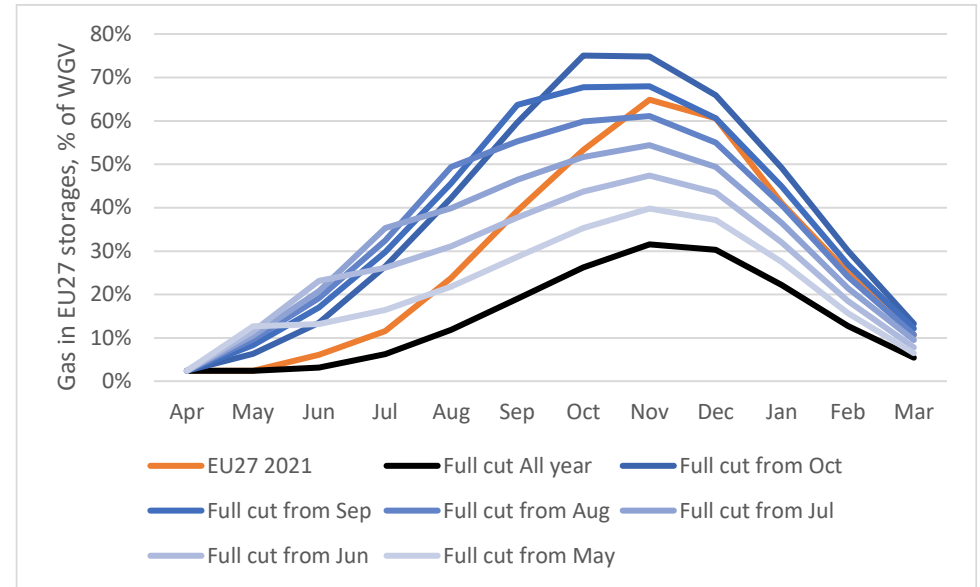


NEW EQUILIBRIUM CAN BE REACHED AT LOWER GAS CONSUMPTION LEVELS

Effect of storages in Full cut

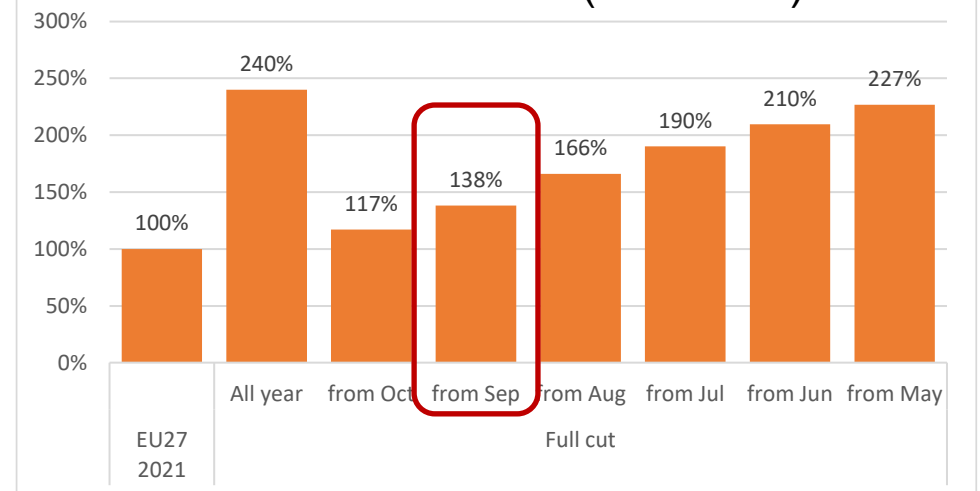


Storage fill-up (modelled)



- Russian deliveries are only curtailed for the withdrawal period (from October onwards) and tested if Russian supplies happen to stop already in the previous months (from May, June, July, Aug, Sept)
- Russian gas was used to fill up European storages
- Storages can significantly mitigate the effect if they can be filled up until October
- Problem: next winter

EU27 Gas bill (modelled)



Conclusions and policy messages

■ **SHORT TERM**

- EU has acted timely with the storage targets. With over 82% filled by September, for this winter we see no major threat for supply disruption.
- Europe needs to pay more for its gas supply than previous winter

■ **MID-TERM**

- Full cessation of Russian deliveries may be mitigated completely with combined supply and demand measures
- The new equilibrium of gas consumption at ~3000 TWh for the EU27 brings lower gas bills
- Short-term switching in power&heat sector will result in increased use of solid fossil fuels and GHG emissions

■ **LONG-TERM**

- Continue energy efficiency and secure alternative gas suppliers, increased use of LNG
- Speed up RES-E deployment to move away from fossil fuels

THANK YOU FOR YOUR ATTENTION

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