

The Shift of European and Global Energy Flows

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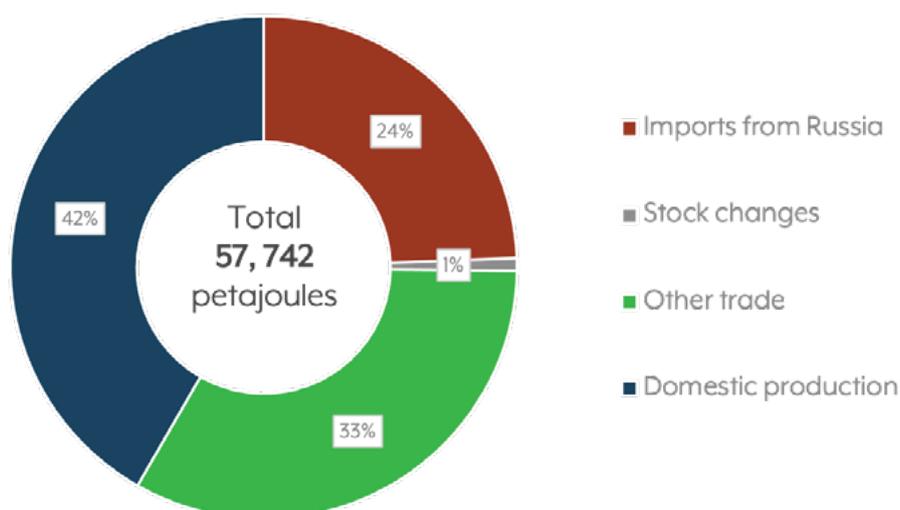
Russia's invasion of Ukraine in February of 2022 shocked the world. Its political, military and economic reverberations are already being felt globally and will be lasting. What is only beginning to dawn on markets is how profound this conflict will change energy flows inside and outside of Europe.

1 Introduction

Russia's invasion of Ukraine in February of 2022 shocked the world. Its political, military and economic reverberations are already being felt globally and will be lasting.

What is only beginning to dawn on markets is how profound this conflict will change energy flows within and into Europe. As of 2020 the EU depends on Russia for 24.4% of all its energy needs. Although the main origins of EU energy imports have shifted over the past decades, Russia has held its position as the main energy importer to the EU for all primary energy commodities – natural gas, crude oil, and hard coal^[1].

Gross Available Energy in the EU and it's Sources (% , 2020)

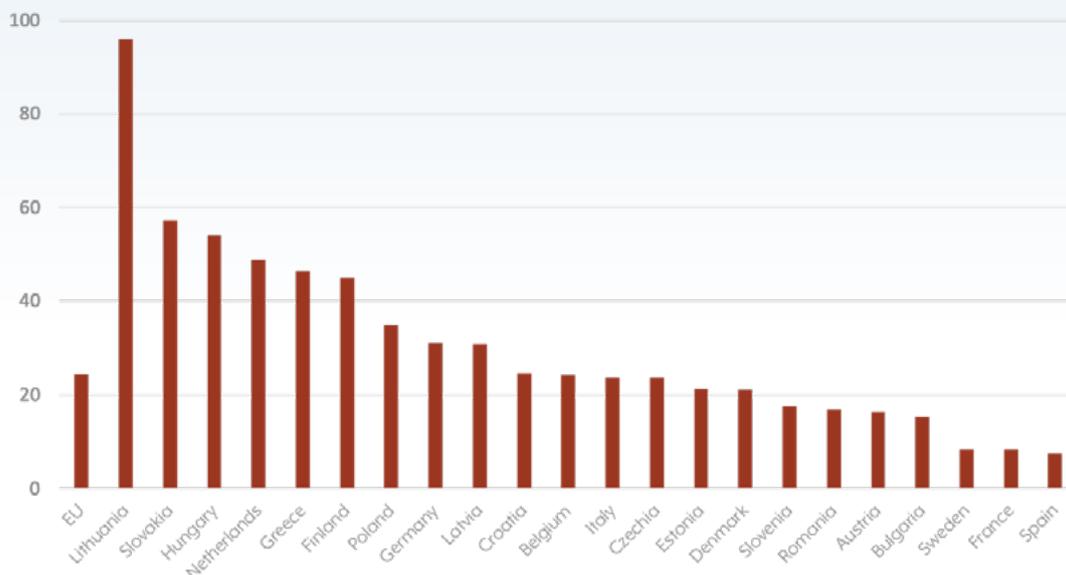


Source: Eurostat, KBR Analysis

[1] EU energy mix and import dependency - Statistics Explained (europa.eu)

The energy mix and dependence on Russian energy imports vary drastically within Europe. Lithuania, Slovakia, and Hungary have the highest shares of energy needs in the EU supplied by Russia, 96.1%, 57.3% and 54.2%, respectively^[2].

Imports from Russia in Gross Available Energy (% , 2020)^[3]



Source: Eurostat, KBR Analysis

2 Energy Mix

2a - Natural Gas

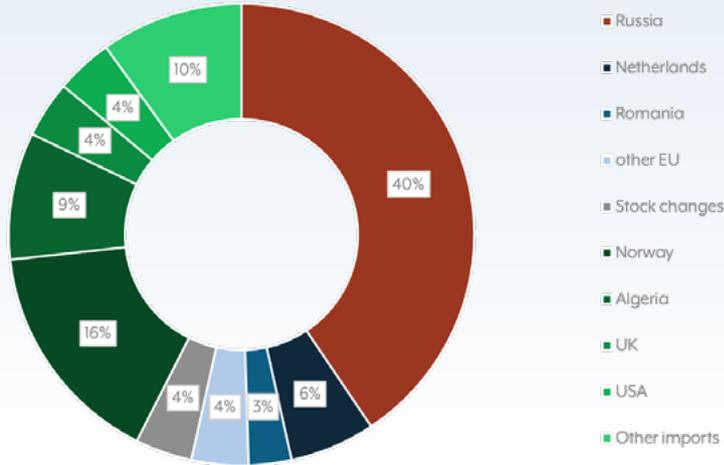
Natural gas accounted for 23.7% of the EU's gross available energy with imports totalling 400.6 billion cubic meters. The reliance of Russian natural gas has steadily increased over the last decade, reaching 41.1% of EU natural gas being imported from Russia. This makes natural gas the fuel with the highest exposure to Russian imports in the EU energy mix.

Additionally, EU production of natural gas has decreased over the past decade causing an increased reliance of imports to satisfy increasing demand. Other important providers are Norway, Algeria, Qatar, the USA, the UK, Nigeria, Trinidad and Tobago, and Libya.

[2] EU energy mix and import dependency - Statistics Explained (europa.eu)

[3] Malta, Portugal, Luxembourg, Ireland, Cyprus all have imports from Russia of less than 5%

Natural Gas: EU Production, Trade and Imports (% , 2020)



Source: Eurostat, KBR Analysis

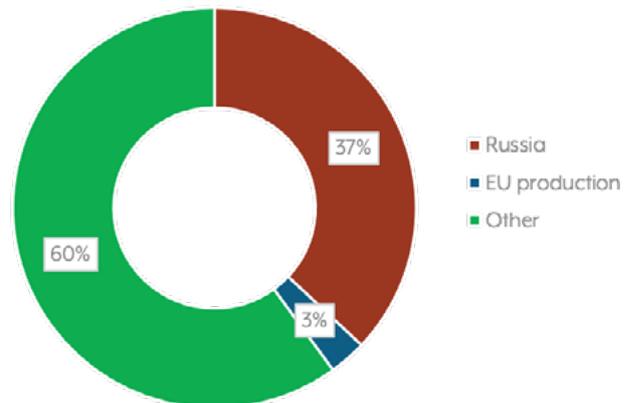
2b - Oil

Although the EU's total consumption of crude oil and petroleum products has decreased since its peak two decades ago, they still hold the largest share of the EU energy mix: 34.5%. Production of these products within the EU has reached one of its lowest points ever, increasing import dependence to 96.2%.

Russia's global footprint for oil production is significant, only falling behind the USA and Saudi Arabia. Due to their massive production capacity, relatively low domestic demand, and proximity to the EU, Russia was the world's largest exporter of oil products in 2020. Out of the EU's 19,919 petajoules of oil demand in 2020, imports from Russia totalled 7,263 petajoules – a 36.5% dependency of Russian imports. The dependency on Russian oil has been fluctuating over the past 5 years but has ultimately decreased 5.8 percentage points from 42.3% in 2015 to 2020's 36.5%. Despite less dependency on Russian oil, it is still the fuel family with the second largest exposure to Russian imports.

Oil: EU Production, Trade and Imports (% , 2020)

- UK
- Iraq
- Saudi
- Norway
- Nigeria
- Kazakhstan
- USA
- Other imports

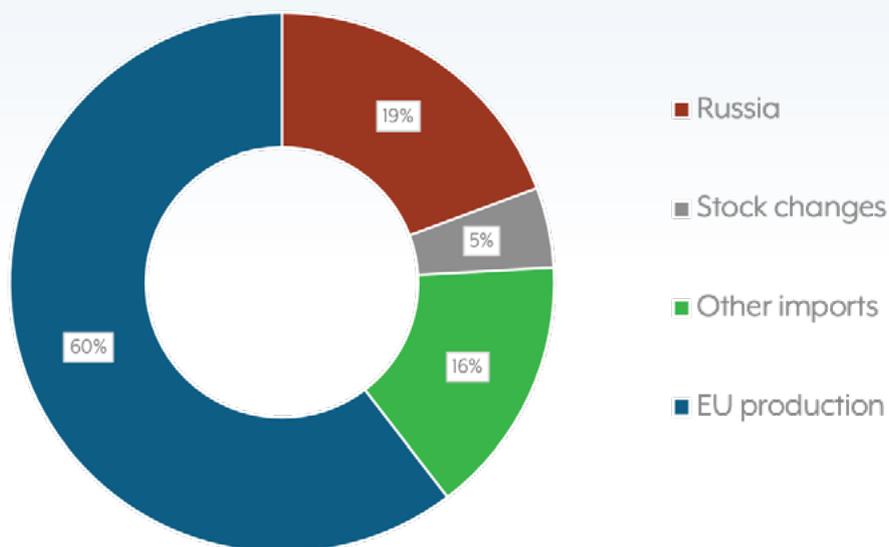


Source: Eurostat, KBR Analysis

2c - Coal

EU solid fossil fuel demand has been decreasing over the past 30 years but still accounts for 10.5% of the 2020 EU energy mix. Compared to oil and natural gas, domestic production is relatively high, creating less dependence on imports. Owing to this, Russian import accounted for 19.3% of EU consumption.

Coal: EU Production, Trade and Imports (% , 2020)



Source: Eurostat, KBR Analysis

3 The Energy Shift

EU countries paid €99 billion (\$105 billion) for Russian energy imports last year, according to the European Commission – two-thirds of the total value of goods the bloc imported from Russia^[4].

By mid-2022 this trend has taken a sharp turn already, with a statement from the EU claiming it will block all Russian oil imports by sea by the end of 2022. Poland and Germany have also said they will end pipeline imports, though not all member states have agreed to this position. Hungary and Slovakia are dependent on receiving oil from Russia through pipelines.

[4] Russian energy: Can the EU reduce its reliance on Moscow? | World Economic Forum (weforum.org)

Main Oil Pipelines Between Russia and Europe



The Most Important Gas Pipelines in Europe



Source: S&P Global Platts

The EU is also planning for longer-term energy independence. Just weeks after Russian forces invaded Ukraine in late February, Brussels announced the REPowerEU plan to end all Russian energy imports by 2030.

“In 2021, the EU imported around 155 billion cubic meters (bcm) of natural gas from Russia. The bloc’s proposed gas replacements by the end of 2022 – which include LNG (liquefied natural gas) diversification, renewables, heating efficiency, pipeline diversification, biomethane, solar rooftops and heat pumps – amount to around 102 bcm annually, according to data from the EU Commission’s REPowerEU, aggregated in a recent report from economic consultancy TS Lombard^[5]. This leaves 53 billion cubic meters of natural gas still to be imported from Russia by the end of 2022 – 14.1% of the EU consumption based on 2020 figures.

3a - Energy Transition

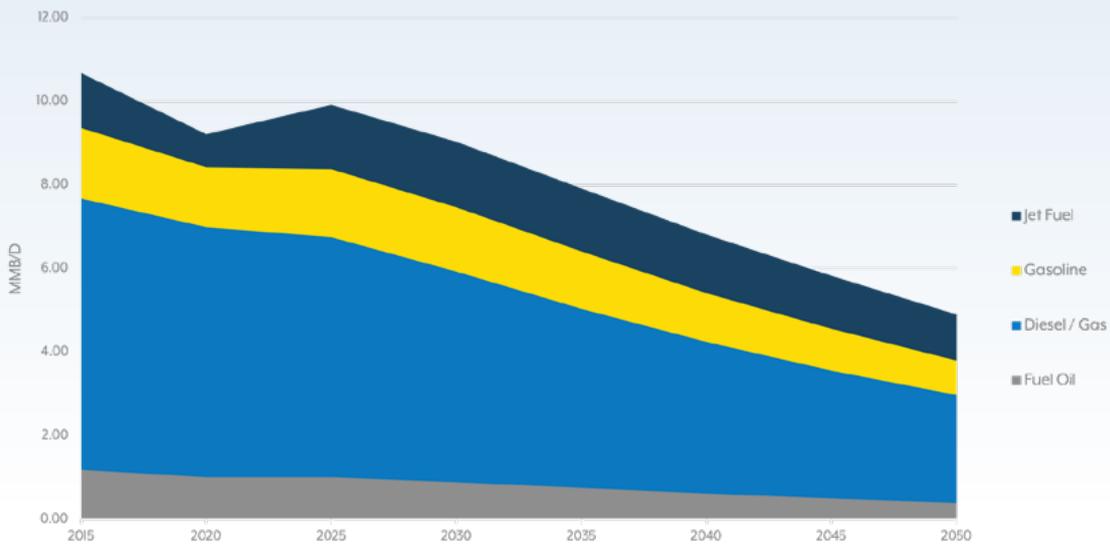
How will this dramatic and compressed change in energy balances impact the transition of hydrocarbon-based fuels to renewable energy?

The EU had already laid out aggressive renewable fuel targets on the back of the Renewable Energy Directives (RED) of 2009 and 2016. In 2021, the EU endorsed a binding target for a net domestic reduction of at least 55% in greenhouse gas emissions by 2030 compared to 1990.

Based on these EU and additional national policies the energy demand outlook for hydrocarbon fuels at the end of 2021 looked muted.

[5] Europe’s plans to replace Russian gas are deemed ‘wildly optimistic’ – and could hammer its economy (cnbc.com)

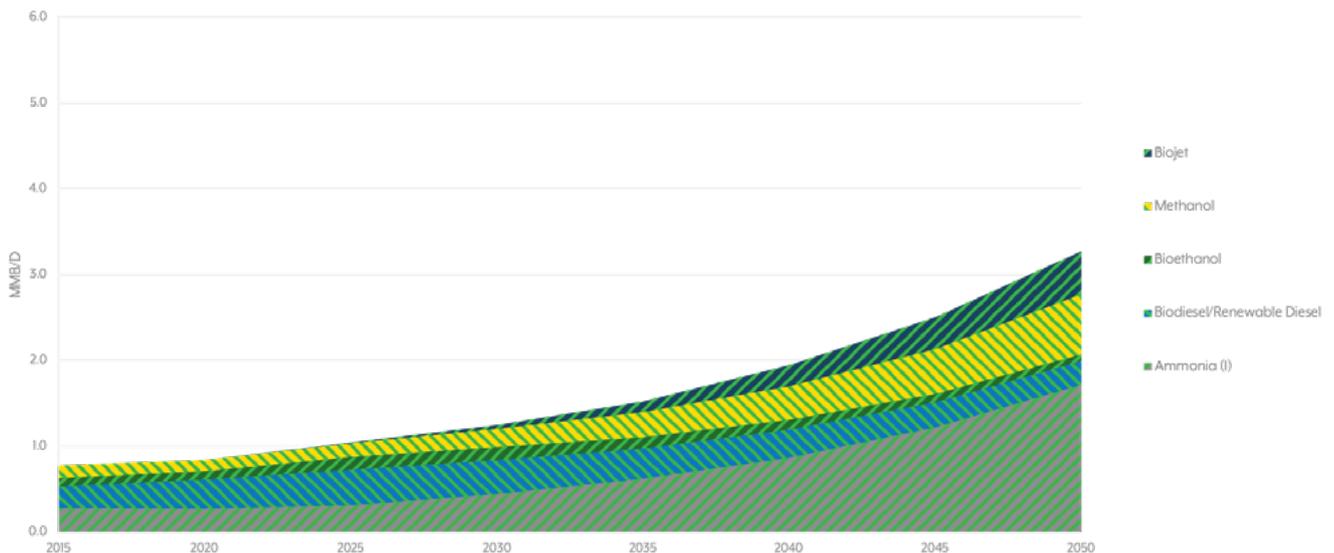
EU Hydrocarbon Fuel Demand (2021)^[6]



Source: KBR Analysis, IHS

Much of the traditional energy demand drop-off was captured in renewable fuels demand increases.

EU Renewable Fuel Demand (2021)^[7]



Source: KBR Analysis, IHS

3b - EU Response

Bring in the Ukraine war and the EU's response to energy imports from Russia, not only did the RePowerEU energy plan set reduced targets for Russian oil and gas imports in an effort to wean the EU off Russian energy, but it also accelerated renewable targets.

[6] IHS Markit

[7] IHS Markit and KBR analysis

Renewable Targets per RePowerEU Energy Plan^[8]

Theme	Target
Saving Energy	Increase from 9% to 13% of the binding Energy Efficiency Target under the 'Fit for 55' package of European Green Deal legislation
	'EU Save Energy Communication' detailing short-term behavioural changes which could cut gas and oil demand by 5%
Accelerating the Roll-out of Renewables	Increase the headline 2030 target for renewables from 40% to 45% under the 'Fit for 55' package
	A dedicated EU Solar Strategy to double solar photovoltaic capacity by 2025 and install 600GW by 2030
	Doubling the rate of deployment of heat pumps, and measures to integrate geothermal and solar thermal energy in district heating systems
	10 million tonnes of domestic renewable hydrogen production and 10 million tonnes of imports by 2030, to replace natural gas, coal and oil in hard-to-decarbonise industries and transport sectors
	A Biomethane Action Plan sets out tools including a new biomethane industrial partnership and financial incentives to increase production to 35bcm by 2030
Reducing fossil fuel consumption in industry and transport	Energy savings, efficiency, fuel substitution, electrification, and an enhanced uptake of renewable hydrogen, biogas and biomethane by industry could save up to 35 bcm of natural gas by 2030 on top of the Fit for 55 proposals

By laying out more aggressive renewable targets the RePowerEU implementation plan specified the levers by which these targets will be achieved:

- The EU Energy Platform will enable voluntary common purchases of gas, LNG and hydrogen by pooling demand, optimising infrastructure use and coordinating outreach to suppliers
- The Commission will consider the development of a 'joint purchasing mechanism' which will negotiate and contract gas purchases on behalf of participating Member States
- The Commission will also consider legislative measures to require diversification of gas supply by Member States. The Platform will also enable joint purchasing of renewable hydrogen
- A Solar Rooftop Initiative with a phased-in legal obligation to install solar panels on new public and commercial buildings and new residential buildings
- Tackling slow and complex permitting for major renewable projects, and an amendment to the Renewable Energy Directive to recognize renewable energy as an overriding public interest
- Two Delegated Acts on the definition and production of renewable hydrogen to ensure that production leads to net decarbonisation
- Additional funding of €200 million is set aside for research to accelerate hydrogen projects, and to complete the assessment of the first Projects of Common European Interest by the summer
- Carbon contracts to support the uptake of green hydrogen by industry and specific financing for REPowerEU under the Innovation Fund, using emission trading revenues
- Guidance on renewable energy and power purchase agreements and providing a technical advisory facility with the European Investment Bank
- A Greening of Freight Package, aiming to significantly increase energy efficiency in the transport sector, and an initiative to increase the share of zero emission vehicles in public and corporate car fleets above a certain size

[8] REPowerEU (europa.eu)

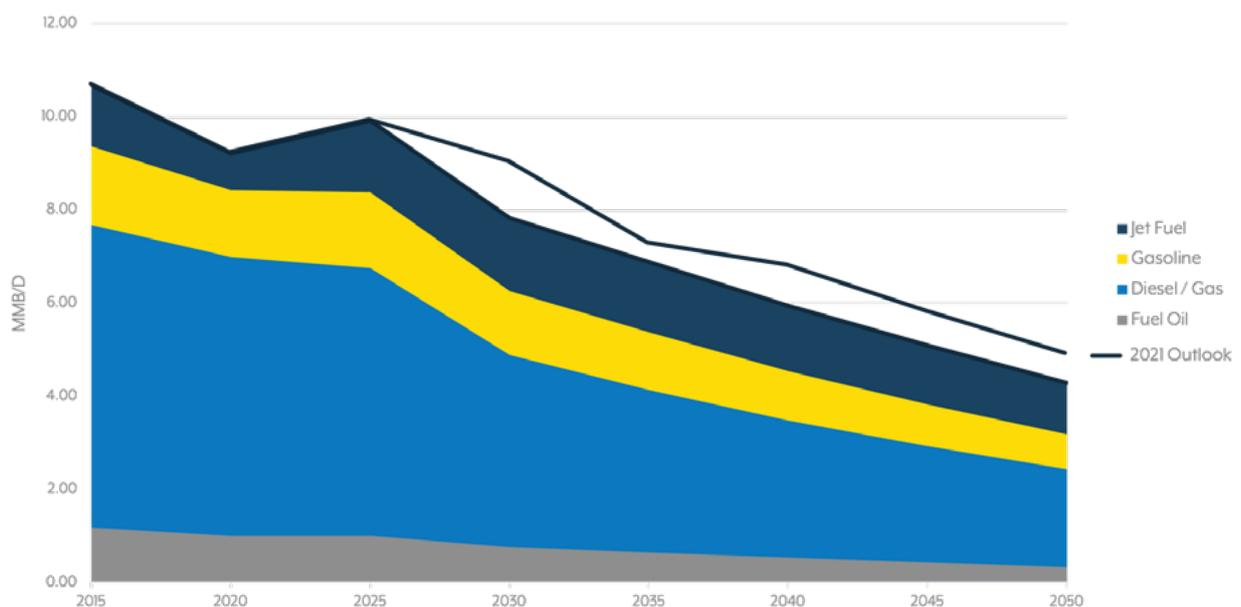
Specific spending and actions underpin the efforts to achieve Renewable targets per RePowerEU implementation plan:

- Delivering the REPowerEU objectives requires an additional investment of €210 billion by 2027
- €225 billion is already available in loans under the Recovery and Resilience Facility (RRF)
- Cutting Russian fossil fuel imports can also save the EU almost €100 billion per year. These investments must be met by the private and public sector, and at the national and EU level
- The Commission proposes to increase the RRF financial envelope with €20 billion in grants from the sale of EU Emission Trading System allowances currently held in the Market Stability Reserve
- An additional €26.9 billion from cohesion funds made available in voluntary transfers to the RRF
- A further €7.5 billion from the Common Agricultural Policy is also made available
- Double the funding for the 2022 Large Scale Call of the Innovation Fund to €3 billion
- Additional gas infrastructure of around €10 billion of investment is needed to complement existing Projects of Common Interest (PCI) List and compensate for Russian gas imports
- Accelerating electricity PCIs will be essential to adapt the power grid to our future needs. A new call for proposals with a budget of €800 million, with another one to follow in early 2023

3c - Changes in Energy Flow

In summary, the EU plan accelerates the production of renewable fuels and compresses the decline of hydrocarbon fuel demand as shown in the new demand outlook based on the RePowerEU energy plan.

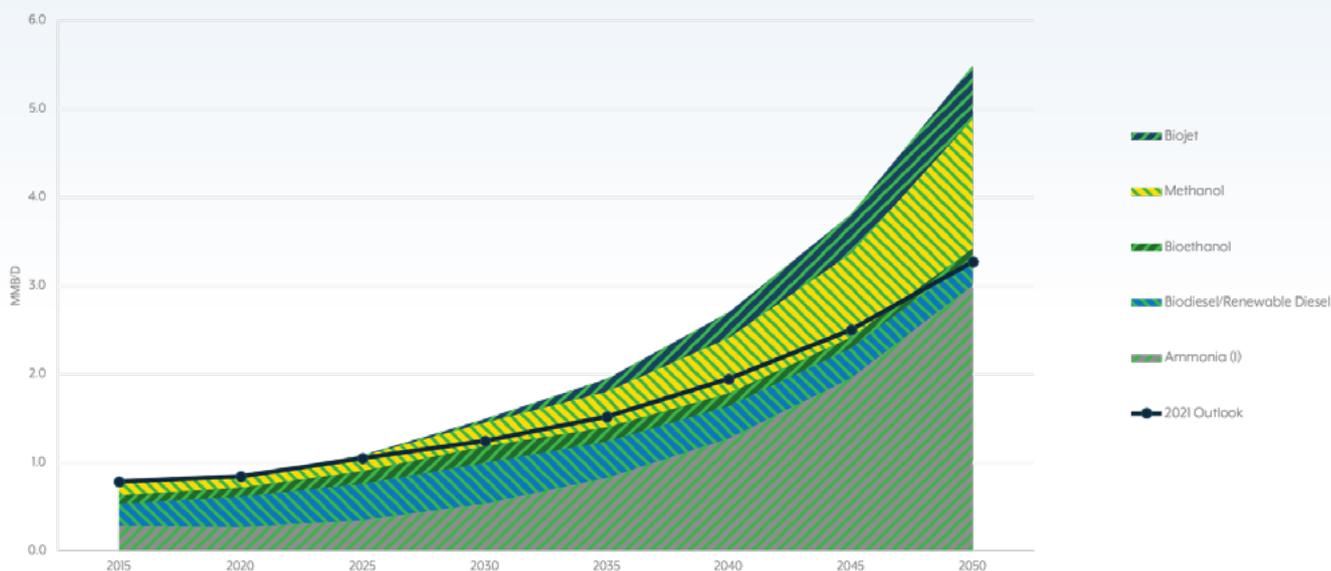
EU Hydrocarbon Fuel Demand (2022)



Source: KBR Analysis

Based on the EU plan and its targets, KBR expects a material decline in demand for hydrocarbon fuels starting within the next 12 months and accelerating through 2030. In contrast, we expect an even more material increase in the demand for renewable fuels which will accelerate through the next 2 decades.

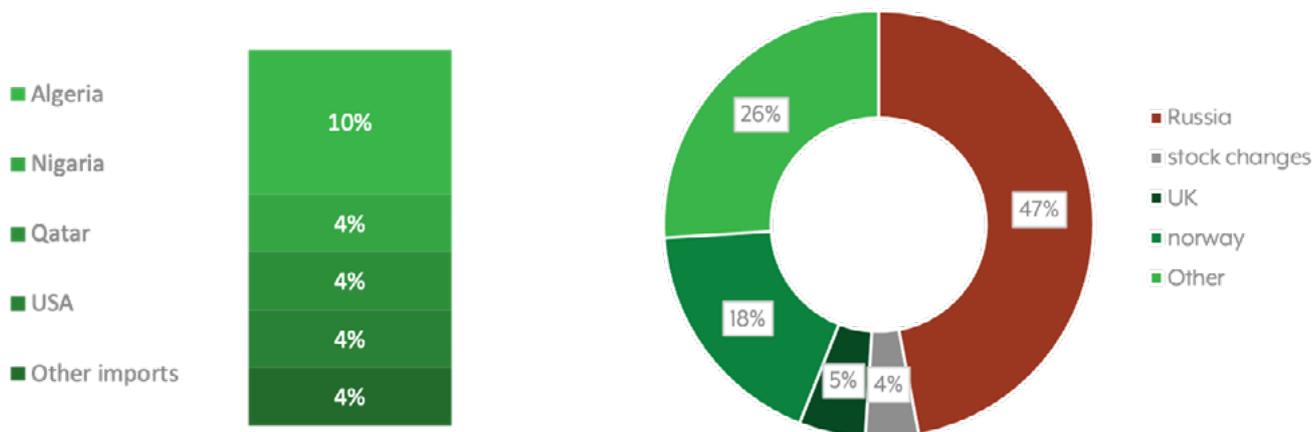
EU Renewable Fuel Demand (2022)



Source: KBR Analysis

Some of the decline in traditional hydrocarbon fuels, in particular transportation fuels, will be absorbed by electricity and hydrogen production, which is not shown here. The fuel-mix for electricity production will also change significantly with Russian coal and natural gas dropping out of the mix. Natural gas in particular, which is also used for heating and industrial applications, will see a dramatic shift to new import sources, relying less on pipeline gas and more on LNG.

EU Natural Gas Trade in Petajoules (2020)



Source: Eurostat, KBR Analysis

- Several deals have already been announced to underline these changes, while many more are in the works. Here are a few recent highlights.
- Norway: ‘Norway to increase gas supply to EU as Russia deepens cuts’ with a deal to bring in around 100TWh to the European market in 2022^[9].
- UK: Gas production has increased 5% since 2021, while LNG imports have increased by nearly 50% as regasification infrastructure was used to feed the European gas supply^[10]. Additionally, the two gas interconnector pipes that connect the UK with mainland Europe have been exporting 75 million cubic meters per day, reaching maximum capacity^[11].
- Algeria: ‘How Algeria is emerging as Europe’s energy partner of choice’ due to an increasing natural gas production capacity reaching 81 billion cubic meters in 2020 and 100 bcm in 2021. Italy have already announced that gas supplies from Algeria will increase by 9 bcm^[12]
- USA: ‘U.S., EU strike LNG deal as Europe seeks to cut Russian gas’ with aims to supply 15 bcm of LNG this year^[13]. The US are already on track to blow past this commitment and are looking to double their pledge^[14].
- Qatar: The country’s largest state-owned petroleum company struck a deal for a major expansion of its North Field reserve, allowing LNG production capacity to increase from 77 million tons a year to 110 million tons^[15].
- Nigeria: ‘EU looks to replace gas from Russia with Nigerian supplies’ - The EU imports 14% of its total LNG supplies from Nigeria which could be doubled to around 46 bcm^[16].
- LNG terminals:
 - Germany to build two facilities located in Brunsbuttel and Wilhelmshaven as well as a 12 bcm regasification project (Stade LNG)^[17].
 - The new Greek Alexandroupolis LNG terminal will be operational in 2023. The ARGOD FSRU project in Volos is going forward with vessel capacity of 150,000-180,000 cbm^[18].
 - Italy announced it has the capacity to construct two LNG terminals.
 - Estonia to build an LNG plant in Paldiski^[19].
 - New Hamina LNG terminal opened in Finland in March 2022 with a 30,000 cbm storage capacity, utilising vessel up to 25,000 cbm^[20].
 - The Netherlands is looking to instal FSRU in their ports, particularly at Eemshaven Port. They are also planning to expand Gate operations by 5-8 bcm^[21].
 - Slovenia has long term plans for an LNG facility at Koper after talks with QatarEnergy for LNG supply^[22].
 - Poland to open an FSRU near Gdansk with capacity of 6 billion cubic meters a year^[23].
 - French government in talks to build a floating LNG terminal in Le Havre^[24].
- Pipeline expansions: 16 gas pipelines are under construction, amounting to 3,200 kilometres. The Baltic Pipe Project is set to increase gas import capacity into the EU by 10 bcm a year from 2023. There are also 62 proposed gas pipeline projects in the pre-construction phase which would stretch 12,500km in total. Included in this is an expansion of the Trans Adriatic Pipeline that would increase gas import capacity into the EU by 69.5 bcm per annum^[25].

[9] Joint EU-Norway statement (europa.eu)

[10] Energy Trends June 2022 (publishing.service.gov.uk)

[11] UK may cease gas supply to Europe if shortage intensifies (offshore-technology.com)

[12] How Algeria is emerging as Europe's energy partner of choice (alaraby.co.uk)

[13] U.S., EU strike LNG deal as Europe seeks to cut Russian gas | Reuters

[14] Analysis: U.S. LNG exports to Europe on track to surpass Biden promise | Reuters

[15] Qatar rises to meet natural gas demand as Europe grows desperate | Fortune

[16] EU looks to replace gas from Russia with Nigerian supplies | Reuters

[17] Time for LNG in Europe? | WSP

[18 - 22] Ibid

[23] Poland could build second unit to receive LNG amid Czech, Slovak interest | Reuters

[24] France wants to build floating LNG terminal at Le Havre – Les Echos | Reuters

[25] Europe Gas Tracker Report 2022 - Global Energy Monitor

4 Conclusion

A significant shift of energy flows lies ahead for the EU as a result of weaning itself off Russian energy imports. This will not only impact inner-European flows but also European imports from around the world. This will have a ripple effect on global energy flows and trade. As we have shown in our analysis, this will particularly impact liquid fuels and natural gas/ LNG flows.

To accommodate these changes, new terminals, pipelines, storage facilities and other transportation nodes will need to be built or upgraded as the initial examples of LNG and pipeline expansions show. The layout of the EU energy infrastructure landscape will change significantly in the coming years creating many new investment and growth opportunities.

We are currently working with several clients assessing how these changes are impacting their energy infrastructure portfolios. Some of the questions we are helping to address are likely to be on your team's minds as well, such as:

- How are these changes effecting your current energy infrastructure assets? Which of your current assets are more or less exposed to these changes?
- How might these changes impact your future energy infrastructure strategies and decisions?
- How does your exposure change by region or country?
- How are these changes impacting your assets' values both now and in the near, medium, and long term?
- What can be done to enhance their values and future-proof these assets?
- Are there alternative uses for these infrastructure assets that will help to address the changing energy landscape of the future?

If you are facing infrastructure questions like these and any others, please do not hesitate to contact us immediately. Our team of experts will be thrilled to work with your team to find answers and plan your energy transition strategies.

5 About the Authors

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Daniel has 30 years of experience in energy strategy and M&A. He has hands-on expertise through the full cycle of M&A, divestitures, integrations and carve-outs with deal sizes ranging to over \$100B. He is a global professional with work experience across 5 continents in five languages.

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