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Will Europe be left in the cold next winter?

Quitting Russian gas is easier said than done

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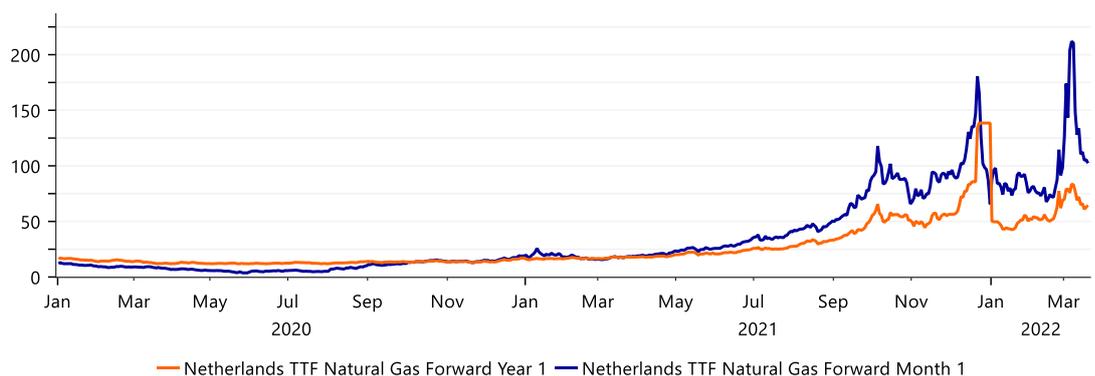
Summary

- The current energy crisis has highlighted the significant geopolitical risks associated with EU's dependence on Russian gas
- Reserves are significantly lower than usual and without Russian gas, reserves will likely be depleted next winter
- Eastern-European countries, Germany and Italy are likely to be most significantly impacted by the gas squeeze, because of large Russian gas dependency and gas intensive energy mix
- Europe can mitigate most of the damage by replacing Russian gas supplies with alternative sources whilst simultaneously reducing gas use for power generation, improving gas use efficiency of households and reducing production in sectors that depend on gas
- Some member states can fund investments in the energy transition through the RRF, since a large share of the loan part of the RRF has not been committed yet

Introduction

On March 8 Russian deputy Prime Minister Alexander Novak threatened to halt gas exports to Europe in a response to the western sanctions imposed on Russia. Volatility in markets spiked and gas futures rose to unprecedented highs, only to come down a few days later. This stark reaction in markets makes clear that the stakes are high. If Russia were to stop gas exports to Europe, the implications would be immense, given that basically every part of the economy, directly or indirectly, depends on gas. Consequently, the European Union has drawn up [a plan](#) to decouple itself from Russian energy as soon as possible.

Figure 1: Gas futures are sky high and very volatile



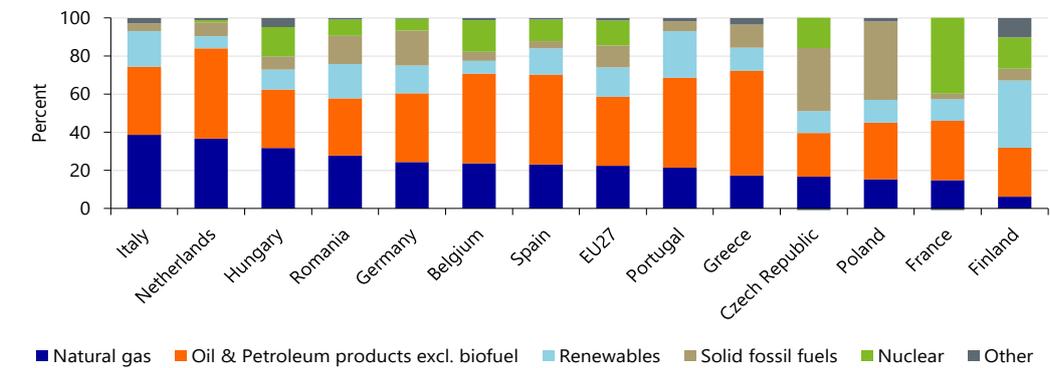
Source: Bloomberg

How dependent is Europe on Russian gas?

But before we dive into what Europe can do to prevent such a crisis, we zoom in on how dependent Europe is on Russian gas. First we see that most European countries are still very reliant on gas for their energy supply (Figure 2). Gas accounts for roughly 40% of the gross available energy mix in Italy and the Netherlands, whilst that number is around 20% for the EU27 as a whole. France, Poland, Greece and Finland are less reliant on gas since a large part of their

energy mix is accounted for by nuclear energy, coal, oil and renewables respectively. Gas consumption exceeds the capacity of domestic gas production, so imported gas has played an important role in in the EU, especially Russian imports.

Figure 2: Gross available energy mix. Most countries are still very reliant on natural gas

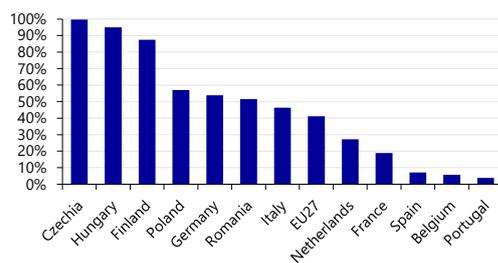


Source: Eurostat (data for 2021)

The next step is to look at what percentage of gas imports is actually from Russia. In 2020, the EU imported just over 150 billion m3 of natural gas from Russia, representing 43% of total EU gas imports (Figure 3). Most gas is transported by pipelines which run from Russia through Eastern-Europe. Given the location of these pipelines, it is no wonder that Czechia, Hungary and Poland rely heavily on Russian gas. Combining all of this data, we can compute the share of each country's available mix that falls away should Russian gas stop flowing (Figure 4). The Eastern-European countries are most impacted, but Germany and Italy would be severely impacted as well.

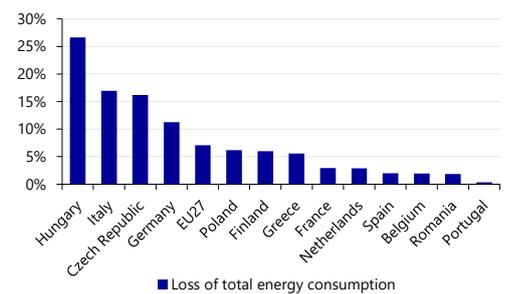
Of course, this only highlights the share of the energy consumption that would fall away, but it does not take into account what the alternatives are for Russian gas. For example, LNG isn't a short term solution for Germany, since it currently has [no LNG terminals](#) to 'easily' replace some of the Russian gas with American (or [Qatari](#)) LNG. No wonder that the German government just announced the building of two LNG terminals. Italy, on the contrary, does have a number of LNG terminals, which should make diversification easier.

Figure 3: Russian gas as percentage of total gas imports



Source: Eurostat, RaboResearch

Figure 4: Especially Hungary's energy security is at risk



Note: Energy loss is defined as: % gas in energy mix * % gas from Russia * import share gas consumption
Source: Eurostat, RaboResearch

How long before we run out of gas?

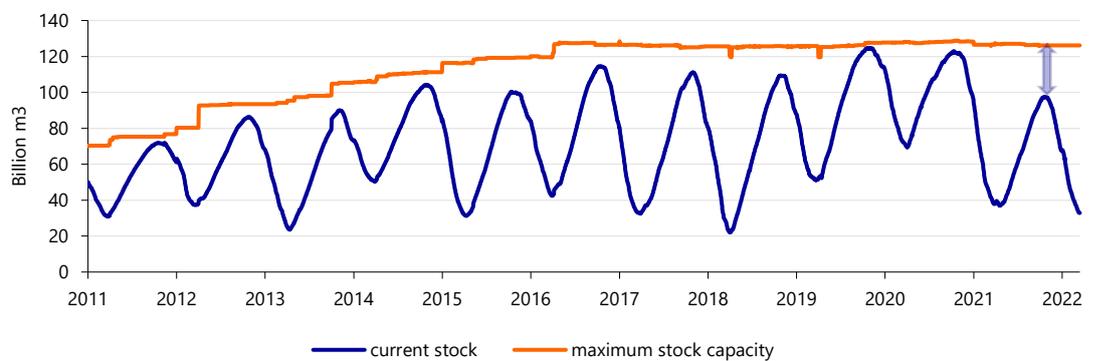
To accommodate seasonal fluctuations in the demand for gas, underground gas storage is used. The underground storage mainly serves to absorb peak consumption in the winter, but also prevents direct shortages from occurring when the import of gas stops. The EU can store about

126 billion m³ of gas, around a third of yearly consumption (Figure 5) and, thus, some 25 billion m³ short of Russian gas imports in 2021.

Normally, the gas storage is almost completely filled before the start of winter, but in 2021 this was not the case for the first time in years. The gas storage was only 77 percent of capacity before the start of the winter in October, while it was filled for 95% and 97% in 2019 and 2020 respectively. This is partly due to lower production in the EU and the lowest supply on record from Russia.

[Researchers at Bruegel](#) have analysed the possible consequences of a complete disruption to Russian gas flows. Their calculations show that with the current EU gas storage and gas demand at average levels (2018-2021), even if the EU imports record high non-Russian gas to the maximum capacity (including gas from North Africa, Norway, Azerbaijan and LNG), it would not be enough to sufficiently refill storage ahead of next winter. In this scenario, gas storage could be depleted at the start of the next winter.

Figure 5: Gas reserves were lower than usual in 21Q4.



Source: GIE – AGSI, RaboResearch

How big will the economic impact be?

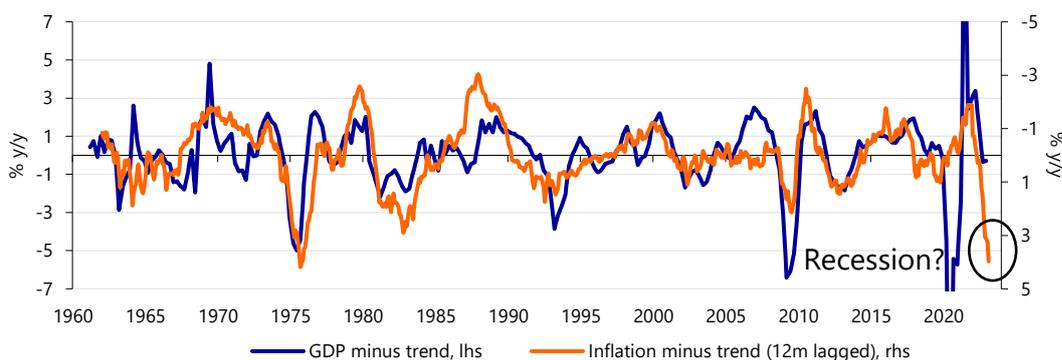
If we run out of gas, or drastically have to cut demand, the economic consequences will likely be dire. Higher gas -and other energy- prices and commodity prices have already contributed to surging inflation. Consumers have to deal with higher petrol and electricity and heating bills, while producers are confronted with higher production costs. Under the pressure of profit reduction, producers will reduce their investments, and/or partly pass the higher costs on in the final prices of goods and services, and consumers in turn have to deal with it directly. This erodes the purchasing power of consumers and decreases consumption, leading to lower or even negative GDP growth.

Without interventions or cutbacks in demand, the relationship would be simple: the less gas we have, the higher the price. This would also trickle down to other energy commodities and products that are highly energy intensive to produce, such as fertilizers and multiple basic metals. It also raises (the risk of) shortages of those products. And the longer commodity prices remain elevated, the more downward pressure on output and consumption the economy will face. The historical experience also suggests that once the inflation genie is out of the bottle, economic growth has a tendency to slow down regardless of the policy reaction. Based on the very simple historical relationship between trend-adjusted inflation and trend-adjusted GDP growth (where inflation leads growth by 12 months on average), the Eurozone economy would contract over the next 12 months (underlying trend is around 2%), as shown in the following figure.

So far, certain accommodative factors had prevented us from predicting a recession just yet in our most recent [forecast](#). But risks are clearly to the downside here. Moreover, if we actually run out of gas, it would clearly no longer be 'only' a matter of high prices anymore, but Europe will actually

be forced to ration its gas use, probably limiting or even halting production in certain sectors. In this scenario, [a European recession](#) is very likely.

Figure 6: Inflation spikes are good predictors of economic recessions



Source: Macrobond, RaboResearch

Relative impact between countries

We can also try to gauge what the relative impact will be between member states. The effect on the total economy is still rather uncertain, but it is clear that the industrial sector is likely to be among the most impacted by higher energy prices and/or shortages. We can draw a comparison between countries based on their industrial sectors, their energy intensity and the relative size of the industrial subsector (table 1).

Germany has a large industrial sector, which, combined with a large dependence on gas (24%), is quite a bad combination. Especially since the energy intensive chemical industry is relatively large compared with the other member states.

France on the other hand is likely to be least impacted by higher energy prices and/or shortages. France is less dependent on gas (only 15%) because of the large role that nuclear energy plays. Additionally, subindustries that are relatively energy intensive, are smaller in France.

Italy is very dependent on gas (37%), of which almost half is imported from Russia. Additionally, Italy has a relatively large industrial sector. On top of this, Italy has a relatively large basic metals industry.

Spain is not extremely dependent on gas and not reliant on Russian gas at all. Spain imports most of its gas from Algeria and will therefore be less affected by a potential supply crunch in Russian gas, although gas prices will still rise in Spain if there is a shortage of gas in the rest of Europe. Additionally, due to its composition, Spain's industry is not as energy intensive as that of other countries.

The Netherlands are pretty reliant on gas, but have the option to produce some of that gas themselves. Historically, the Netherlands exported a large share of the produced gas, but luckily for the Netherlands, they do not have a lot of long term contracts. Therefore, they are not obliged to keep exporting the same volumes of gas as they do right now, but can use (some of) it for domestic consumption. This could remediate the lack of Russian gas for a couple of months, although that does not offer a structural solution nor would it prevent price hikes. Given the fact that the Netherlands have a relatively energy intensive industry, it will need to find alternatives or curb demand.

Table 1: Overview of energy intensity and size of sectors

Sector	Energy intensity	Share economy				
		DE	FR	IT	SP	NL
Industry		23%	11%	16%	13%	12%
Food products, beverages and tobacco	0.6	1.6%	2.1%	1.8%	2.5%	2.3%
Textiles, wearing apparel	0.2	0.3%	0.2%	1.6%	0.9%	0.2%
Wood and paper products	1.9	0.9%	0.6%	1.0%	0.7%	0.6%
Coke and refined petroleum products	3.1	0.2%	0.2%	0.2%	0.3%	0.2%
Chemicals and chemical products	4.2	1.7%	1.0%	0.8%	0.9%	1.7%
Basic pharmaceutical products	0.2	0.8%	0.9%	0.6%	0.7%	0.4%
Rubber and plastics products	0.7	1.6%	0.6%	1.5%	1.1%	0.8%
Basic metals and fabricated metal products	0.8	2.6%	1.3%	2.5%	1.7%	1.4%
Computer, electronic and optical products	0.2	1.4%	0.6%	0.5%	0.2%	0.6%
Electrical equipment	0.2	1.5%	0.3%	0.7%	0.4%	0.4%
Machinery and equipment n.e.c.	0.2	3.5%	0.6%	2.4%	0.7%	1.8%
Transport equipment	0.2	5.3%	1.4%	1.4%	1.5%	0.7%
Other manufacturing; repair and installation	0.2	1.4%	1.4%	1.5%	1.0%	1.3%

*Energy consumption as a percentage of the sector's total added value

** Percentage of total value added per sector.

Source: Eurostat, EIA

What can Europe do to mitigate this?

In order to compensate for the omittance of Russian gas, Europe could either choose to replace Russian gas supplies with alternative sources or to decrease gas use. We will elaborate on both separately.

Replace Russian gas supplies with alternative sources

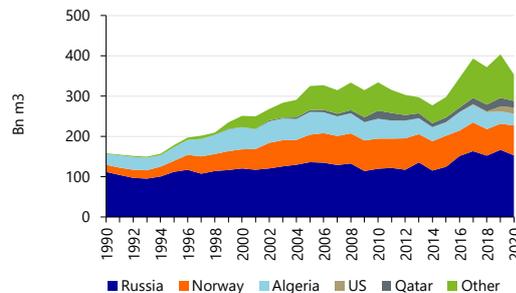
The most obvious way to cope with a shortage of gas, is to replace Russian gas with non-Russian gas imports (Figure 7). There is significant unused capacity of gas imports from other sources, but for higher utilization of gas import capacity, production quotas need to be revised upwards. Norway for example, has recently changed its national regulation to allow for more natural gas extraction from key fields to keep production at full tilt throughout the summer, when output usually falls. Algeria is also increasing its gas production to meet European demand.

Besides the fact that there probably isn't enough available gas to replace Russian supply immediately, switching to different gas suppliers also faces technical constraints. Much of Europe's gas is supplied through the central and eastern European pipelines from the east to the west, which are not suitable for sending gas the other way around. There have been recent investments in new pipelines and so-called 'reversal flow' technology, but it is unlikely that it will be technically possible to supply Eastern-Europe with gas on a short notice.

Increasing domestic production is another option. Figure 8 shows that the EU has been more reliant on gas imports and domestic production has been declining since 1990. The Ministry of Economic Affairs in the Netherlands expect much higher gas extraction at Groningen gas field in 2022 (it would make a final decision in April). But due to damage and safety concerns over earthquakes triggered by this activity, gas extraction is set to stop in 2023 or 2024, although this is still rather uncertain given the geopolitical situation. Besides that, gas produced in the Netherlands is low calorific, which uses different infrastructures than high calorific gas imported from Russia.

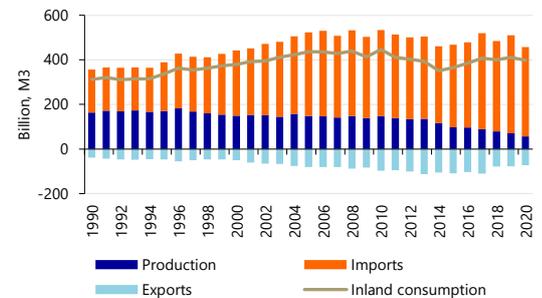
European gas companies can also buy more gas in the coming weeks to replenish the gas storage, but are probably not very keen on replenishing storages at the current market prices. A reversal in market prices is a significant risk for those companies. Governments could choose to share some of that risk if they want to persuade gas companies. Still, it is unlikely that Europe can replenish its stock before the start of the next winter this way, according to a recent report by [Bruegel](#). In addition to the increase in supply, demand would have to be cut by around 10% to 15% to avoid empty storage tanks.

Figure 7: Can Europe increase supply from other gas suppliers?



Source: Eurostat

Figure 8: European domestic gas production has given way to gas imports



Source: Eurostat

Additionally, Europe is trying to secure extra LNG imports, but there is challenge in scaling up the use of LNG. The production and transportation of LNG is a very capital intensive business and takes some time to scale up. Natural gas is cooled to -160°C in large terminals to transform the gas into a liquid and then shipped. Currently, the capacity of the worldwide LNG industry is nearly fully utilized, which became painfully clear during last winter, even before the war in the Ukraine began. Low supplies and potential shortages led prices to skyrocket. The United States (one of the biggest LNG exporters together with Qatar and Australia) alleviated some of the pressure by redirecting a number of vessels carrying LNG to Europe. However, it remains uncertain to what extent the US can continue to meet European demand for LNG more structurally, given the worldwide increase in demand. Especially since the current Biden administration is not a big fan of shale gas drilling. Europe is also [building extra LNG-terminals](#), but this takes time.

Decrease gas use

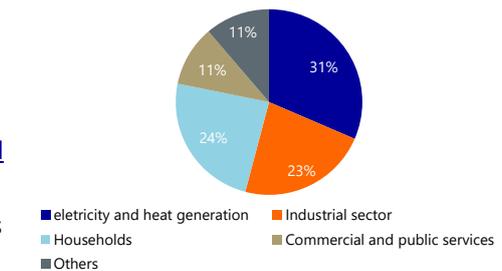
Natural gas is mainly used for power generation (electricity and heat), industrial processes, and residential and commercial heating and cooking (Figure 9). There is potential to reduce gas use in all three areas.

Finding alternatives for power generation

The easiest way is, probably, to replace (some of the) gas consumption by switching to (dirtier) coal or burning oil in gas turbines. According to the Bruegel report this should be nearly enough to get Europe through the next winter (although this is still very dependent on the weather condition, which can shift gas demand by 10% to 30% in extreme cases). This obviously clashes with the green ambitions of the EU and is therefore not the most preferable option. Another option would be to delay the phase-out of nuclear plants in Germany. The last nuclear plants are set to close at the end of 2022, but their lifespan [could be extended](#). Yet the signals from the operators with respect to the feasibility of this plan are mixed as facilities are already in the midst of being wound down. Simply put, there is no simple on and off switch. Moreover, it is far from certain whether there is enough political support for this plan.

The best long-term option is investments in renewable energies, such as solar panels and wind turbines. The problem here is that renewable energies won't be able to fill the supply gap in the short run. Medium-wind turbines for example, take around a year to [build at best](#), but tedious procedures can significantly lengthen the process. It seems that governments are looking for ways to speed up decisions, however. [Germany](#) and the [Netherlands](#) have recently announced their ambitious plans to increase their production of wind energy.

Figure 9: Eurozone gas use per sector, 2020



Source: Eurostat

Improving gas use efficiency by households

Another option would be to reduce the final consumption of gas. Consumption will automatically fall somewhat because of the higher prices for gas, but consumer gas demand is very inelastic. Some efficiency could be gained from insulating and electrifying homes (see [this report](#) for advice from the IEA), but it will take time to renovate buildings. An energy-saving incentive to reduce thermostat by 1 °C will also reduce gas consumption significantly.

Currently, governments are subsidizing gas to prevent consumer purchasing power from plummeting. Whilst this makes sense from a social point of view, it doesn't help to reduce gas demand. Targeted measures at lower-income households may be less distortionary from that point of view, as we argued earlier in [this Dutch piece](#).

Winding down gas-intensive industrial plants

Gas demand in industry can be somewhat more elastic however. At a certain price level some industries are simply no longer profitable and firms [shut down in the short term](#), hoping for better prices further down the road. Additionally, EU governments have emergency plans which could force non-critical and energy intensive industries, such as the chemical and metal industry, to shut down in an emergency scenario (such as [Bescherminstplan Gas](#) by the Dutch government in 2019). In the long run, the economics of operating a natural gas-intensive plant in Europe would become so unfavorable that companies would be forced to close or move operations elsewhere. This industrial wind down would likely take place over a multi-year timeframe.

What role does the European Union play?

The history of the European Union has been defined by crises, but it has managed to fend off all these crises quite well so far. So what role does the European Union play in this energy crisis?

Financing

Some officials within the European Union have floated the idea to issue common debt in order to speed up the energy transition and the decoupling from the Russian economy. In this plan, the European Union would issue debt at a favorable rate, which, in turn, lends it to member states. This could reduce the financing cost for a couple of member states, especially in the periphery, since the yield on European debt is lower than the yield on most national sovereign debt, given the high credit worthiness of the European Union.

This isn't a completely new idea however. The European Resilience and Recovery Fund (RRF) also included funds earmarked for the energy transition. Moreover, a large share of the loan part of the RRF has not been committed yet -as countries have not applied for it given the need to accompany the use of the loans with reforms and the low market borrowing rates at the time . Some people have therefore [suggested](#) that member states should first make full use of the RRF, before designing a new fund. Given the nature of the current crisis, the stipulation that a certain

share of the RRF funds needs to be used for *investment* in the energy transition should not pose a problem.

Strategic autonomy

European leaders have highlighted the more assertive, geopolitically active role that the European Union should play on numerous occasions. The European Union has [drawn up plans](#) to become a world leader in digital and emerging technologies, whilst also reducing reliance on foreign powers for key technologies and products. The current energy crisis is speeding up this transformation enormously. The European Union is aiming to be truly independent of Russian gas in 2027 and if it is able to secure plenty of materials for renewable technologies (such as batteries and solar cells), this would take it a step closer to strategic autonomy.

Conclusion

When Russia halts gas exports, the gas storages cannot be replenished this summer and European gas storages could be depleted next winter. This will likely further push up the price of gas from what are already very elevated levels and/or would sustain high prices for a much longer stretch of time. In turn this would push inflation higher still and risk shortages and forced rationing. The European economy would almost certainly fall into recession. We expect member states and the European Union to take action however, increasing the import of gas from other countries, whilst simultaneously decreasing demand from consumers and industry through a number of (fossil) energy saving investments. Funding those investments should not be a problem. There are still vast sums of money in the RRF, earmarked for the energy transition. So, on a more positive note, the energy crisis could also be viewed as a blessing in disguise, speeding up the energy transition and bringing European strategic autonomy one step closer.

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A summary of the methodology can be found on our [website](#)

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