US Policy Options to Reduce Russian Energy Dependence

Russia's invasion of Ukraine has brought into stark relief the national security consequences of European reliance on Russian natural gas and global reliance on Russian oil. Russia accounts for more than a third of all natural gas consumed in Europe and is the second-largest oil exporter in the world, which is constraining US, European, and other allies' responses to Russian aggression in Ukraine. This note outlines specific policy options available to the US government to reduce EU and global dependence on Russian energy, while continuing to reduce greenhouse gas (GHG) emissions.

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Key points

The current energy landscape

- *Natural gas:* When it comes to natural gas, Europe needs Russia more than Russia needs Europe. Europe (broadly defined) relies on Russia for 34-38% of its current natural gas needs. Gas plays a critical role in European energy security at present, providing flexible capacity for peak winter heating and industrial production. Gas sales to Europe are a meaningful source of Russian export revenue (accounting for 1.5-1.6% of GDP in 2020 and likely 2.3-2.6% of GDP in 2021) but significantly less important than oil export revenue, which reached 11% of GDP last year. Reducing dependence on Russian gas is critical for European energy security but less likely to on its own compel Moscow to change course.

- *Oil:* Reducing Russian oil export revenue would put greater economic pressure on Moscow but also presents significant risks for oil consumers in the US and elsewhere in the world, with implications for the global economic recovery. Russia exports 7.4 million barrels a day of oil—11% of all internationally traded oil globally. Markets were already relatively tight before Russia invaded Ukraine, and complete elimination of Russian supply—an amount three times larger than Iranian oil exports in 2011 when those sanctions were adopted—would be massively disruptive (as indicated by the recent run-up in global oil prices).

Short-term US policy options

In the coming months, the most pressing priority is to reduce European natural gas demand and identify alternative sources of gas supply. While most of this burden falls on European policymakers, there are concrete actions US policymakers can take to lend support. The US will play a more central role in the effort to reduce Russian oil revenue (and global dependence on Russian oil exports), while limiting the impact on global oil prices through its expertise in administering financial sanctions.

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- *Reducing European dependence on Russian gas:* Options for delivering large-scale reductions in European gas demand over the next 6-9 months ahead of the 2022/2023 winter heating season are largely limited to a) redirecting existing LNG supply from other parts of the world to Europe, b) maximizing the use of existing non-gas power generation resources, and c) implementing an aggressive demand response program. Some of these measures may increase GHG emissions, but the effect will be small (less than 0.1% of total global emissions) and temporary. The US can help support European efforts through diplomatic engagement with LNG importers, by providing manufacturing and technical support for a widespread European demand response campaign in buildings, and by ensuring that gas-price driven reductions in European industrial production have as limited an economic and national security cost as possible.

- *Reducing Russian oil revenue while minimizing global price risk:* US policymakers have a more central role to play in efforts to reduce Russian oil revenue at as little cost as possible to consumers in the US and around the world. The US ban on oil imports from Russia currently being considered in Congress would have a modest impact—both on Russian revenue and global oil prices—as the US only accounts for 9% of Russian oil exports. Were Europe to follow suit the impact (and risk) would be much larger—more than half of Russian oil exports go to Europe, with a large share being shipped by pipeline (and thus harder to quickly replace). The most important role for US policymakers in the weeks and months ahead is to steward the new sanctions regime, leveraging the Treasury Department's deep sanctions expertise, including implementation of the 2011-2015 Iranian oil sanctions. There are important differences between that situation and the current crisis, but the Iran sanctions playbook still has a lot to offer on how to effectively reduce Russian oil export revenue while limiting the increase in global oil prices.

Medium-term US policy strategy

While short-term options to reduce dependence on Russian energy are largely limited to the redirection of existing supply and reductions in demand, investments in new energy capacity starting today can substantially improve the options available over the next 5-10 years. Here the most attractive US policy options for reducing dependence on Russian energy will also reduce GHG emissions, helping both the US and Europe stay on track to meeting their international climate commitments.

- *Reduce US oil and gas demand to reduce economic vulnerability and diversify European supply:* Accelerating clean energy deployment reduces US economic vulnerability to supply disruptions in Russia or elsewhere in the world and frees up oil and gas for export to Europe and other allies. For example, in our modeling of a policy pathway to the US's 2030 climate target—a combination of federal clean energy tax incentives and grant programs, and additional actions by the executive branch and subnational actors—we find significant associated energy security benefits. US oil expenditures fall by up to 24% by 2030 compared to current policy, and US oil and LNG exports increase by up to 29% and 15% respectively.

- *Scale US production of emerging low-carbon alternatives to Russian oil and gas:* Providing Europe and other countries with alternative sources of oil and gas will only go so far in reducing Russian economic leverage. There are a number of options available to US policymakers to significantly accelerate the research, development, demonstration and deployment of the low-emissions technologies that will be most effective in substantially reducing European dependence on Russian gas while still meeting their climate commitments. These include technology investments in hydrogen, sustainable aviation fuels, long-duration electricity storage and advanced battery technology, and manufacturing and deployment incentives to get these technologies to scale.

- ***Directly support an accelerated energy transition in Europe:*** Alongside investments in scaling the production of key low-emissions technological alternatives to Russian oil and gas in Europe, the US can directly support the export and installation of those technologies. This can include grant programs, loan guarantees, technical assistance and trade and project finance—a Marshall Plan of sorts for energy. This could be particularly important if the current confrontation with Russia proves economically costly for Europe and limits their ability to entirely self-finance their own energy transition.

- ***Use the anti-Russia coalition to secure critical material supply chains for a low-carbon economy:*** While in general, low-carbon alternatives to current oil and gas markets provide more price stability and economic security, new clean energy technologies do come with some of their own security risks given their reliance on critical minerals like lithium, cobalt and nickel. Diversifying global supplies of these critical minerals over the next few years will be crucial to securing the clean energy economy. The current coalition of countries countering Russian aggressing in Europe is an excellent group to develop a coordinated international strategy, once the immediate crisis has passed.

The current energy landscape

There are two ways in which Russia's role as a global energy supplier is factoring into the calculus of policymakers in Washington, Brussels, and allied capitals around the world as they respond to Russia's invasion of Ukraine. The first is offensive: Russia's reliance on energy export revenue gives the West a weapon to pressure President Vladimir Putin (through import bans, energy sanctions, etc.) to withdraw from Ukraine and/or limit further aggression in Europe. The second (and inverse) is defensive: global dependence on Russian energy exports gives Moscow a weapon it can use in its campaign of aggression, threatening energy security in Europe and economic stability around the world. The balance of opportunity (offensive action) and risk (defensive considerations) varies across fuels, and between the short and medium term.

Natural gas: Europe needs Russia more than Russia needs Europe

The importance of natural gas in the European[1] energy system has grown in recent decades, in response to a decline in the use of coal and, to a lesser extent, nuclear power (Figure 1). Gas now accounts for one-quarter of total European energy supply, but plays a far greater role in European energy security than that statistic suggests. Gas provides almost all flexible seasonal energy supply to meet peak winter heating demand in homes, offices, schools, and stores, particularly in Northern Europe (Figure 2). It is a major fuel source for European industry as well, which also experiences peak demand during the winter.

Russia is the single largest supplier of natural gas to Europe, accounting for 57% of total imports and 34% of total European gas supply in 2020 (and 40% in EU member states). That share has held relatively constant over the past two decades. Russian gas is delivered to Europe primarily by pipeline (91% of all Russia-Europe gas trade in 2020) as opposed to the more flexible LNG market. This further complicates Europe's ability to rapidly shift away from Russian gas if there is a large and sudden disruption in supply. Even before Russia invaded Ukraine, Europe was experiencing something of a natural gas supply crisis. A cold winter in 2020, a rebounding economy after the COVID recession, lower than usual Russian deliveries, and increased LNG competition from Asia put a strain on European gas storage going into the 2021/2022 winter heating season. By the fourth

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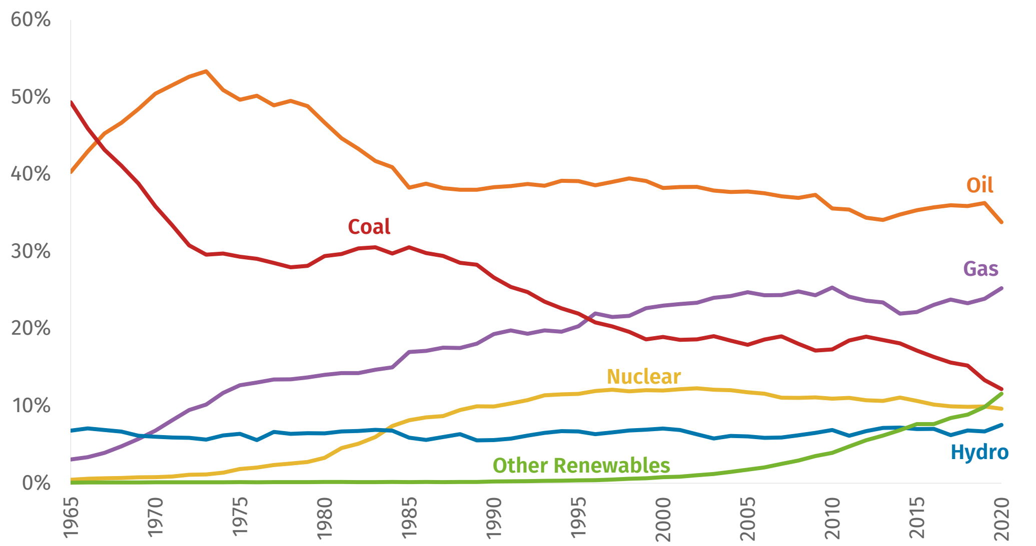
[1] In this note, unless otherwise specified "Europe" is defined broadly as the European members of the OECD plus Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Cyprus, North Macedonia, Georgia, Gibraltar, Malta, Montenegro, North Macedonia, Romania, and Serbia.

quarter of last year, European natural gas was trading at well over €75 per MWh ($24 per MMBTU) in futures markets, sharply above the sub-€30 prices experienced for the past ten years. The increased risk of supply disruption from Russia's Ukraine invasion has caused price spikes above €200 per MWh, with futures prices reaching €265 per MWh on Monday ($85 per MMBTU).

FIGURE 1

European total primary energy consumption by fuel

Percent of total

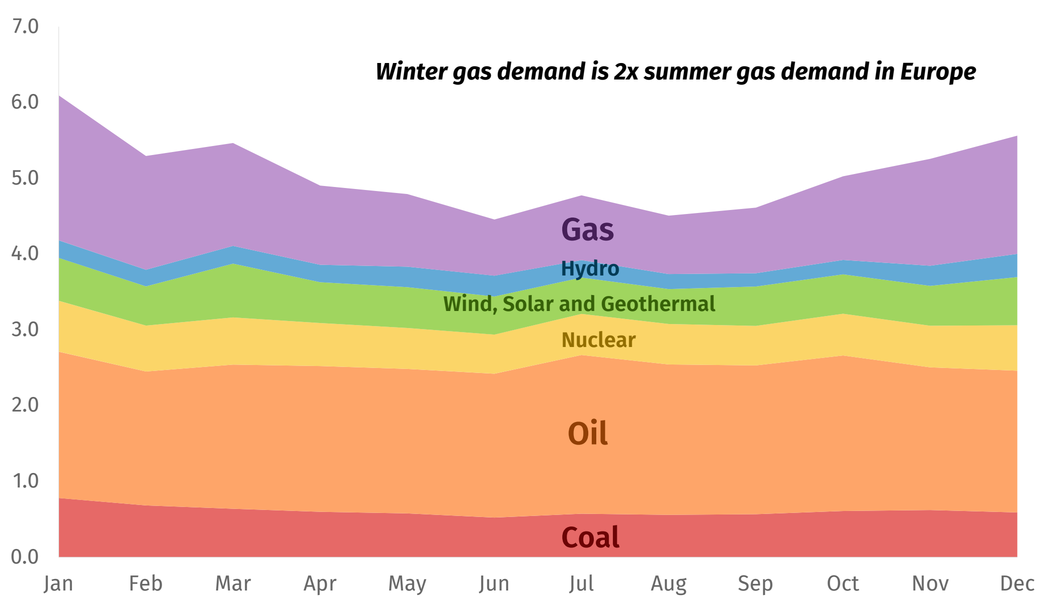


Source: BP statistical review. Europe here includes European members of the OECD plus Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Cyprus, North Macedonia, Georgia, Gibraltar, Malta, Montenegro, North Macedonia, Romania, and Serbia.

FIGURE 2

EU-27 energy consumption by month in 2019

Exajoules



Source: Eurostat, BP statistical review, and Rhodium Group estimates.

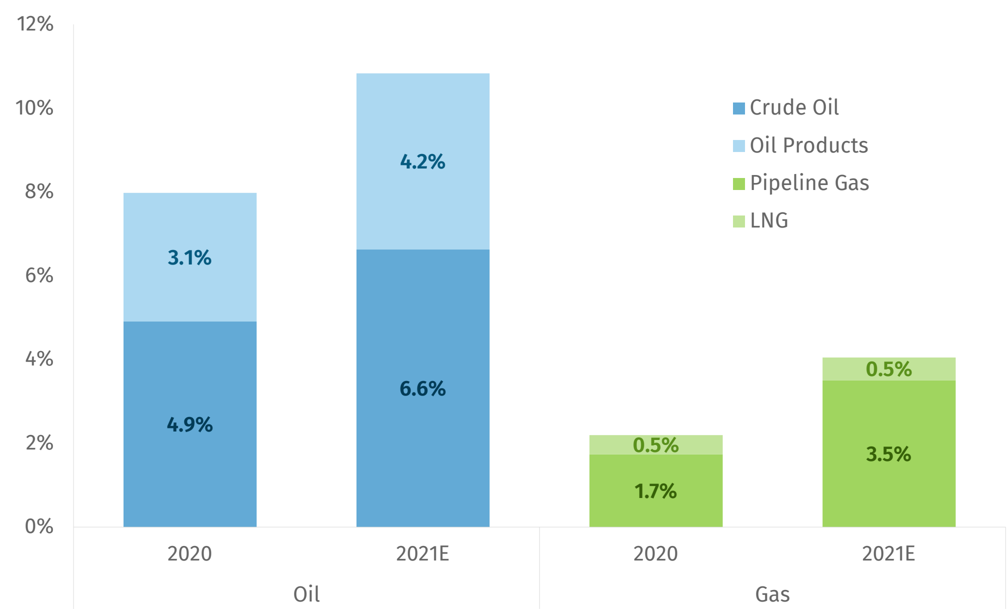
Gas exports are important to the Russian economy, but not as important as they are to European energy security. According to the Central Bank of Russia (CBR), the country earned $32 billion exporting natural gas (both pipeline and LNG) in 2020, down from $49 billion in 2019. Sales to Europe likely accounted for between two-thirds and three-quarters of that total—or 1.5-1.6% of Russian GDP. Based on Q1-Q3 data from the CBR and oil and gas price trends during Q4 of last year, we estimate that total Russian gas export revenue rose to $67 billion in 2021, the highest annual total since 2013. That likely puts Russian gas exports to Europe at 2.3-2.6% of GDP in 2021. Losing that revenue would certainly not be painless for Moscow, but it is relatively modest in comparison to Russian oil revenue (see the next section). Therefore, for gas we see defensive considerations (how to protect Europe from Russia using gas supply as a weapon) as more important than offensive considerations (Europe proactively halting Russian imports to coerce Putin to change course).

Oil: Greater costs for Russia, but also for the rest of the world

Russia is the world's second-largest oil exporter at 7.4 million barrels per day in 2020—just behind Saudi Arabia at 8 million barrels per day. That's 11% of all internationally traded oil globally. In 2020, Russia earned $118 billion on its oil exports, according to the CBR, or 8% of GDP. Of this, 62% was crude oil and 28% refined petroleum products (Figure 3). We estimate that in 2021, Russian oil export revenue grew to $180 billion, or 10.8% of GDP.

Given that oil exports are four times more important to the Russian economy than gas, a coordinated offensive effort by the US and its allies to reduce Russian oil exports could put considerable economic pressure on Moscow. But it also comes with significant economic risk for both Europe and the rest of the world. Global oil markets were already relatively tight ahead of Russia's invasion of Ukraine, as post-COVID demand recovered faster than supply, and inflation in the US is at its highest level since the early 1980s.

FIGURE 3
Russian global energy exports as a share of GDP
Percent



Source: Central Bank of Russia, IMF and Rhodium Group estimates

Fully removing Russia's 7.4 million barrels a day from the global market would be massively disruptive. For a sense of scale, Russia exports almost as much oil as the overall drop in global oil demand in the first year of the COVID-19 pandemic—a period when airline and passenger vehicle travel were severely constrained and the global economy was in a deep recession. The ability to significantly increase supply elsewhere in a matter of months is limited. Total OPEC spare production capacity had fallen to 5 million barrels per day by the end of 2021, with analysts projecting it would continue to decline prior to Russia's invasion of Ukraine. The International Energy Agency (IEA) and Energy Information Administration (EIA) both expect US oil production to increase by more than 1 million barrels per day this year, but much of that is needed to meet expected pre-Ukraine global demand growth. There is the potential for Iranian sanctions relief, but that will only add another 1 million barrels at most to the global market. As a result, some analysts are starting to project crude oil prices reaching between $150 and $200 a barrel this year if the increase in Russian economic isolation continues. Every $10 increase in oil prices costs global oil consumers nearly $400 billion a year on an annualized basis, so that kind of run-up would impose significant costs on the global economic recovery.

Don't forget coal

While oil and gas are Russia's most important energy exports, the country is also an important coal exporter, particularly to Europe. In 2020, imports of Russian coal accounted for just over 20% of European coal consumption. While Europe has more short term-options for replacing Russian coal than gas (or oil shipped from Russia via pipeline), the fact that this import source could also be under pressure just further complicates Europe's energy picture.

Short-term policy options

In the coming months, Europe and US policymakers have two overarching energy priorities. The first is to reduce European consumption of Russian gas as fast as possible to protect European citizens and the European economy as much as possible from a potential disruption in Russian supply. The second is to reduce Russian oil revenue (and gas as well if Europe can reduce demand enough) in a bid to persuade Moscow to change course, while limiting the resulting increase in global oil prices. Given the short time horizon for both, most solutions will have to rely on redirecting existing assets (such as LNG or crude tankers currently headed elsewhere in the world) or increasing output from existing assets (e.g. by keeping nuclear power plants online). Some of these solutions will reduce GHG emissions, some will increase emissions. Either way, the effect will be relatively small and temporary, as time is too short for the kind of large-scale infrastructure investment that locks in energy pathways for years to come. This section focuses on the short-term policy options available to the US specifically. We then turn to discussing medium-term options where there is a more natural alignment between policies that reduce Russian energy dependence and GHG emissions.

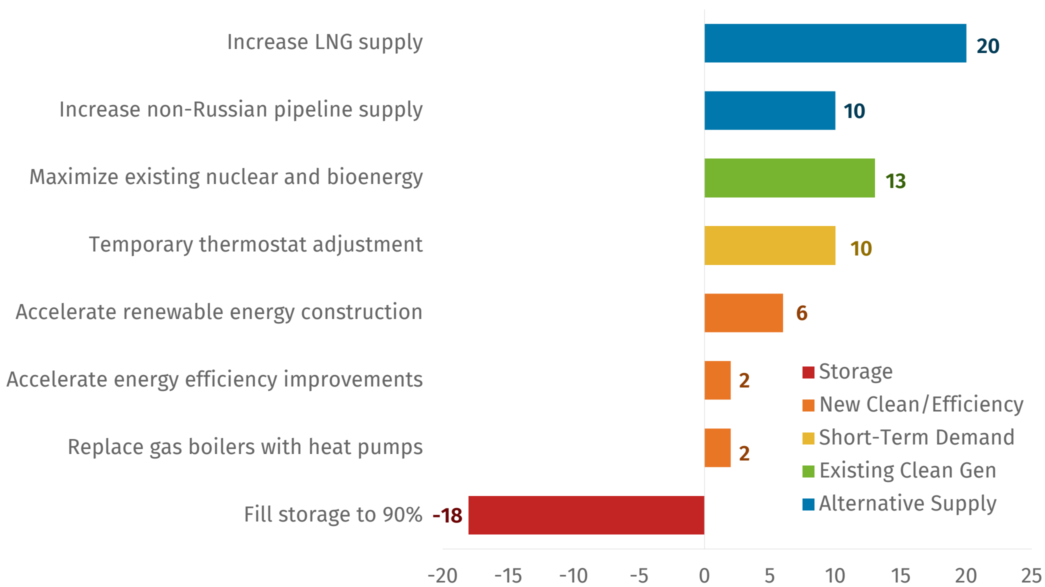
Reducing European reliance on Russian gas

Fortunately, the coldest months of winter are behind us and, as a result, European gas demand is starting to decline. That gives European leaders—and US policymakers looking to provide support—6-9 months to take aggressive steps to reduce gas demand and diversify gas supply before the next winter heating season. Last week, the IEA published a 10-point plan for how the EU could potentially reduce Russian gas imports by one-third over the coming year. Of the interventions they identify, half of the potential savings come through alternative sources of gas supply. The IEA estimates that the EU could potentially increase LNG imports this year by up to 60 bcm (which would by itself reduce Russian imports by one-third), but that due to limited available short-term supply in the global LNG market, the most the EU could hope to secure is 20 bcm (Figure 4). Another 10 bcm could potentially come from increasing pipeline imports from non-Russian suppliers. The next largest category of intervention—at 13 bcm—is to ramp up production of (or delay the closing of) existing nuclear and bioenergy power plants. Temporary demand response measures (in this case reducing thermostats by 1 degree Celsius) could deliver an additional 10 bcm in savings. Due to the lead times involved in building new clean energy generation or reducing demand through efficiency and end-use electrification investments, the IEA estimates these categories combined would likely deliver only 10 bcm of savings in the short term. On top of these measures, the EU also plans to resupply gas storage from currently low levels, which the IEA estimates will require an additional 18 bcm.

FIGURE 4

Short-term interventions identified by the IEA

Annualized reduction in Russian gas imports, BCM



Source: IEA

There are additional interventions the IEA didn't consider. Europe could increase generation from existing coal-fired power plants, though coal prices are rising quickly as well, given European reliance on imports from Russia. The EU Emissions Trading System also impacts the relative economics of coal vs. natural gas, though allowance prices have fallen over the past few weeks. More promising is the potential for additional demand response measures beyond the 1 degree C° reduction in thermostat levels explored in the IEA report. Much of this can come from buildings, which accounted for almost 40% of European gas consumption in 2019 (Figure 5). The gas savings benefits of demand response apply both to heating demand (which is met with both gas and electricity) and cooling demand (which is met entirely with electricity), given that gas is a significant source of electricity generation in Europe. Demand response needs to begin immediately to maximize gas storage builds ahead of the next winter heating season.

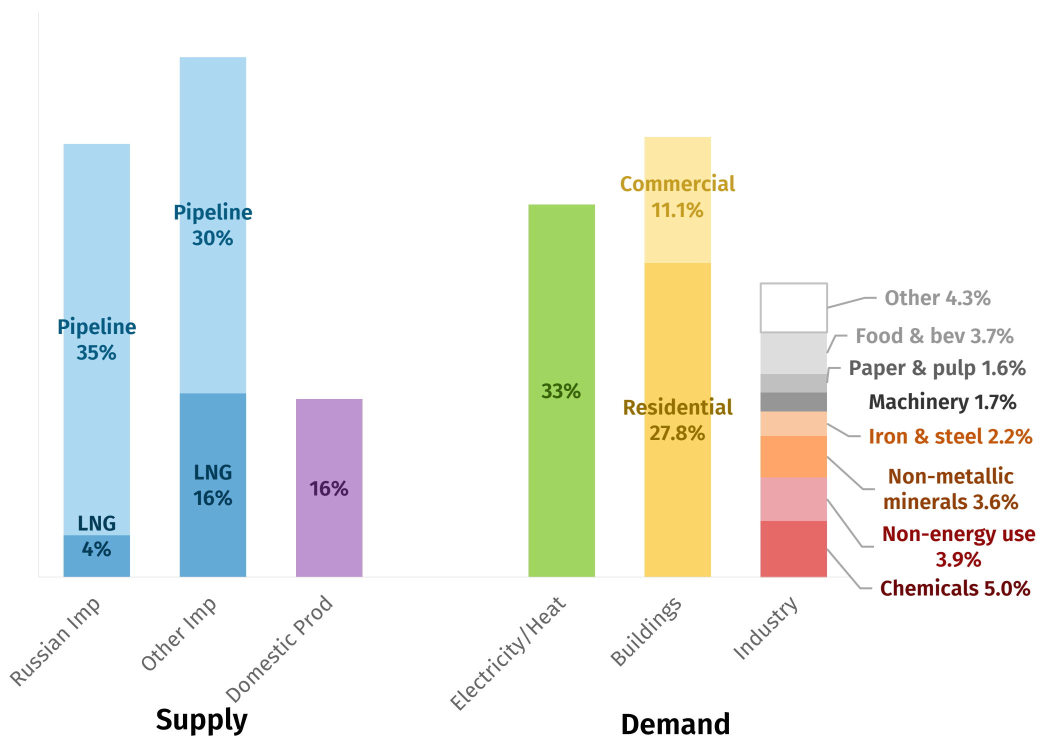
In theory, currently record-high natural gas prices in Europe would on their own drive large-scale demand response measures. Evidence suggests, however, that European household heating and cooling demand is relatively unresponsive to price increases over the short term. This is due to several factors. First, households generally receive their power and gas bills weeks after demand occurs. Second, fixed transmission and distribution costs account for a large share of total utility bills, which weakens the price signal of variable energy costs. Third, regulatory structures in retail electricity and natural gas markets often mitigate direct passthrough of wholesale energy price changes. As a result, proactive policy is required. Smart thermostats give utilities the ability to directly control building energy demand and are quicker, cheaper, and easier to install than efficiency retrofits or electric heat-pump installations. Europe could launch an aggressive campaign to procure and distribute smart thermostats, focusing on the most gas-intensive parts of the continent. While quicker than other demand-side measures, it will still take time to roll smart thermostats out at scale. European policymakers will therefore likely need to complement this technological approach with an aggressive public awareness campaign encouraging households and businesses to cut consumption.

The other option for demand response is in industry, which accounted for 26% of European gas demand in 2019. The majority of industrial gas demand comes from the production of energy-intensive materials: chemicals (both energy use and non-energy feedstock), iron and steel, cement, lime, glass, paper, and pulp. These sectors are far more price-sensitive than gas consumers in the buildings sector. They pay close attention to spot prices, wholesale energy costs account for a larger share of their utility bills, and they operate in competitive global markets with limited ability to pass region-specific energy price increases onto consumers. European energy-intensive industrial production is already declining in response to higher gas prices, a trend that will accelerate if Russian gas supplies are disrupted. Leaving this to market dynamics alone could have significant negative consequences—beyond the economic and employment costs of European industrial closures. Russia is also a major exporter of a range of energy-intensive products, so a decline in European manufacturing could leave Europe—and the world—more dependent on Russian supply. European policymakers could get ahead of this by working with industry to idle production in less economically and national security-sensitive sectors, and by providing fiscal compensation for lost revenue where appropriate.

FIGURE 5

European gas supply and demand

Percent share of total, 2019



Source: IEA, Eurostat, BP and Rhodium Group estimates

Europe's success in reducing Russian gas demand this year will primarily depend on the actions of policymakers in Brussels and member-state capitals, but Washington can play an important supporting role.

- *Diplomatic engagement on LNG:* Natural gas remains relatively abundant in the US (as evidenced by the more than 10x difference between US and EU spot gas prices currently). Existing US LNG export capacity is completely maxed, however, and it takes years to build new terminals, so US supply offers no short-term relief. Getting additional LNG into Europe will require redirecting existing LNG shipments from other markets. The US has an important role to play in supporting European diplomatic efforts in identifying redirection opportunities among allied countries that reduce Russian leverage with minimal economic damage to LNG importers elsewhere in the world. Most LNG exports go to Asia, and there might be short-term opportunities for Asian importers to use other fuels for power generation instead of LNG. If Japan were able to restart some of its nuclear reactors, this switch would reduce emissions. If Japan, Korea, India, or China switch from LNG to coal or oil, it will lead to an increase in emissions, but it would be relatively small and temporary. Citigroup estimates that if all excess coal and oil power generation capacity in LNG-importing countries is deployed this year, it could free up to 70 bcm of LNG supply. In this scenario, we estimate that global emissions would increase by roughly 50 million metric tons. That's less than 0.1% of global GHG emissions, and will be more than offset by the impact of higher oil prices this year due to Russia's invasion on global oil demand and resulting emissions.

- *Demand response support:* The US government has an important role to play in supporting European demand response efforts. The Department of Energy and national labs have deep technical expertise that can be shared with European policymakers. The US government can also help support a smart thermostat installation campaign in Europe by working with US manufacturers to ramp production, and by potentially redirecting existing supply from US markets.

- *Energy-intensive industrial coordination:* The US government should also, in partnership with other allies, support European governments in focusing industrial demand response on the least economically and national security damaging areas. This could include identifying industries where the US has the potential to quickly ramp production to offset declines in European output, and providing financial support to help offset short-term economic losses in Europe from idled factories.

Reducing Russian oil revenue while minimizing global price risk

There are two direct mechanisms through which US policymakers can reduce Russian oil export volumes this year:

1. Ban imports of Russian crude oil and/or refined product into the US and work with other countries to do the same.

2. Extend sanctions to cover Russian crude and/or refined product exports, with the threat of secondary sanctions for countries and companies that continue to buy Russian oil.

Both carry considerable oil price risk, with the potential to impose significant costs on households and businesses in the US and around the world. That could not only threaten the current global economic recovery, but also undermine public support for countering Russian aggression. The worst-case scenario is one in which import bans or sanctions increase oil prices enough to more than offset the decline in Russian export volumes, overall Russian export revenue increases as a result, and securing additional LNG supply is made more difficult because high oil prices make it tougher for other LNG importers to switch. Thoughtful design and implementation is required.

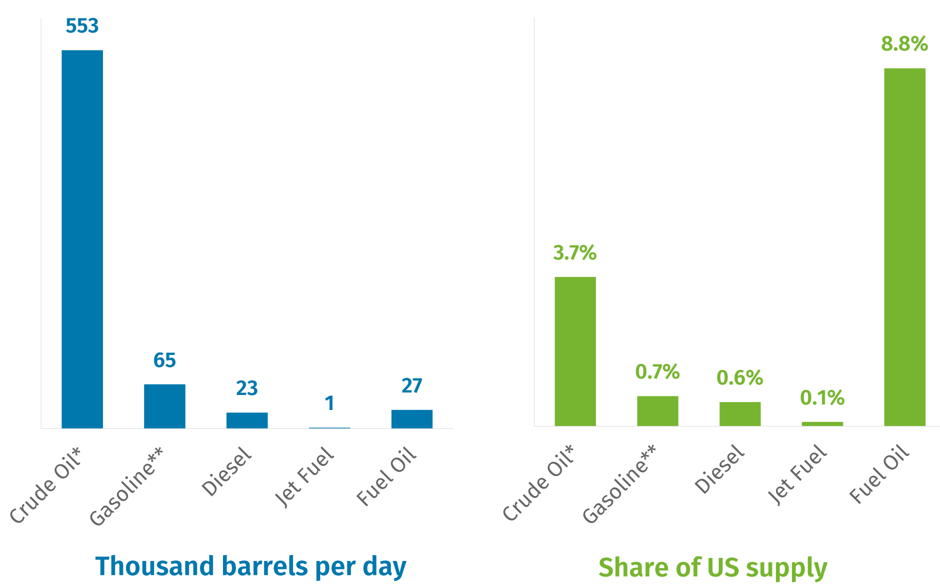
Import ban considerations

Over the past week, a growing number of members of Congress have called for legislation that would ban the importation of Russian energy into the US. The US does not currently import any natural gas from Russia and only imported two tons of coal in 2021 according to the Energy Information Administration (EIA), so this would primarily impact oil. The US imported 670,000 barrels per day of crude oil and refined product from Russia in 2021, accounting for 9% of Russia's net export total. Most of this was crude oil or a semi-finished oil product call Mazut that is used as a refinery input and alternative to heavy crude from Venezuela. This accounts for 3.7% of total crude oil used in the US (Figure 6). The US imports some finished petroleum product from Russia, but this amounted to less than 1% of domestic supply in 2021.

FIGURE 6

US imports of Russian oil, 2021

Thousand barrels per day (left) and share of total supply (right)



Source: EIA. * includes semifinished "Mazut" used as a refinery input. ** includes gasoline blending agents.

Both US refineries and the global oil market should be able to accommodate a US ban on Russian oil imports without too much disruption. The adjustment costs would be concentrated in the US refineries currently using Mazut and can be mitigated through proactive outreach to alternative suppliers. Such outreach appears to already be occurring, with news over the weekend that the Biden administration is sending a delegation to Venezuela.

The bigger risk with a US import ban is that it could threaten the close coordination between the US and Europe in countering Russia that has occurred to date, if European policymakers feel pressure to follow suit but cannot move as quickly due to their substantially greater dependence on Russian oil. While only 9% of Russian oil exports go to the US, more than half goes to Europe. Russian crude accounts for 25% of all crude used in European refineries (compared to less than 4% in the US) and imported Russian gasoline, diesel and other refined product accounts for roughly 10% of European refined product demand. About one-quarter of Russian crude exports to Europe are shipped via the Drubzha pipeline, making it more difficult to quickly replace than seaborne shipments. There is also a non-zero risk that Moscow could retaliate against a European ban on oil imports with an immediate cut-off of gas exports, before Europe has had time to reduce demand and secure alternative sources of supply. Given all this, it's important that an oil import ban in the US be closely coordinated with allies in Europe, as appears to have begun happening over the weekend.

Sanction considerations

The US federal government is now quite experienced in the effective design and implementation of financial sanctions, including against major oil-exporting countries. At the end of 2011, Congress passed an amendment to the National Defense Authorization Act that required the US Treasury Department to sanction the Central Bank of Iran, in an attempt to force the Iranian government to abandon its nuclear weapons program. At the time, Iran was the third-largest net oil exporter in the world, after Saudi Arabia and Russia, at 2.7 million barrels per day. When the sanctions were adopted, oil prices were around $135 a barrel in today's dollars and OPEC spare capacity was very low. Then, as now, there was considerable concern among US policymakers that cutting off Iranian exports through sanctions would spike global oil prices and threaten the still-fragile economic recovery that was occurring at the time.

To address these concerns, Congress included in the sanctions regime a phased approach for oil. Oil transactions were only subject to sanction if the Treasury Department determined that a) the importing country had sufficient alternative supplies, and b) the country had not taken steps to significantly reduce its purchase of Iranian oil. This proved a largely successful strategy, both in limiting the risk to global oil prices and maintaining a broad coalition behind the sanctions. Iranian net exports fell from 2.7 million barrels per day in 2011 to 2.05 in 2012, to 1.73 in 2013—giving the market time to adjust. Iranian revenue declined even faster. As the number of buyers willing to buy Iranian oil declined, those buyers were able to negotiate steep discounts on the crude. This decline in revenue played an important role in persuading Tehran to agree to the 2015 Joint Comprehensive Plan of Action (JCPOA) with the US, Europe, and other allies.

There are a number of important differences between the Iran sanctions experience and what the US now faces with Russia. First, Russia exports nearly three times as much oil as Iran did in 2011, so the same percent reduction in exports could have a much larger impact on global oil prices. Second, Russia sells most of its oil in the spot market, compared to Iran which relied more on long-term contracts. Third, Russia is a large exporter of refined products as well as a crude exporter, while Iran exported mostly crude. And fourth, the high-profile conflict in Ukraine is creating significant reputational risk for Western companies buying Russian oil, even if there are no sanctions preventing them from doing so.

Indeed, though the sanctions the Treasury Department imposed on the Central Bank of Russia on February 28 explicitly exclude energy, there have been news reports over the past week that Russian companies are struggling to find buyers for their spot cargoes, with storage filling quickly and a reduction in production likely to occur in the weeks ahead unless conditions change. This is likely due in part to uncertainty about the scope of the new sanctions regime (the Treasury put out a Q&A on this question last Friday) as well as reputational concerns among European oil companies in particular (see the criticism Shell recently received for buying Russian barrels).

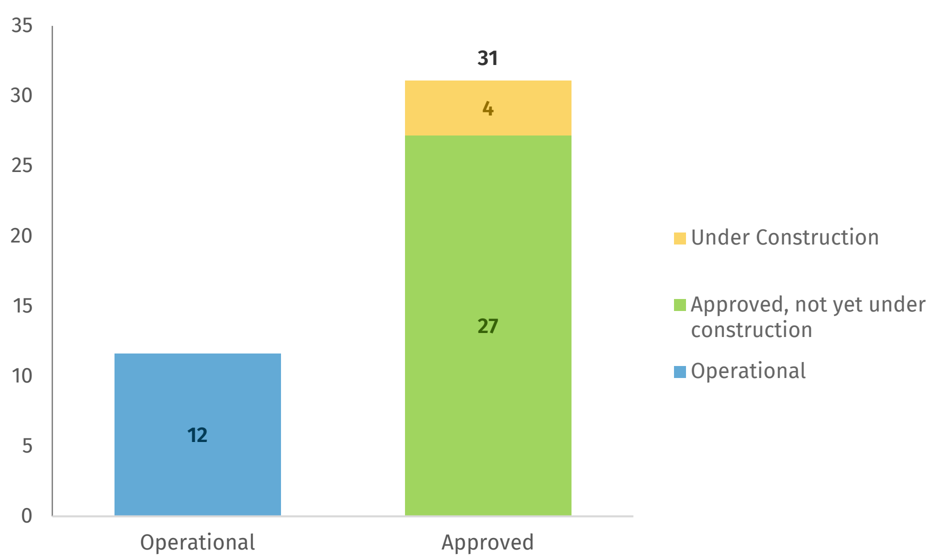
The good news is that the difficulty in finding buyers has already resulted in a steep discount in the price of Russian crude relative to global oil prices. The trick for US policymakers is to implement the sanctions regime in a way that maintains this price discount, but does not lead to a decline in overall Russian export volumes faster than the market can handle.

Medium-term strategies

While the primary focus of US policymakers is, correctly, how to most successfully reduce dependence on Russian energy and minimize price increases over the coming year, it's important to begin considering medium-term strategies as well. The current crisis is demonstrating how vulnerable European energy security and the global economy is to Russian supply disruptions, and how hard it is to find large enough substitutes in a short period of time. Those large-scale substitutes take time to build, but are available with focused policy attention starting now.

Undoubtedly part of any medium-term reduction in global dependence on Russian oil and gas will come from an increase in US oil and gas production. That will start to occur this year as US oil production growth accelerates in response to higher oil prices. With increasingly tight global gas markets, US LNG capacity will continue to expand. While these are both important, they require relatively little policy attention. Most shale production occurs on private land, with relatively easy access to domestic refineries and export capacity. New LNG export terminals require approval by the Department of Energy and the Federal Energy Regulatory Commission (FERC), but all credit-worthy terminals have been approved, under both Democratic and Republican administrations. Indeed, there are 15 fully approved export terminals projects that have yet to commence construction representing 27 billion cubic feet per day (bcf/day) of expanded capacity (or 278 bcm). Add in nearly 4 bcf/day of capacity currently under construction and US export capacity is on track to expand by nearly three-fold just from projects already approved. At a combined 443 bcm, this would be more than double current European imports from Russia (Figure 7).

FIGURE 7
US current operating and approved liquified natural gas export capacity
Billion cubic feet per day



Source: EIA.

What requires more policy focus is the development and deployment of technologies that reduce both dependence on Russian energy and GHG emissions. This is critical in Europe, where there is strong and broad-based public support for addressing climate change. Continued American action on climate change is also essential for the credibility of US leadership globally, particularly in a world where we are competing with Russia for influence. Finally, left unchecked, climate change will introduce myriad new threats to the security of both the US and allied countries, all while increasing

Russian economic strength and influence. Recent research suggests that Russia is one of the few countries that stands to potentially gain from climate change, whether through higher rates of economic growth, reduced mortality rates, increased agricultural production or improved shipping routes.

In this section, we offer a four-part framework for policy that will significantly reduce US and European dependence on Russian energy and reduce global GHG emissions between now and 2030.

1. Reduce US oil and gas demand to reduce economic vulnerability and diversify European supply

Growth in US oil production over the past decade has mitigated the overall cost to the US economy of global oil price spikes like the one currently occurring, but price spikes still have important distributional effects. Increases in global oil prices are positive for American oil companies, employees, and states and localities dependent on oil-related tax revenue. But since the price Americans pay at the pump is still determined by global market dynamics, price spikes impose significant costs on households, businesses, and states and localities outside the oil patch. Price spikes are particularly difficult for low-income and rural households who spend a larger share of their income on gasoline.

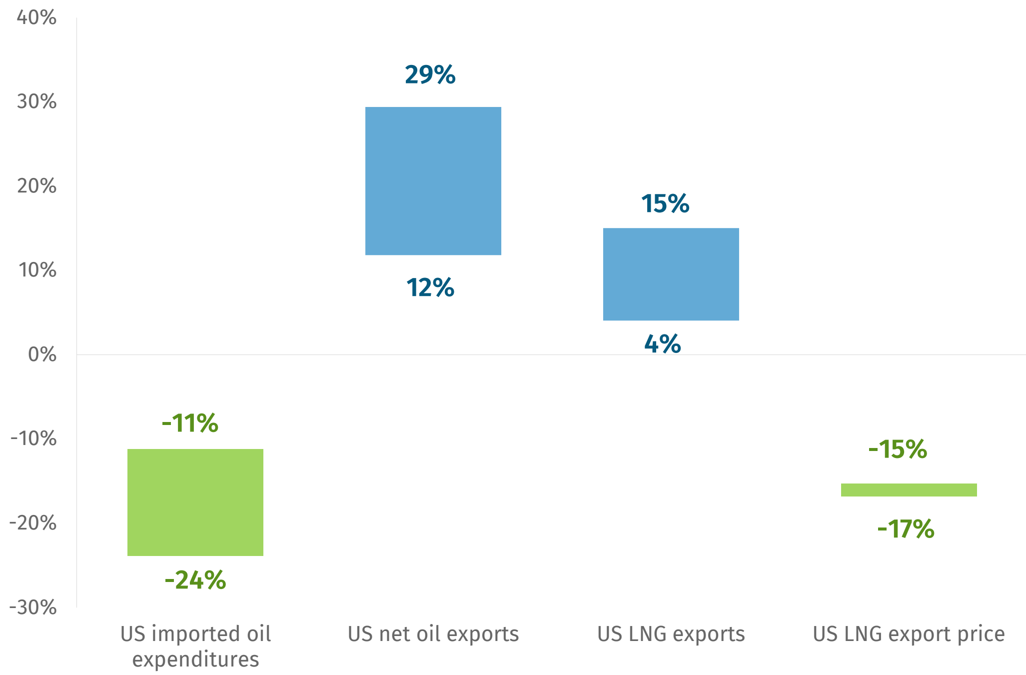
Policies that reduce US oil demand through the development and deployment of alternative transportation technology like electric cars and hydrogen trucks mitigate these costs. They shield US consumers from oil price spikes and free up additional US oil supply for export that can substitute for Russian supply.

For example, in our modeling of our "Joint Action" policy scenario—federal clean energy tax incentives and grant programs, combined with additional actions by the executive branch and subnational actors, which together can put the US within striking distance of its 2030 climate target—we find significant associated energy security benefits. Thanks to accelerated deployment of vehicle efficiency and electric and hydrogen vehicle technology, fueled in large part by grant programs and tax credits like those contained in the Build Back Better Act (BBBA), by 2030 the amount American households and businesses spend on imported oil products declines by 11-24%, depending on how renewable energy and electric vehicle costs evolve and uncertainty in the domestic oil and gas resource base (Figure 8). Lower demand frees up more oil for export, with net crude and refined product exports expanding by 12-29% by 2030 relative to current policy. BBBA tax credits and grant programs accelerate renewable energy deployment, retention of at-risk nuclear plants, and improved building efficiency. All of these shifts reduce US natural gas consumption, freeing up additional gas for export to Europe or elsewhere. By 2030, US LNG export volumes are 4-15% higher than under current policy, and LNG export prices are 15-17% lower. All told, US consumer exposure to fossil fuel price volatility based on fuel expenditures as a share of GDP drops by 11-15% compared to current policy in 2030.

FIGURE 8

Change in key US energy security metrics in 2030 under the Joint Action scenario

Relative to current policy. Range reflects uncertainty in oil and gas resource base and renewable energy and EV vehicle costs.



Source: Rhodium Group. Our Joint Action policy scenario is detailed in our report, Pathways to Paris: A Policy Assessment of the 2030 US Climate Target.

2. Scale US production of emerging low-carbon alternatives to Russian oil and gas

Providing Europe and other countries with alternative sources of oil and gas will only go so far in reducing Russian economic leverage. As long as Russia is connected to the global oil and gas market, Moscow will have the ability to impact the prices that both Europeans and Americans pay at the pump. And meeting global climate goals will require considerably reducing overall oil and natural gas consumption in the decades ahead. There are a number of options available to US policymakers to significantly accelerate the research, development, demonstration, and deployment of the low-emissions technologies that will be most effective in substantially reducing European dependence on Russian gas, while still meeting their climate commitments.

The US is already off to a strong start on this front. The enactment of the bipartisan Infrastructure Investment and Jobs Act (IIJA) devotes tens of billions of dollars in new programs to advance clean alternatives to natural gas and oil. These include $9 billion for hydrogen hub demonstration projects and research to cut the cost of producing clean hydrogen through electrolysis (Table 1). Enactment of policies like those contained in the climate portions of the BBBA will put in place a suite of new policies that have the potential to greatly accelerate the innovation of a number of clean energy technologies that could reduce US and European reliance on natural gas and oil. These include tax credits for the production of sustainable aviation fuel, clean hydrogen, and the construction and expansion of US manufacturing of clean energy equipment. There are new programs to accelerate building electrification and heat pump deployment. New programs that reduce the cost of using clean hydrogen in industrial facilities and increase the US government's use of clean fuels can also drive down the cost of these technologies and facilitate uptake in Europe. The same goes for policies that scale electric heat pump manufacturing and deployment.

Some of these policies directly support production of these technologies in a way that will lower costs and increase supply for Europe (e.g. manufacturing tax credits and demonstration projects). Others (including those discussed in point 1 above) do so implicitly by driving deployment in the US that helps build out a lower cost, larger-scale manufacturing base and supply chain.

TABLE 1

Select policies that can expand oil and natural gas substitute technologies to Europe

Policy	Description	Fuel displaced	Status
Hydrogen Hubs	$8 billion for demonstration projects that expand supply and use of clean hydrogen	Oil and natural gas	Enacted as part of IIJA
Clean Hydrogen Electrolysis Program	$1 billion for tech that cuts the cost of H2 from clean electricity	Oil and natural gas	Enacted as part of IIJA
SAF production tax credit	Tax credit of up to $1.75/gallon for clean aviation fuels	Oil	Currently in BBBA
H2 production tax credit	Tech neutral clean H2 production incentive of up to $3/kg for cleanest producers	Oil and natural gas	Currently in BBBA
Manufacturing conversion grants	$3.5 billion to convert facilities to manufacture fuel cell vehicles	Oil	Currently in BBBA
Clean manufacturing tax credit	48C tax credit for investments in clean energy equipment manufacturing include H2	Oil and natural gas	Currently in BBBA
Building efficiency and electrification	$12.5 billion in consumer rebates for home efficiency and heat pump installation	Natural gas	Currently in BBBA
H2 retrofit grants	Investments to cut the cost of retrofitting industrial facilities to use clean H2 instead of fossil fuels	Oil and natural gas	Not currently in legislation
Federal clean H2 procurement	Federal government purchase of clean H2 for civilian and military use	Oil and natural gas	Not currently in legislation

Source: Rhodium Group. Note: List is not intended to be comprehensive.

3. Directly support an accelerated energy transition in Europe

Alongside investments in scaling the production of key low-emissions technological alternatives to Russian oil and gas in Europe, the US can directly support the export and installation of those technologies. On February 28, Reps. Slotkin (MI-08) and Fletcher (TX-07) introduced a bill that would provide funding to the Department of Energy to support the development, export and installation in Europe of US technology that can reduce European dependence on Russian energy. The US Export-Import Bank and Development Finance Corporation also have potentially powerful roles to play in helping to finance large-scale deployment of US-made, low-emissions alternatives to Russian oil and gas in Europe—a Marshall Plan of sorts for energy. This could be particularly important if the current confrontation with Russia proves economically costly for Europe and limits their ability to entirely self-finance their own energy transition.

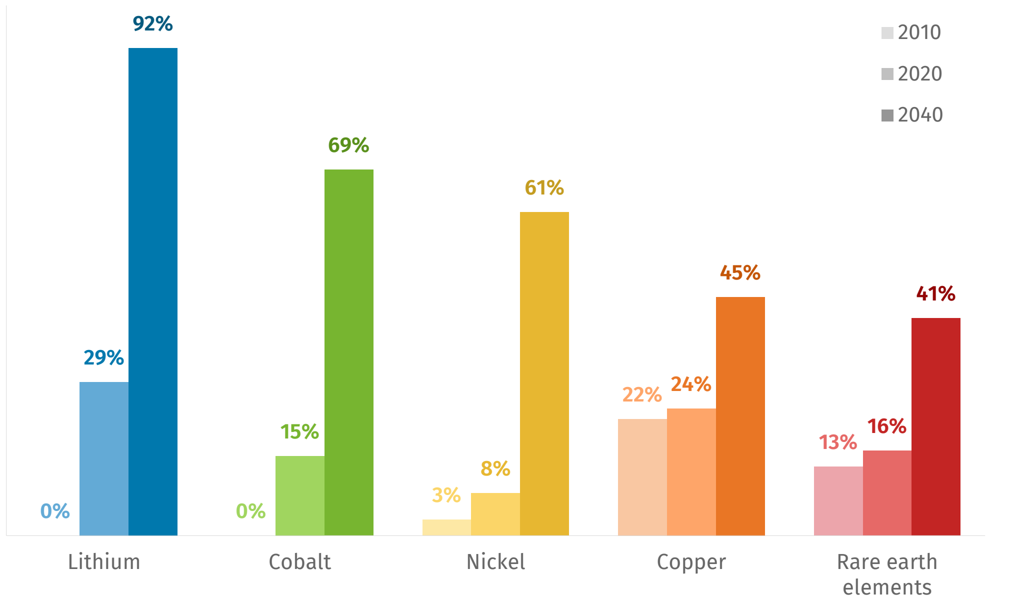
4. Use the anti-Russia coalition to secure critical material supply chains for a low-carbon economy

While in general, low-carbon alternatives to current oil and gas markets provide more price stability and economic security, new clean energy technologies do come with some of their own security risks. For example, lithium, nickel, cobalt, manganese and graphite are critical minerals used to manufacture large batteries used in electric vehicles and grid storage. The IEA estimates that as part of a low-carbon transition, clean energy technologies will account for 92% of global lithium demand by 2040, 69% of global cobalt demand, 61% of global nickel demand, 45% of global copper demand, and 41% of global rare earth element demand (Figure 9). Russia is a major producer of cobalt, nickel, and copper. Diversifying global supplies of these critical minerals over the next few years will be crucial to securing the clean energy economy

FIGURE 9

Share of clean energy technologies in total demand for selected minerals

Global, 2010-2040, Sustainable Development Scenario



Source: IEA

The US government has begun work on this through investments in new domestic production. That effort needs to be expanded to include key allies. The current coalition of countries countering Russian aggressing in Europe is an excellent group to develop a coordinated international strategy. That work should begin in earnest as soon as the immediate crisis has passed.

Disclosure Appendix