THE UKRAINE WAR WILL NOT DERAIL EUROPE'S ENERGY TRANSITION

As Europe struggles to build energy security in response to Russia's invasion of Ukraine, uncertainty looms on many fronts. By turning its back on Russian oil and gas, will Europe speed or slow down its response to the more global crisis – climate change?

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That is a complicated question, and hinges on the extent and duration of the war. But, as things stand, our conclusion is that improved energy security does not come at the cost of decarbonization and there is likely to be a small acceleration in Europe's energy transition.

This feature outlines DNV's provisional view on how the ongoing war is likely to impact Europe's energy transition in the short, medium, and long term. Our emphasis here is on the consequences of the unfolding developments and not on making policy recommendations. The present commentary is confined to the implications of current developments in Europe. Elsewhere, in our Pathway to Net Zero Emissions (DNV, 2021), DNV sets out what we believe to be a feasible way for the world to achieve the Paris ambitions. The results from DNV's energy transition model underpin the conclusions we present here, but we underline the uncertainty in the quantification. We also acknowledge that the small acceleration of progress towards the Paris Agreement in a geographically limited part of the world, comes at the cost of a profound humanitarian crisis.

Energy security

Roughly one third of European gas demand is used for buildings heating and cooking, and another third for electricity production. Almost twenty percent is used by the manufacturing industry, and the reminder in petrochemical industry and by the gas industry itself during production.

European policymakers are determined to slash the EU's Russian gas dependence by two-thirds this year. The replacement will be painful and costly, with increased import of LNG taking centre stage. However, there is currently insufficient regasification capacity in Europe, and production in places linked to the European gas pipeline networks in Norway, Algeria and Azerbaijan can only inch their output upwards. Replacing two thirds of Russian gas by year-end looks like a tall order, and the European energy security ambition therefore hinges on additional policies, such as those outlined by the IEA in its 10-point plan (IEA, 2022). Beyond nudging consumer behaviour towards lower energy use, there is scope for a concerted policy push for energy efficiency, a postponement of nuclear retirements, and an extensive renewable energy buildout. Europe is working hard to remove regulatory barriers, ensuring that scaling can happen early to improve energy security, and to help reaching the longer term net zero goal.

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There is certainly opportunity for acceleration on these fronts: Belgian nuclear, French heat pumps, German solar and pan-European wind will all contribute to a lower dependence on imported Russian energy. Some of these options can make a difference this year; others will need multiple years to take meaningful effect. Behavioural changes in travel and domestic heating, both due to governmental push and due consumer awareness, can have effect immediately. So far the impact is believed to be modest, but there is a potential upside we will watch carefully.

While non-fossil supply and energy efficiency can and will be accelerated, there are counterforces at work with respect to the energy transition. These include burning more coal to replace natural gas and increasing costs of EV batteries and PV panels due to higher commodity prices. To this extent, the push for energy security works against the transition. Other effects of the war that are not linked to energy security like reduced global trade and cooperation, such as the realignment of global logistics to address a mounting food crisis, and a shortfall of critical minerals, could also slow down the energy transition.

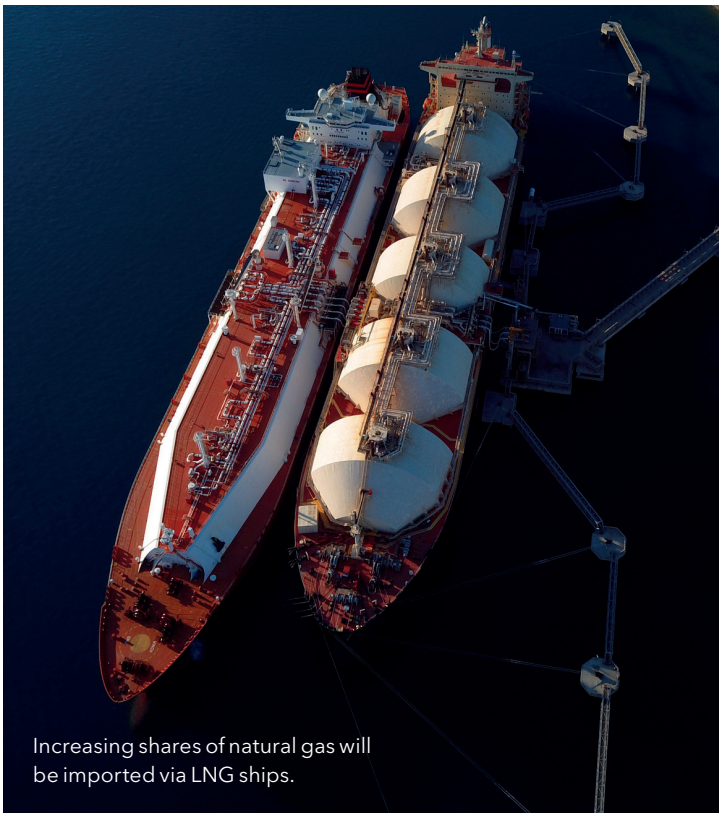
Modelling the transition

DNV's system dynamics energy transition model provides insight on how economics, technologies, sectors, geographies, and policies influence each other. The next edition of our annual *Energy Transition Outlook* is due in October, but we have run the model now to assess how the changes we have seen since 24th February this year are likely to influence the energy transition in Europe.

The largest uncertainties have to do with the war itself – its duration and possible escalation, and whether strengthened countermeasures bring the export of Russian oil and gas to Europe to complete stop. While it is likely that Europe's commitment to its Fit for 55 climate plan will endure, public reaction to energy affordability may challenge its momentum in the short term. There are many other imponderables, like whether the war will give rise to a new cold war, or end in a calmer détente. With all these uncertainties in mind, we have chosen to model a scenario where the European energy system discontinues the importation of Russian gas, with zero Russian gas imported from 2025 onwards.

Higher energy prices

Russia produces about 17% of global natural gas and import from Russia met 33% of Europe's overall natural gas consumption in 2020. When we let our model choke Russian gas supply to Europe by 80% in 2023 and 100% in 2025, and factor in the higher gas prices that result, we see a spillover to other areas, like electricity prices. For example, for 2024, the electricity price is 12% higher than a model run with no change in Russian energy import. Globally, the war leads to 3% lower energy demand within two years, compared with our pre-war model run, mainly because of lower GDP.



Increasing shares of natural gas will be imported via LNG ships.

Alternatives to gas

To account for a gradual independence of Russian gas in the coming few years, we let the model reduce Russian gas export to Europe by 40% as an average figure for 2022, 80% in 2023, 90% in 2024 and 100% from 2025 onwards.

As illustrated in Figure 1, we find that within 2 years, in 2024, Europe, including Norway and UK, manage to increase domestic production with 420 PJ, while the import, mainly LNG from Middle East and US, increase with 4100 PJ. That leaves a gas deficit or reduced consumption of 1740 PJ. Most of that will be replaced by other energy sources, but there will also be some net reduction – meaning overall decline in energy use – due to GDP decline, higher energy prices and increased energy efficiency.

Ease and means of gas replacement depend on which sector it is used. Growth and greening of electricity, and hence the decarbonization of end uses in the transport, building and manufacturing sectors, is the most important means to decarbonize European energy use. Renewables and nuclear have low operating costs and are at the top of a cost merit order in our analysis, producing whatever quantities available. These quantities are not sufficient in the short term to cope with the entire shortfall in gas – that is when gas needs to be replaced by coal, which also has higher costs as a result of the war. The switch to coal is temporary. Being the fuel of the last resort, we find that, by 2024 only 6% of the reduction in natural gas supply will be taken up by coal.

The postponement of nuclear retirements and higher utilization of existing nuclear assets together produce an important short-term effect and these developments are likely to happen in several countries, but notably not Germany. Nuclear production makes up for one-third of the shortfall in natural gas supply in 2024.

Unlike most other energy sources, bioenergy costs have not grown due to the war, and it is possible to slightly grow bioenergy – mainly from sewage and waste – over the coming few years. We find that bioenergy makes up for 20 % of the shortfall in natural gas supply in 2024.

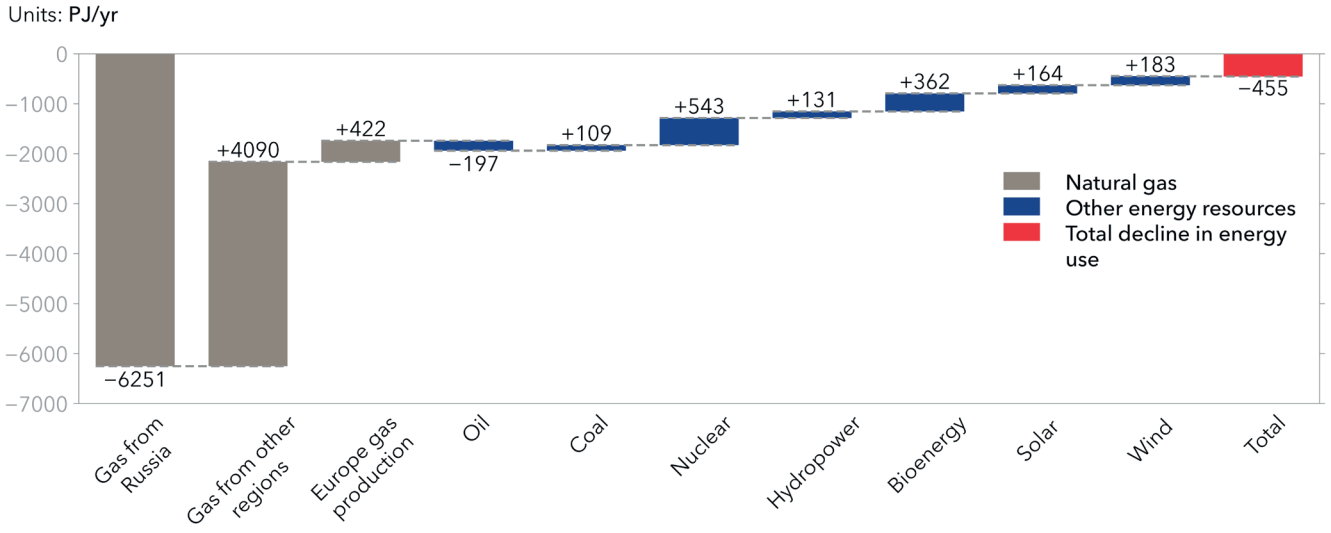
By contrast, the main energy independence measure advanced by European politicians – a bigger and faster renewable energy buildout – has a much slower initial effect. It will take two years, for example, for this faster buildout to make up 10% of the shortfall resulting from an absence of Russian gas. However, while there may be a small impact in 2023, it becomes more meaningful with each passing year. Over a five-year period, we see the renewable buildout matching the 20% increase the EU aims for, and by 2030, solar PV and wind will make up for more than half of the shortfall in natural gas supply.

Nothing has lower costs and footprint than the energy not used, and Europe is putting more effort into energy efficiency to ensure energy independence

Higher commodity prices will inflate battery costs. EV uptake will suffer, such that the timing of the milestone where 50% of new car sales in Europe occurs is delayed by almost one year – 2028 rather than 2027. This has further implications for long-term decarbonization and delays the decline in oil somewhat. Countries with ambitious 2030 decarbonization targets will need to review and possibly strengthen incentives for EV uptake.

FIGURE 1

Impact of the Ukraine war on European primary energy mix in 2024, compared with a pre-war model run



If we look at percentage changes, overall gas use is down 1700 PJ or 9% in 2024 compared with our pre-war model run. The biggest percentage increase is in solar, which is up 9%. The overall effect on the energy mix is limited, bearing in mind Europe's overall primary energy demand is 70 EJ or 70,000 PJ. As a result of the decline in gas, the decarbonization of the energy mix increases to 34% non-fossil energy sources in 2024, 2% higher than our pre-war model run. This small acceleration endures, such that by 2030, the overall change in the share of non-fossil energy sources in the energy mix continues to be 2% higher than the pre-war prediction.

Nothing has lower costs and footprint than the energy not used, and Europe is putting more effort into energy efficiency to ensure energy independence. The standout action here is support for heat pumps, and, as a result, we expect the overall energy demand in the building sector to decline a further 4% towards 2030, with efficient electricity use for heat pumps replacing some of the gas. Overall energy efficiency improvement is a key lever for limiting energy consumption, and due to this, European primary energy consumption peaked already 15 years ago, while globally we expect primary energy demand to peak around 2030.

(Green) hydrogen push

Hydrogen is an(other) important pillar in securing both Europe's energy independence and the sustainability of its energy mix. But its main challenge is affordability.

There are signals from Germany that the energy crisis is reducing the opposition towards blue hydrogen (Recharge, 2022). However, when Europe is in dire need of gas to replace the phase-out of Russian gas, it is unlikely that significant amounts of surplus natural gas will be available for producing blue hydrogen. Furthermore, gas prices are high, and that makes blue hydrogen, with its additional carbon sequestration and storage costs, less competitive. Even if blue hydrogen remains cheaper than green hydrogen (produced from renewables by electrolysis) for the next few years, we find blue hydrogen uptake low in Europe towards 2030 and decreasing rather than increasing as a consequence of the war.

Europe has limited capacity for producing sufficient renewable electricity to simultaneously phase out fossil fuels from the power mix and produce meaningful amounts of green hydrogen. Nevertheless, policymakers continue to prioritize both objectives. Consequently, we anticipate higher support for green hydrogen as part of the new push for renewables and have factored a 12% lower hydrogen price into our model, compared with our base case for 2030. In spite of increased support, green hydrogen use in Europe will remain modest by 2030, albeit 25% higher compared with our pre-war model output.

As things currently stand, we forecast a small acceleration of the energy transition in Europe as the most likely energy-related outcome of the Ukraine war.

Gas demand shifts

Russia will be looking to the East to replace its energy export revenue, but export capacity to China and neighbours is currently limited and new transmission pipelines and LNG export terminals take a long time to build. Hence, we find that gas production in North East Eurasia, which includes Russia, Ukraine and other former Soviet Union countries, will decline by 24% in 2024, as there is not sufficient infrastructure to export the gas.

By 2030, solar PV and wind will make up for more than half of the shortfall in natural gas supply.

In contrast, we estimate that Europe itself will produce 12% *more* gas between now and 2030, reflecting the industry's reaction to higher oil and gas prices in the short term and responses to the pledge from EU to deliver more gas. High oil and gas prices will stimulate new developments globally, but in the wake of this initial rush to new production, over the next decade global demand will likely reduce rather than increase, as GDP growth and globalization reduce, and both oil and gas production and transport hence inch a little lower. Thus, we anticipate that over-investments will result in lower oil and gas prices in the second half of this decade and our model suggests that this will lead to a small *increase* in global oil use later in the 2030s relative to our pre-war forecast.

A small acceleration of decarbonization and emission reduction

The ultimate metric for decarbonization is reduction in GHG emissions, and the net effect of the invasion in Ukraine will be a small acceleration of decarbonization and emissions reduction towards 2030. The main reasons for the difference are postponed nuclear retirements in the short term and, in the medium term, a faster renewables buildout, and increased energy efficiency and lower economic growth. The overall effect is, however, limited, amounting to a 580Mt or 2.3% reduction in emissions in Europe in the period 2022-2030, compared with a case without a Ukraine war. In Figure 2, we show that the total emissions change is almost entirely due to reduced gas consumption; the changes in the other energy sources and in Carbon Capture and Storage (CCS) are minor in comparison.

We emphasize that there are significant uncertainties in our forecast. These relate primarily to the duration and outcome of the war itself, and the strength and duration of the policy measures enforced by the European nations to improve energy security and sustainability.

However, as things currently stand, we forecast a small acceleration of the energy transition in Europe as the most likely energy-related outcome of the Ukraine war. As with COVID-19, we see a Europe that manages to cope with a short-term crisis without harming its ability to deal with the long-term climate crisis.

At a *global* level, the net effect of the war on the energy transition is minor. The DNV system dynamics model captures some of the emerging global complexities, including changes in energy trade and the effect of increased commodity prices. It also takes account of how regionalization and energy security boost more short-term coal use in e.g. China, and how the renewables buildout is slowed down by higher commodity higher prices and at the same time accelerated by the push for energy independence. We will comment on these developments more fully in our forthcoming Energy Transition Outlook 2022 towards the end of this year.

References:

DNV, 2021 *Pathway to net zero emissions*, Energy Transition Outlook, 2021, www.dnv.com/eto

IEA, 2022 *A 10 point plan to reduce the European Unions Reliance on Russian Gas*, https://www.iea.org/reports/a-10-point-plan-to-reduce-the-european-unions-reliance-on-russian-natural-gas

Recharge, 2022 *Germany and Norway mull pipeline for massive hydrogen imports in wake of Russian war*, https://www.rechargenews.com/energy-transition/germany-and-norway-mull-pipeline-for-massive-hydrogen-imports-in-wake-of-russian-war/2-1-1186196

FIGURE 2

Impact of the Ukraine war on European energy-related CO_2 emissions, compared with a pre-war model run