



European Economic Impacts of Cutting Energy Imports from Russia: A Computable General Equilibrium Analysis

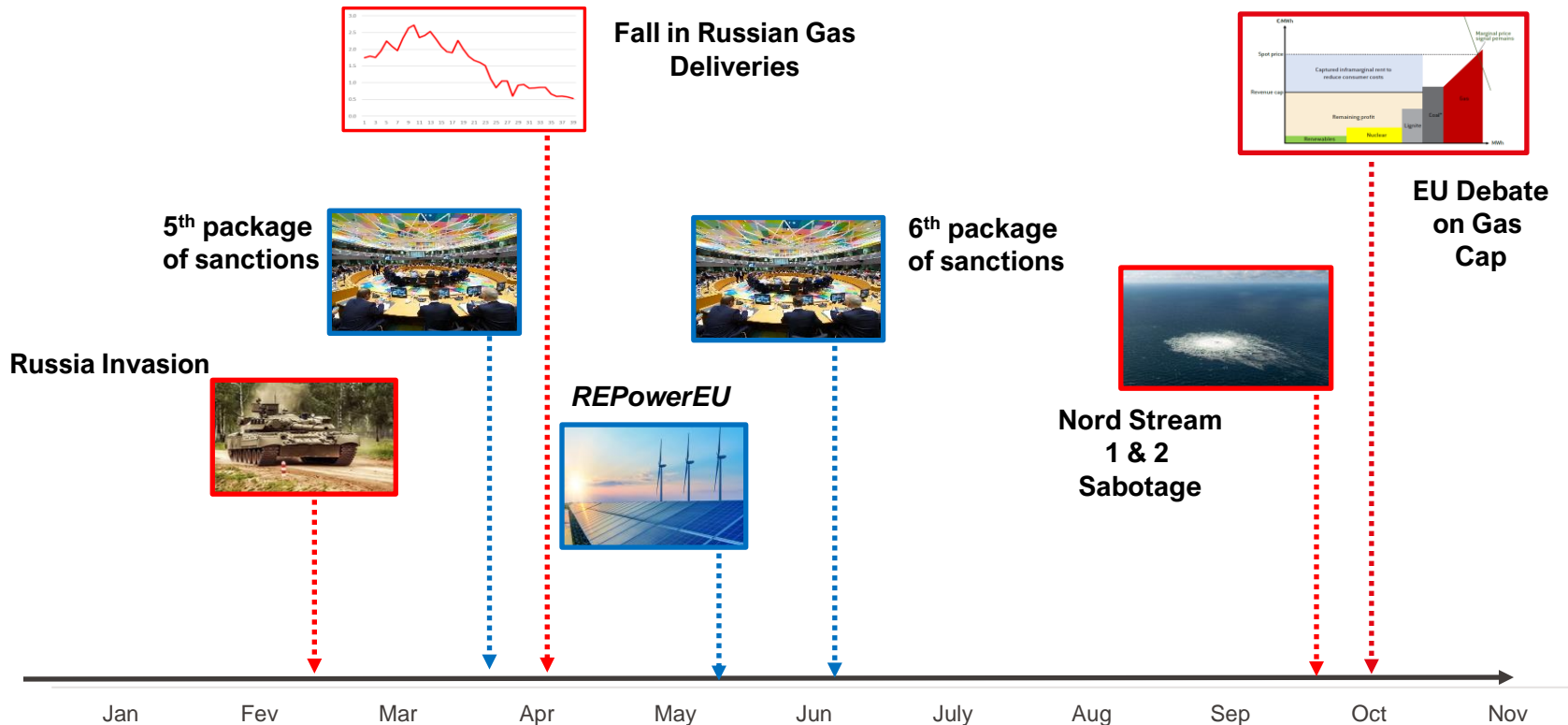
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Timeline of European energy events related to the Russia Invasion to Ukraine



Background

- Dependency of EU on Russian fossil energy:
 - Gas : EU imports **85 - 90%** of its gas consumption, with **Russia providing around 40%** of those imports, in varying levels across Member States.
 - Russia also accounts for around 25% of oil imports and 45% of coal imports.
- **EU Position on Gas:** less stringent relative to coal and oil
 - **Capacity Constraint of Gas:** Dependency on Russia's
 - Substantial for EU Fit For 55: support transitional energy from coal to renewables

Research Aim, methods & scenarios development

Research Question: *What are the impacts of cutting Russian fossil energy imports considering the fit for 55 Package?*

- Provide an assessment of scenarios of EU energy imports cuts from Russia
- We use the GEMINI-E3 Paris Reinforce version where EU28 and Russia are represented
- The reference scenario assumes that the fit for 55 package is implemented (i.e. **-55% of GHG emissions in 2030**)
- Timeframe 2022 – 2030.

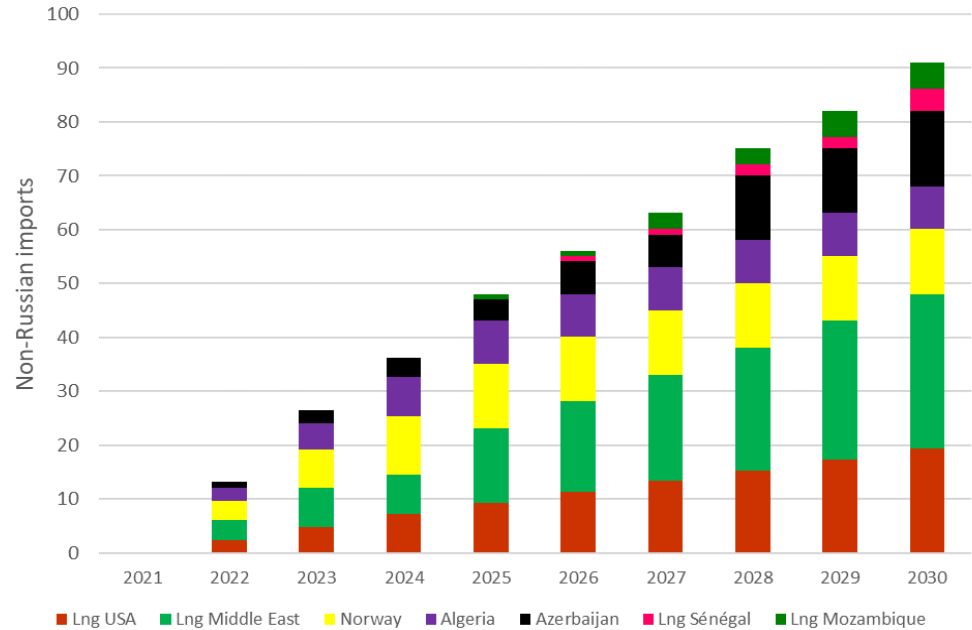
Scenarios design

- **Reference Scenario:**
 - **EU: Current Policies** (Fit for 55 package)
 - Current Policies for other regions
- **No gas embargo:** Only the 5th and 6th packages of energy restrictive measures are implemented
- **Limited and Short Term embargoes;**
- **Full embargo:** Extend to embargo on Natural Gas in 2023

Full embargo scenario

- Current natural gas imports from Russia in 2021: **157 bcm**

Assumptions on additional gas import capacities in bcm:



Full embargo scenario: European energy impacts

	2022	2023	2023	2025	2030
GDP ^a	-0.10%	-0.46%	-0.43%	-0.38%	-0.16%
Welfare ^b	-0.52%	-1.81%	-1.74%	-1.61%	-1.29%
Energy Consumption^a					
Coal	7.9%	22.9%	24.0%	26.0%	15.9%
Natural Gas	-13.4%	-33.2%	-31.2%	-30.4%	-24.3%
Petroleum Products	-0.7%	-4.1%	-3.4%	-2.3%	1.1%
Electricity	-9.0%	-2.2%	-1.7%	-0.3%	1.0%
Wholesale Energy Price^a					
Coal	11.1%	36.5%	36.6%	36.7%	37.7%
Natural Gas	23.1%	76.6%	74.4%	69.3%	63.8%
Petroleum Products	2.5%	14.1%	13.3%	11.9%	12.3%
Electricity	2.6%	7.2%	5.4%	2.0%	1.0%
CO ₂ ETS Price ^c	51	43	61	75	106
CO ₂ ESR Price ^c	0	0	0	0	47

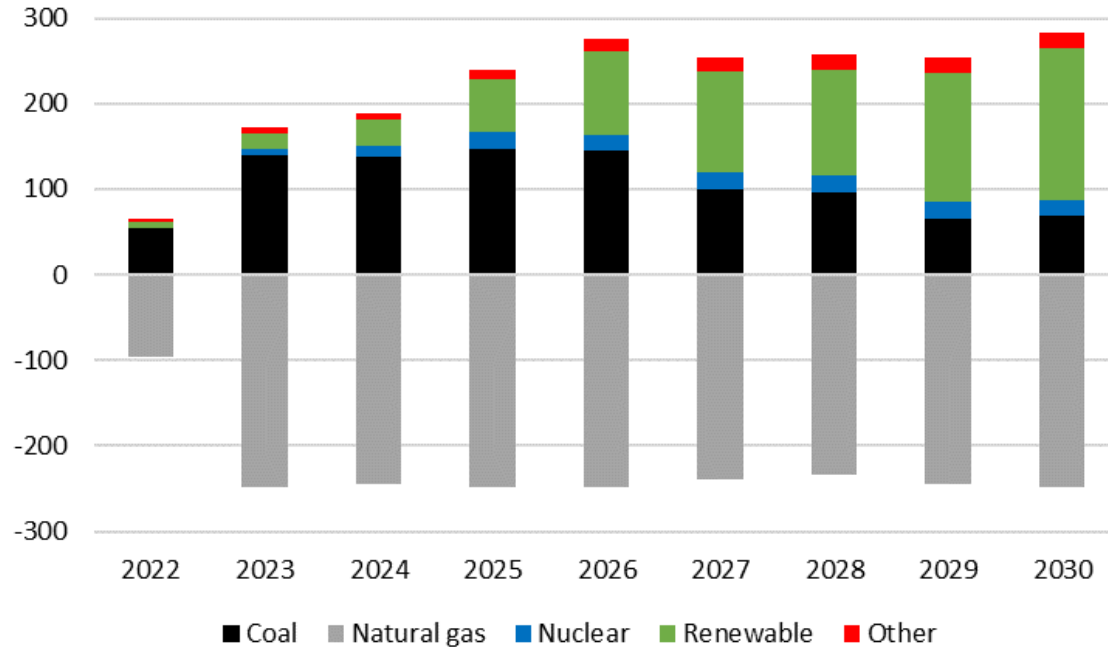
^a In percentage with respect to the reference case (current policy scenario)

^b In percentage of households' consumption expenditure

^c in USD₂₀₁₄

- Wholesale gas price increase
- EU gas decreases by 134 bcm in 2025 (87 bcm in 2030) :
 - Electricity -51 bcm,
 - EII -21 bcm,
 - Residential -31 bcm ,
 - other sectors -31 bcm
- Natural gas partly replaced by coal

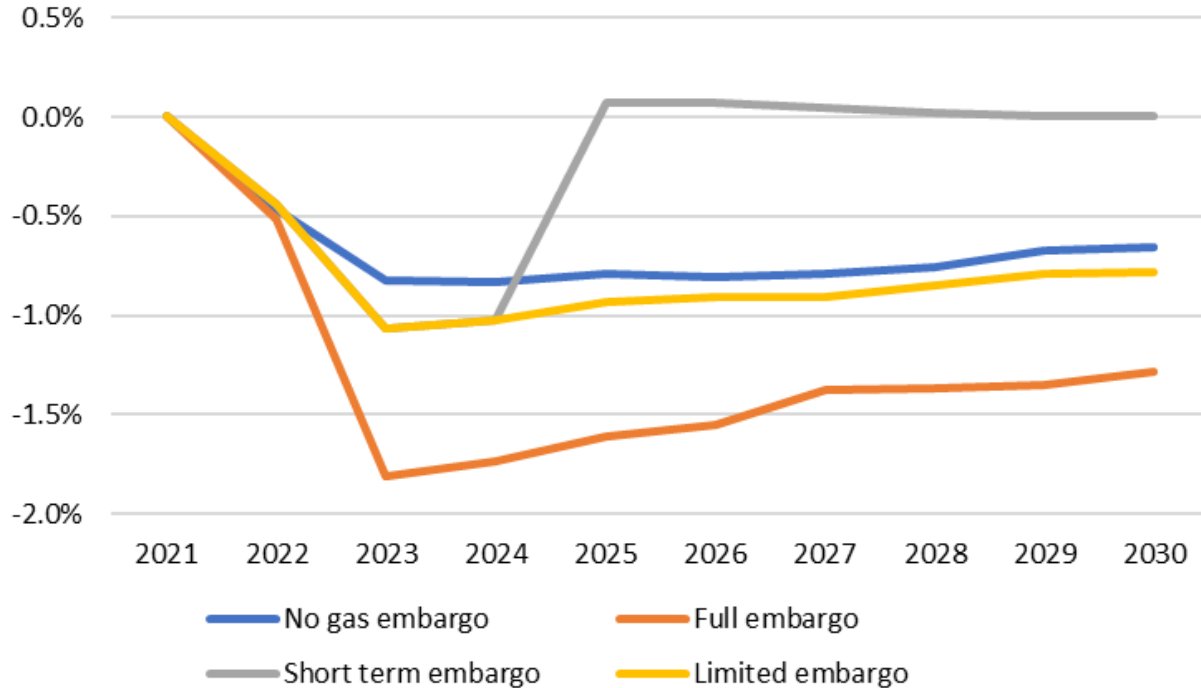
Full embargo scenario: European electricity generation in TWh



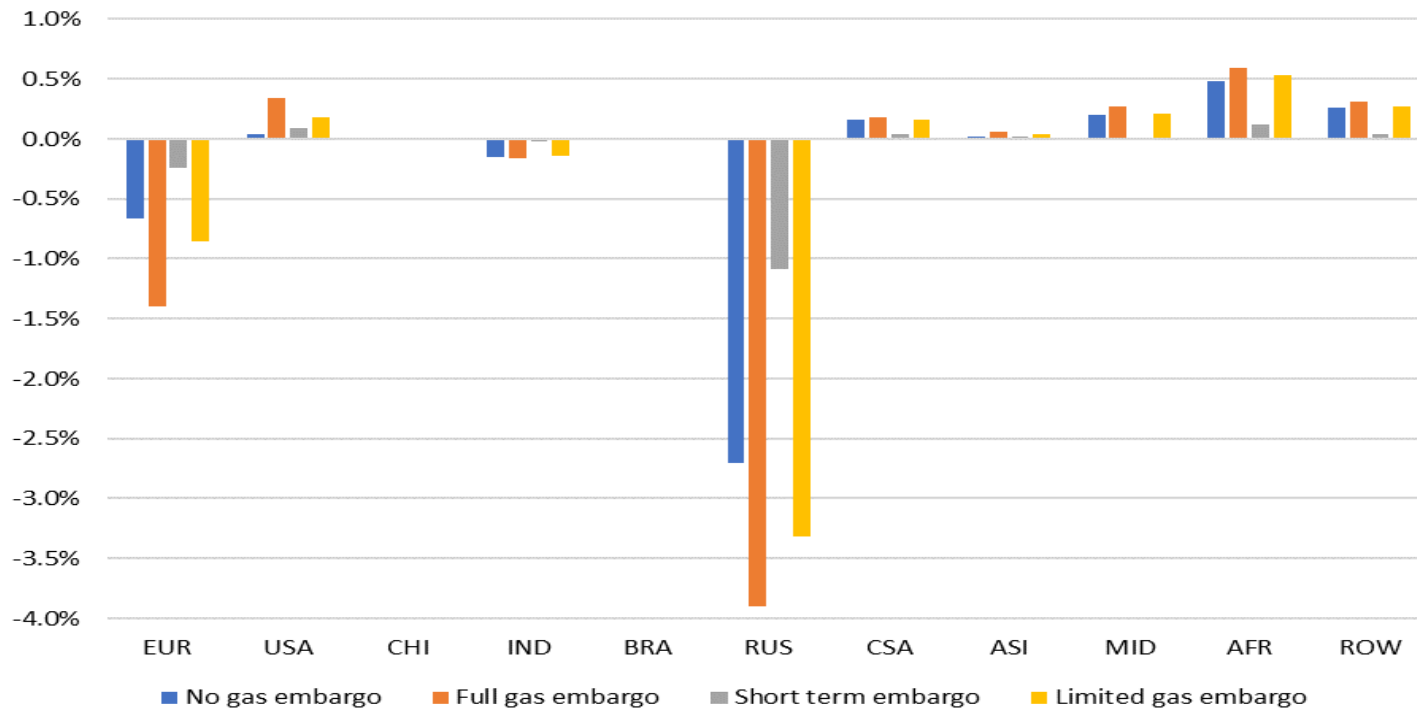
Full embargo scenario: Macro-economic impacts

- European GDP: -0.38% in 2025 and -0.16% in 2030
- Welfare cost: -1.61% of household consumption in 2025 (-1.29% in 2030)
- Total European welfare cost is evaluated to **3092** €₂₀₂₁ per European resident from 2022 to 2030

Comparison with other scenarios: European welfare change in % of HC



Cumulative welfare change in % of Households consumption



Main findings and Policy Implication

- The cost of current EU 5th and 6th energy restriction packages is substantial (**1468** €₂₀₂₁ per European resident);
- An embargo on natural gas doubles this cost (**3092** €₂₀₂₁);
- Coal plays a significant role in short term especially in electricity generation;
- These restrictions have a more detrimental impact on Russia;
- Policy implications
 - **Supply side:** Diversification & overcoming bottlenecks → investment in natural gas infrastructure *versus* stranded asset
 - **Demand side:** Demand adjustment *versus* price cap
 - Solidarity between Member States
 - Net zero trajectory toward new dependencies

For Details please refer to:

Perdana, S., Vielle, M., & Schenckery, M. (2022). European Economic impacts of cutting energy imports from Russia: A computable general equilibrium analysis. *Energy Strategy Reviews*, 44, 101006.

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Thank you for your attention!

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Appendix

European Gas Import from Russia in bcm

	Current Policies	No Gas Embargo	Full Embargo	Limited Gas Embargo	Short term Embargo
2021	157.0	157.0	157.0	157.0	157.0
2022	155.7	73.9	64.0	78.5	78.5
2023	155.7	155.7	0.0	78.5	78.5
2024	154.5	154.5	0.0	78.5	78.5
2025	153.0	153.0	0.0	78.5	78.5
2026	151.8	151.8	0.0	78.5	151.8
2027	148.9	148.9	0.0	78.5	148.9
2028	146.1	146.1	0.0	78.5	146.1
2029	143.1	143.1	0.0	78.5	143.1
2030	142.8	142.8	0.0	78.5	142.8

No Gas Embargo

	2022	2023	2023	2025	2030
GDP ^a	-0.08%	-0.24%	-0.22%	-0.19%	-0.16%
Welfare ^b	-0.46%	-0.82%	-0.83%	-0.79%	-0.66%
Energy Consumption^a					
Coal	6.6%	-1.6%	0.3%	0.7%	-4.7%
Natural Gas	-11.4%	1.9%	2.1%	3.1%	2.3%
Petroleum Products	-0.7%	-4.6%	-3.9%	-2.8%	-2.0%
Electricity	-0.7%	0.2%	0.7%	0.7%	1.3%
Wholesale Energy Price^a					
Coal	10.6%	26.9%	27.8%	28.0%	29.9%
Natural Gas	19.4%	1.5%	1.7%	2.2%	1.5%
Petroleum Products	2.5%	12.8%	12.2%	11.0%	10.6%
Electricity	2.1%	-0.5%	-1.6%	-1.4%	-2.2%
CO ₂ ETS Price ^c	52	62	79	92	113
CO ₂ ESR Price ^c	0	0	0	0	146

^a In percentage with respect to the reference case (current policy scenario)

^b In percentage of households' consumption expenditure

^c in USD₂₀₁₄

Appendix

Limited Embargo

	2022	2023	2023	2025	2030
GDP ^a	-0.08%	-0.28%	-0.26%	-0.22%	-0.19%
Welfare ^b	-0.44%	-1.07%	-1.02%	-0.93%	-0.78%
Energy Consumption^a					
Coal	6.0%	5.5%	7.0%	7.4%	-5.3%
Natural Gas	-10.5%	-8.7%	-7.4%	-5.8%	-3.7%
Petroleum Products	-0.7%	-4.4%	-3.7%	-2.5%	-1.7%
Electricity	-0.7%	-0.5%	0.1%	0.4%	-0.2%
Wholesale Energy Price^a					
Coal	10.4%	29.7%	30.3%	30.4%	29.8%
Natural Gas	17.8%	18.4%	17.3%	16.3%	11.4%
Petroleum Products	2.4%	13.1%	12.5%	11.2%	10.9%
Electricity	1.9%	1.3%	0.0%	-0.7%	1.3%
CO ₂ ETS Price ^c	53	55	71	82	122
CO ₂ ESR Price ^c	0	0	0	0	127

^a In percentage with respect to the reference case (current policy scenario)

^b In percentage of households' consumption expenditure

^c in USD₂₀₁₄

Short Run Embargo

	2022	2023	2023	2025	2030
GDP ^a	-0.08%	-0.28%	-0.26%	0.01%	0.01%
Welfare ^b	-0.44%	-1.07%	-1.02%	0.07%	0.01%
Energy Consumption^a					
Coal	6.0%	5.5%	7.0%	-1.0%	-0.5%
Natural Gas	-10.5%	-8.7%	-7.4%	-1.2%	-0.3%
Petroleum Products	-0.7%	-4.4%	-3.7%	0.6%	0.0%
Electricity	-0.7%	-0.5%	0.1%	0.7%	0.6%
Wholesale Energy Price^a					
Coal	10.4%	29.7%	30.3%	0.1%	1.0%
Natural Gas	17.8%	18.4%	17.3%	-0.5%	-0.1%
Petroleum Products	2.4%	13.1%	12.5%	-1.6%	0.0%
Electricity	1.9%	1.3%	0.0%	-1.8%	-1.1%
CO ₂ ETS Price ^c	53	55	71	104	112
CO ₂ ESR Price ^c	0	0	0	32	195

^a In percentage with respect to the reference case (current policy scenario)

^b In percentage of households' consumption expenditure

^c in USD₂₀₁₄