AozoraStep

How to master the Putin Energy Game

As relations between Russia and the West are close to an all-time low, Russia now has nothing to lose and can play the game of supply and demand for gas to optimize profits. Europe is keen on getting their storage tanks full ahead of the winter to put pressure on prices, while Russia's target is to keep European storage levels below 80% into the winter. Let's take a look at this game step by step starting with a table of current gas in storage vs. annual consumption and the first supply disruption… *Brief disclaimer: These numbers are by no means 100% accurate and are at best a good estimate.*

European Gas in Storage as of 19th June 2022 vs. Annual Consumption

Area	Gas in storage (TWh)	Full (%)	Consumption (TWh)	Filling level compared to annual consumption (%)
All Europe	673.71	51.22	5,322.93	12.66
EU	602.42	54.75	4,151.84	14.51
Austria	39.94	41.82	98.07	40.72
Belgium	4.58	52.68	195.48	2.34
Bulgaria	1.90	32.67	33.59	5.64
Croatia	1.21	25.44	33.35	3.64
Czech Republic	25.86	72.22	91.90	28.14
Denmark	6.90	75.95	26.73	25.80
France	76.10	57.83	467.62	16.27
Germany	139.73	58.10	995.27	14.04
Hungary	25.73	38.01	117.05	21.99
Ireland	-	-	61.01	0.00
Italy	106.54	55.08	778.11	13.69
Latvia	9.45	43.36	12.34	76.59
Netherlands	68.38	48.33	420.42	16.27
Poland	35.40	97.22	247.91	14.28
Portugal	3.52	98.64	68.93	5.11
Romania	12.80	39.04	122.91	10.42
Slovakia	19.39	53.80	57.25	33.87
Spain	24.95	70.78	372.75	6.69
Sweden	0.02	23.58	12.17	0.19
Non-EU	71.29	21.37	1,171.09	6.09
Serbia	-	-	-	0.00
Ukraine	61.72	19.06	337.40	18.29
United Kingdom	9.57	98.67	833.70	1.15

Source: AGSI

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The Freeport explosion

The 8th June explosion at one of the largest US export plants for LNG has caused another disruption to the energy market. Freeport provides around 20% of US LNG processing and the plant is expected to come back online partially no earlier than September and fully not before the end of the year[1]. The facility is responsible for 15 metric tons per annum, of which around 70% is being ships to Europe lately. This is equivalent to 151 TWh per year, hence the outage is expected to reduce Europe LNG imports from the US by around 50 TWh this year (1% of annual gas consumption in Europe). It takes around two weeks for ships to cross the Atlantic, which means the impact will only be felt in the next couple days. The US has exported around 8bn cubic feet of gas per day to Europe in 2022 (2.34 TWh a day, 854 TWh a year vs. 238 TWh in 2021)[2]. Therefore, due to US imports & taking the Freeport explosion into account, the EU can count on around **566 TWh** of additional gas from the US (10.6% of annual consumption).

Russian gas supply cuts

In a prior note I have laid out the amount of gas Russia has cut due to non-compliance, which is around 18.3bn cubic metres (198.25 TWh). This, however, did not take into account that the entire pipeline is not being used anymore[3]. Therefore, the total loss of supply is actually 357.5 TWh from the Russia Yamal pipeline. Ukraine, on the other hand, needed to reduce gas flows to Europe by at least 10mio cubic metres a day (40 TWh a year) due to interference by occupying Russian forces[4]. Gas flows have subsequently dropped as much as 20mio cubic metres a day (80 TWh). Ukraine has also urged Germany to stop gas imports via Nordstream (to pressure Moscow to make it easier to win the war). Nordstream is now one of the most important supply routes for gas to Europe (from Russia), which has transported a record volume of 59.2bn cubic metres of gas in 2021[5] (641.33 TWh, or 1.76 TWh a day). Russia has now reduced this flow by 60%, i.e. to 0.7 TWh per day. Russia blames problems in repairing turbines that are serviced

[1] https://www.reuters.com/business/energy/freeport-lng-plant-shutdown-main-buyers-risk-2022-06-09/

[2] https://www.eia.gov/todayinenergy/detail.php?id=52659#:~:text=Note%3A%20Europe%20includes%20Turkey.,EIA%20estimates%20for%20April%202022.

[3] https://www.upstreamonline.com/production/gazprom-no-more-yamal-pipeline-gas-shipments-to-poland-and-germany/2-1-1218499

[4] https://www.reuters.com/business/energy/requests-russian-gas-via-key-ukraine-transit-point-fall-zero-data-shows-2022-05-11/

[5] https://www.nord-stream.com/press-info/press-releases/the-nord-stream-pipeline-transported-a-volume-of-592-billion-cubic-metres-of-natural-gas-in-2021-522/

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by Siemens in Canada to sanctions and might have to stop the flow completely. Europe imported a total of 1,679 TWh of gas from Russia in 2021, 31.5% of its annual consumption and around 45% of total gas imports and the EU is 83% dependent on gas imports[6]. The gas storage tanks are being filled by around 4-6 TWh a day. A 1 TWh per day reduction due to Nordstream operating at 40% capacity is therefore substantial. However, Canada is working on finding a way to deliver the turbines to Germany despite the sanctions[7]. Assuming that this is being resolved by the end of this month (optimistic case), the partial shutdown would have an impact of around 15 TWh. This would put total supply cuts to at least **413 TWh**. In reality, there has also been a decline in LNG carrier imports from Russia, which could increase supply cuts to over **640.5 TWh** (in total up to **1,221 TWh** are at risk, if Russia shuts down the Nord Stream pipeline).

EU gas imports from Russia

Pipeline/LNG carrier	EU imports 2019 (in TWh)
Russia Yamal Pipeline	357.5
Russia Nord Stream Pipeline	595.8
Russia Ukraine Pipeline	433.3
Russia TurkStream Pipeline	346.7
Russia Blue Stream Pipeline	173.3
Russia LNG Carrier	227.5

Source: https://mondediplo.com/maps/gas-pipelines#&gid=1&pid=1

Nuclear power vs. Renewables

In mid-December 2021 France's largest nuclear energy provider, EDF Energy, downgraded its electricity output for 2022 from 330-360 TWh to 300-330 TWh due to corrosion in some of their nuclear plants[8]. These problem became worse and after multiple revisions EDF downgraded its output to 280-300 TWh in May[9]. In Germany, the 2019 nuclear power output was around 75 TWh[10]. 3 of Germany's 6 remaining

[6] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Natural_gas_supply_statistics
[7] https://www.reuters.com/business/energy/canada-seeking-pathway-enable-german-gas-flow-amid-russian-sanctions-bloomberg-2022-06-21/
[8] https://www.edf.fr/en/the-edf-group/dedicated-sections/journalists/all-press-releases/edf-updates-its-nuclear-output-estimate-in-france-for-2022
[9] https://www.edf.fr/en/the-edf-group/dedicated-sections/journalists/all-press-releases/update-nuclear-on-may-18th-2022
[10] https://world-nuclear.org/information-library/country-profiles/countries-g-n/germany.aspx#:~:text=Generating%20capacity%20at%20the%20end,GWe%20oil%20(IEA%20figures).

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nuclear power plants were shut down at the beginning of 2022, with the remaining 3 scheduled to be shut down by end of this year. Scholz refuses to extend the remaining 3 nuclear power plants citing shortage of nuclear fuel elements. Last but not least, Belgium is due to shut down its 8 TWh Doel 3 nuclear power plant this year and its 8 TWh Tihange 2 nuclear power plant by next year[11]. Returning reactors and Finland's new Olkiluoto 3 reactor coming online in 2022 will add 20 TWh to the grid[12]. In total, this still leaves Europe short at least **121 TWh**, if not **171 TWh**. According to the IEA and Ember's European Electricity Review, this is by around 75% offset with around **108 TWh** output growth in wind and solar in 2022[13].

Coal to the rescue

Taking all these numbers into account, Europe is net long **140 TWh** or net short **137 TWh (or more)** of gas/nuclear/wind/solar over the course of 2022. With a partial shutdown of Nordstream I, the Germans are now tending to assume the latter and are calling for emergency measures to reduce gas usage and increase coal production. This brings another variable into play: Coal. The EU has banned Russian coal imports (54% of all hard coal imports) starting from August 2022. In 2020, the EU imported around 43mio tonnes of hard coal from Russia, of which only 49% is used for power production (**38 TWh**). The EU consumed around 277mio tonnes of brown coal in 2021 of which 226mio tonnes were used to produce electricity and heat (411 TWh) with Germany representing 46% of that figure (189 TWh) and nearly all consumption covered by domestic production[14]. Germany has now announced to bring back two idled coal power plants that could add up to 10GW capacity (**~53 TWh**) and is looking to reduce gas consumption. Similar efforts are being enacted upon in the Netherlands and Austria[15].

[11] https://www.world-nuclear-news.org/Articles/Extended-operation-of-two-Belgian-reactors-approve
[12] https://www.world-nuclear-news.org/Articles/Reconsider-nuclear-shutdowns-to-cut-gas-imports,-I#:~:text=Three%20of%20the%20units%20that,and%20Tihange%202%20in%202023.
[13] https://ember-climate.org/insights/research/european-electricity-review-2022/
[14] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Coal_production_and_consumption_statistics#Consumption_and_production_of_hard_coal
[15] https://www.france24.com/en/live-news/20220620-dutch-join-germany-austria-in-reverting-to-coal

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European Electricity Production by Source

Region	Electricity production by source							
	Coal (% electricity)	Gas (% electricity)	Hydro (% electricity)	Solar (% electricity)	Wind (% electricity)	Oil (% electricity)	Nuclear (% electricity)	Bioenergy (% electricity)
United Kingdom	2.0	40.1	1.8	4.1	21.1	2.8	15.3	12.8
Germany	28.8	14.7	3.0	8.6	20.2	3.9	12.0	8.8
Italy	5.0	49.7	15.8	8.6	7.4	4.4	0.0	9.1
France	1.1	6.1	10.8	2.7	6.7	1.8	69.1	1.8
Netherlands	12.3	45.9	0.1	9.5	15.1	4.7	3.2	9.3
Europe	13.9	25.5	16.0	3.8	10.0	2.7	23.3	4.7

The world in data 2021

Region	Coal Electricity (TWh)	Gas Electricity (TWh)	Hydro Electricity (TWh)	Bioenergy Electricity (TWh)	Solar Electricity (TWh)	Oil Electricity (TWh)	Wind Electricity (TWh)	Nuclear Electricity (TWh)
United Kingdom	6.0	122.6	5.6	39.1	12.5	8.6	64.4	46.9
Germany	165.3	84.2	17.2	50.7	49.4	22.1	115.9	68.9
Italy	14.2	140.7	44.7	25.8	24.5	12.4	21.0	0.0
France	5.8	33.3	59.5	9.7	14.7	9.9	36.7	379.2
Netherlands	14.8	55.4	0.1	11.2	11.5	5.6	18.2	3.8
Europe	659.9	1,207.5	758.8	220.5	182.1	128.6	474.2	1,105.4

The world in data 2021

Source: Our World in Data

Winner, winner, chicken dinner?

The fear of not having gas to have some roasted chicken for dinner is a potential outcome for this winter. However, as the numbers suggest, the outcome is far from clear. Europe is entirely reliant on US LNG imports. The US, on the other hand, has only boosted its total output by around 10-20%. This leaves Asia short of LNG, and similar to Germany, they too increase coal production. Apart from going nuclear, Putin only has gas as his only weapon, and therefore Russia will likely continue to squeeze supply to get gas prices up. Psychologically, I would expect Russia to win this game… but the numbers actually suggest that coal and LNG shipments from the US could help Europe in becoming partially energy independent from Russia. However, Russia could stop its entire annual gas flows of over 2,130 TWh to Europe, which would be impossible to replace. Germany is due to declare phase 2 out of 3 of emergency gas plan on 8th July. The Germans have a history of incurring dramatic changes, often negative (WWI & II, Brexit/Immigration, EU fragmentation/higher interest rates, Russian gas reliance), but in this case the Germans could make a

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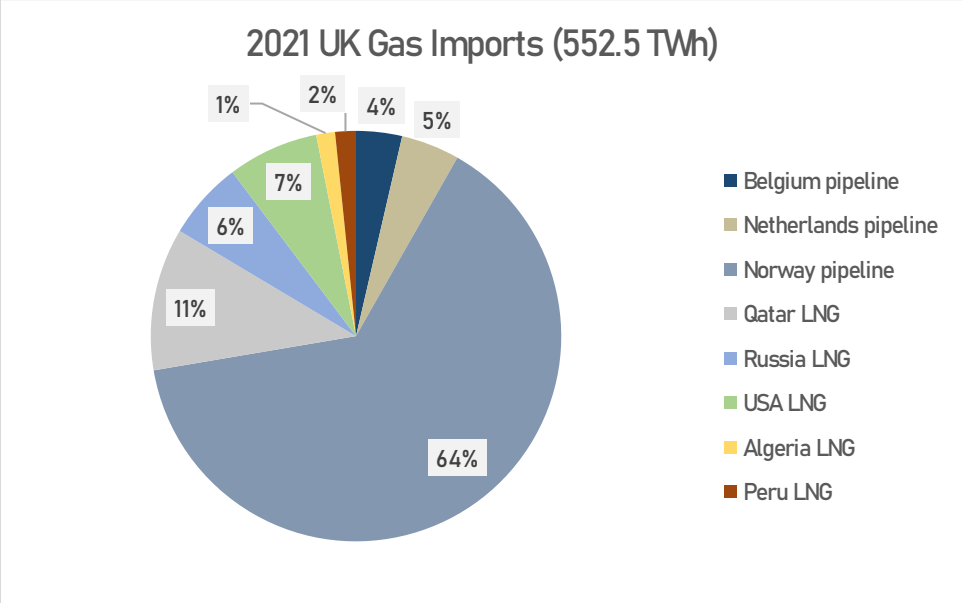
dent in independence from Russian energy (although this would come at a cost of carbon emissions). Gas will be the endgame of this downward spiraling market, with perhaps a decline in coal prices coming last, but before the end of the year… And despite the UK denying its dependence on Russian gas, they are not completely isolated from this crisis either…



Source: Department for Business, Energy and Industrial Strategy (BEIS)

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