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STRATEGIC RESPONSE OPTIONS IF RUSSIA CUTS GAS SUPPLIES TO EUROPE

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"Imagination creates reality."—Richard Wagner[1]

I. Introduction

Russia's intensifying challenges to physical and energy security in Europe demand bold response options. In this paper, we seek to quantify the potential energy security consequences of a significant disruption of gas supplies from Russia[2] to Europe, and objectively assess the strengths, weaknesses, and consequences of potential response strategies.

Moscow pressures Europe on multiple fronts. Russia continues augmenting what is likely already the world's third-largest buildup of ground, air, and naval forces of the past 50 years to the north, east, and south of Ukraine.[3] Simultaneously, Gazprom's deliveries of Europe-bound gas in January 2022 are the lowest since at least 2017, despite record low European gas inventories and a clear demand call.[4] Gazprom's refusal to sell additional gas on the spot market could be characterized as a "commercial" decision. But completely discounting the motivations of the prime occupant of the Kremlin with regard to Gazprom's decisions would be a mistake. Geopolitical motives are equally plausible, such as actively dissuading European support for Ukraine by highlighting the importance of Russian gas supplies, while also coercing key customers toward additional long-term contracts that would perpetuate dependence.

Today's situation in Europe, and how it may play out on the energy front, recalls the Berlin Airlift in 1948-1949 where intrepid action by the United States and its allies dynamically reshaped the situation and turned tactical entrapment into a galvanizing strategic triumph. In June 1948, Gen. Lucius Clay, the administrator of US-occupied Germany messaged to Washington that "there is no practicability in maintaining our position in Berlin, and it must not be evaluated on that basis. ... We are convinced that our remaining in Berlin is essential to our prestige in Germany and in Europe. Whether for good or bad, it has become a symbol of the American intent."[5]

Within two weeks, a US-led effort established an airbridge that ultimately saw a cargo plane landing every 45 seconds at Berlin's Tempelhof Airport, and less than a year later, Moscow lifted the blockade.[6] Present circumstances demand a similar show of American intent (call it a "Berlin Gaslift") and a readiness to support allies boldly and clearly. There is no guarantee of success, but inaction and disengagement carry more certain, global consequences, including the empowerment of malign actors for whom no leverage point—even life critical commodity flows—is off limits. No matter how the event is sliced, an unabated large-scale curtailment of Russian gas supplies to Europe would be regionally devastating and globally impactful. Second- and third-order impacts could even include slower global phaseouts of coal.

Action to uphold energy security is inherently multilateral, involving US allies and strategic competitors alike. But leadership by the world's financial, military, and energy superpower would form an irreplaceable foundation. The current United States national interest in

preventing adversaries from using energy flows to coerce allies echoes the motivations behind the Carter Doctrine promulgated more than 40 years ago.[7] While the specific factual circumstances of gas security in Europe are very different now, the stakes are equally high.

Today the situation in Europe is quite different from past periods when, due to payment disputes, Russia cut its supply of natural gas transiting Ukraine, ultimately impacting downstream consumers in Europe. Concerns about Europe's dependence on Russian gas are not new and have been evaluated on many occasions. Indeed, much attention was given to the role of Russian gas in Europe in the wake of pricing disputes that led to short-term supply disruptions, specifically with Ukraine in the winters of 2005-06 and 2008-09. These events pushed European consumers to reevaluate Russia's role in European gas markets by seeking alternative supplies through LNG and pipelines from the Caspian region. In 2009, Hartley and Medlock addressed the role of Russian gas in Europe using the Rice World Gas Trade Model.[8] They concluded that although the short-term impacts of reductions in Russian gas supplies are deleterious for Europe, there are multiple short- and long-term margins of response available to counter such actions. Additionally, they noted that the long-term ramifications for Russia could be quite severe, as such actions would drive subsequent investments that could compromise Russian market presence.

They also went on to note that their analysis "highlights the common interest that the countries of Western Europe, Northeast Asia, and North America have in promoting the development of an efficient worldwide market for natural gas." Of course, the global market for natural gas is evolving, largely as a result of increased LNG trade, but it has not transitioned to a fully transparent, efficient market for LNG that is deep enough to seamlessly absorb a significant supply disruption. Hence, short-term responses are critical and will remain so even with an efficient market. At the same time, long-term thinking remains as important as ever. As was written more than seven years ago[9] in the wake of the Russian occupation of Crimea, the US has a valuable counterpunch to Russian actions that impact Europe's gas supplies: LNG.

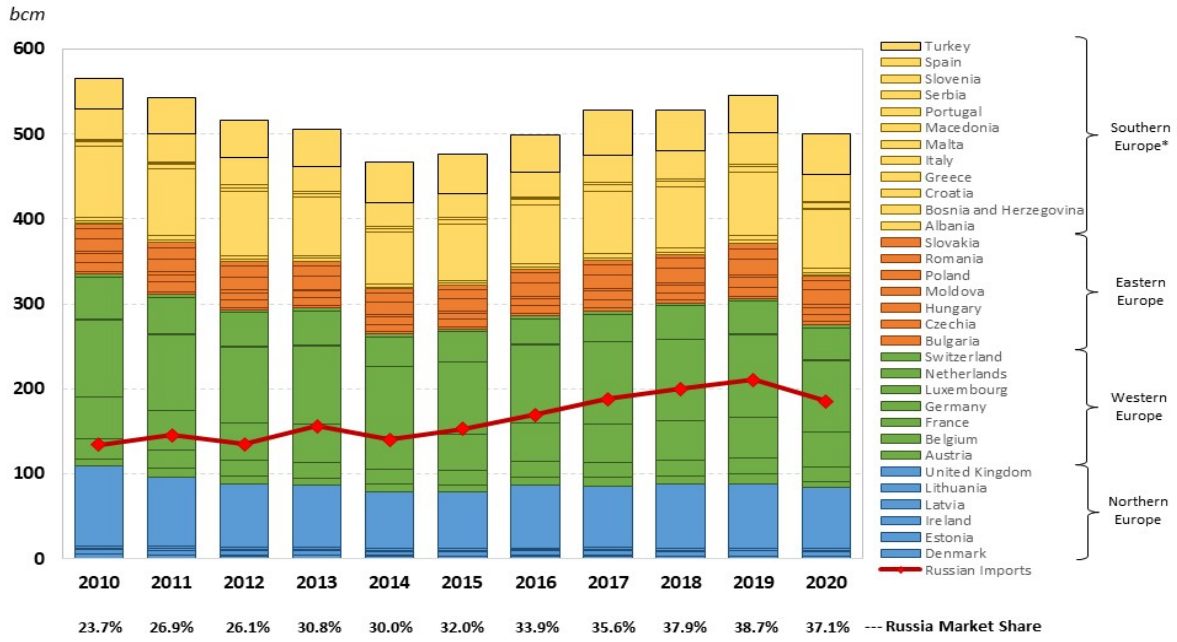
II. How Exposed is Europe if the Russia-Ukraine Crisis Escalates?

Russia supplies around 40% of Europe's gas consumption and became even more vital to Europe's gas security as the Netherlands' Groningen field declined starting in the mid-2010s (Figure 1).[10] While a gas cutoff would be extremely damaging to Gazprom as an enterprise, production and export of gas only accounted for about 6.5% of Russian federal budget revenues in the first 11 months of 2021.[11]

These asymmetrical impacts amplify the potential risks for Europe. Russia could potentially deprive Europe of almost 40% of its gas supply and 10% of its total primary energy supply while sacrificing gas revenues that would likely be largely offset by higher oil prices (assuming oil exports from Russia are not hindered). Of course, the direct impacts of a Russian supply disruption vary regionally across Europe, with Eastern, Northern, and Western European countries the most heavily exposed. But even LNG-

importing nations in the Iberian Peninsula and Southern Europe, which also draw heavily from Turkey and North Africa, would be affected by the ensuing price impacts and redirection of LNG cargoes. In sum, the increased dependence over the last decade on Russian gas has placed Europe in a compromised position that was not fully addressed, as it could have been, in the wake of previous disruptions that have occurred since the winter of 2005-06.[12]

Figure 1. Russia's Gas Market Share in Europe and Regional Demand, 2010-2020



Note: Southern Europe includes Turkey and the Iberian Peninsula. Regional groups are based on World Atlas definitions.

Sources: Cedigaz; authors' analysis.

Of course, this does not mean Russia is destined to cut gas supplies to Europe. But the near-term asymmetry bolsters the probability of Russia leveraging gas supply reductions to drive a wedge between Washington, Berlin, and Brussels—especially in the event that the US and the EU impose additional sanctions on Russia in response to new military actions against Ukraine.[13]

Energy dependence can undermine national leaders' resolve to stand up to Russian revanchism in and near Europe, ultimately dividing and weakening the EU and NATO. Indeed, we may be witnessing this in real time with Germany's lack of resolve to decisively support Ukraine's right to sovereignty and territorial integrity.[14] Germany is particularly exposed to disruptions of Russian gas supplies due to a lack of LNG import facilities in its territory, its high dependence on gas-fired power, and shutdowns of a substantial proportion of its coal (-9 gigawatts, GW) and nuclear (-12.3 GW) generation capacity over

the past decade.[15] To put those numbers in perspective, between 2010 and 2020, Germany voluntarily shuttered almost as much nuclear capacity as Japan did during that same period in the wake of the Fukushima-Daiichi disaster.[16]

Abrupt disruption of a cornerstone energy resource is at best infuriating and at worst life-threatening. This is especially true of heating and power generation fuels—like natural gas—during cold weather seasons. Texans know this all too well from the winter freeze in February 2021 that knocked out power generation for four days.[17] These kinds of disruptions also played out in global oil markets following the OPEC oil embargo in the early 1970s, the Iran-Iraq war and the Iranian Revolution in the late 1970s, and the Iraqi invasion of Kuwait in the early 1990s, each of which triggered a massive push to diversify sources of supply in different ways. China's recent power shortages and the subsequent orders from its leadership to expand coal production are another example.[18]

An important point is that the issue of energy security plays out across all energy sources and must be directly addressed. In the wake of disruptive events, energy security and the steps that can be taken to ensure it inevitably become focal points in public and political discourse. European consumers know this all too well, with emergency declarations issued during previous gas supply disruptions that resulted from disputes between Russia and Ukraine.[19] With so much at stake, what are the "conventional" responses to a gas cutoff, and will they be sufficient if Russian military action against Ukraine precipitates a potentially deeper (and much longer) supply reduction? The 2009 crisis offers a few insights into potential responses, as does the gas price spike of 2021.

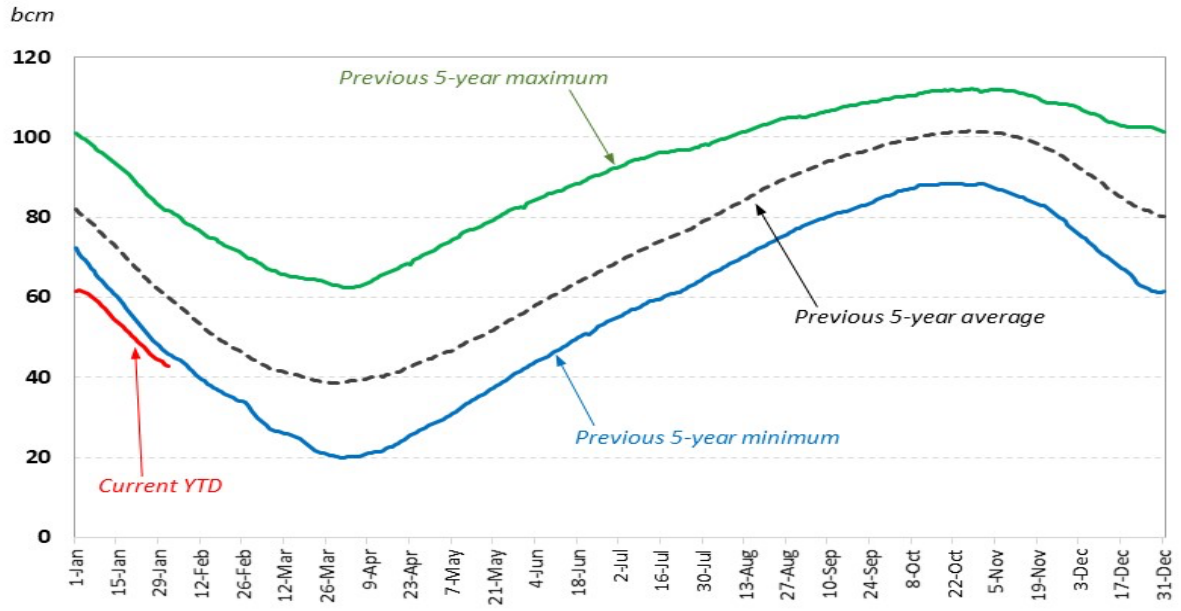
Domestic Option 1: Draw on Gas Storage

The use of natural gas storage would seem a logical first option.[20] But inventory levels reported by Gas Storage Europe as of the end of January 2022 were at their second-lowest point since 2011. Moreover, there are no major replenishment events on the horizon and at least six weeks remaining until spring (Figure 2).

EU-wide inventories as of January 31, 2022, stood at 36% full, with levels closer to 35% in Germany (Europe's largest gas user), according to Gas Infrastructure Europe. In volumetric terms, EU natural gas stocks were at approximately 41 billion cubic meters (bcm) at the end of January 2022, which is equal to about two months of Russian imports on an annualized basis.[21]

Conflict in Ukraine capable of disrupting gas supplies could last for an extended period, as could both Moscow's political motivation for using gas as a coercive lever and the impact of Western sanctions on Moscow's ability (and willingness) to deliver natural gas. Furthermore, a prolonged gas supply curtailment would likely disrupt the critical spring/summer restocking period and set up a deficit for next year's winter heating season, which would transform an acute crisis into a chronic threat to Europe. Thus, drawing on underground gas storage does not appear, in the absence of other options, sufficient if Russian gas supplies are significantly disrupted—especially in the event of an extended disruption.

Figure 2. EU Gas Storage Levels, Billion Cubic Meters (bcm)



Sources: Gas Infrastructure Europe (GIE), authors' analysis.

Domestic Option 2: Surge of Domestic Natural Gas and Other Energy Sources

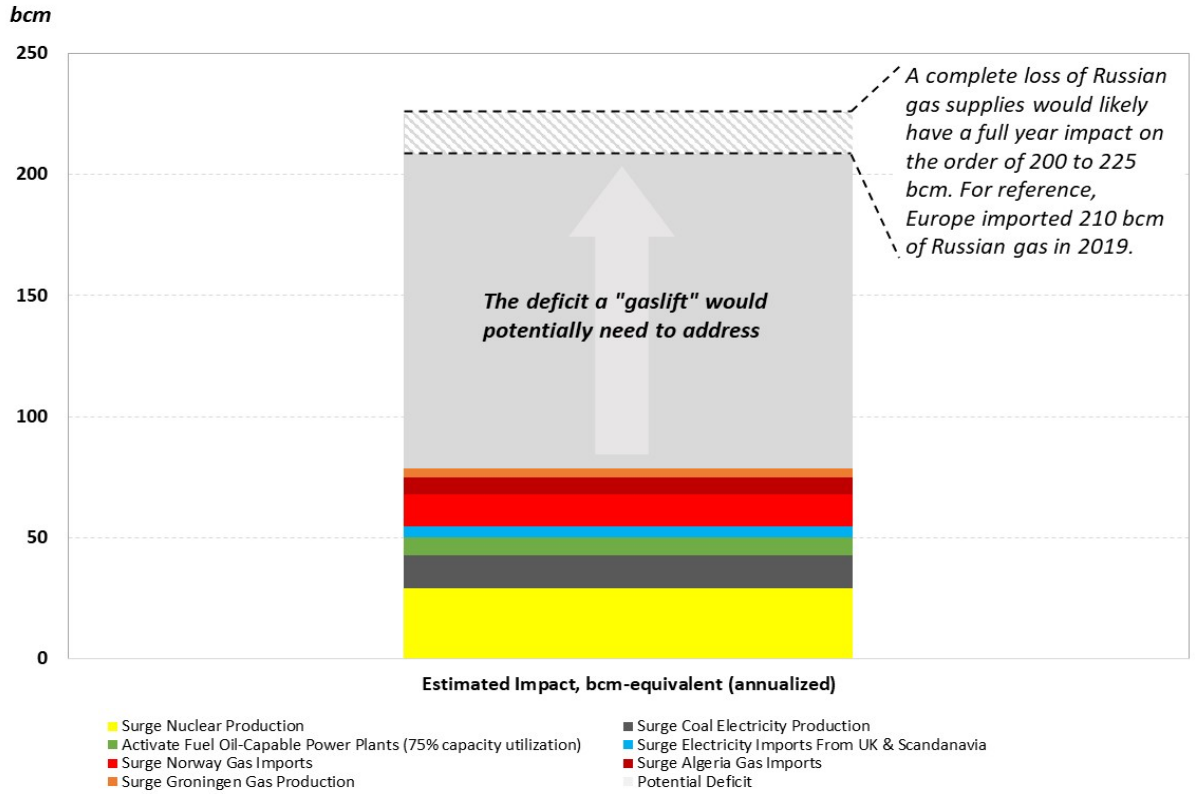
The potential for fuel substitution and ramping up alternative electricity sources to compensate for a loss of gas supplies is another margin of response available to Europe. We tentatively estimate that the combined impact of various supply-side adjustment measures could yield offsetting energy supplies equal to almost 80 bcm of gas on an annualized basis (Figure 3).

These would be delivered in the form of both gas and electricity. We acknowledge the comparison is not perfect since some applications cannot necessarily be electrified. In Europe, natural gas is used to fuel industry, generate electricity, and heat homes. We estimate, based on data from BP, the U.S. Energy Information Administration (EIA), and Eurostat, that industrial activity consumes about 30% of gas used across the EU (as a heat source, feedstock, and in the form of electricity). Therefore, the remaining 70% of natural gas consumed in Europe supports electricity generation and residential and commercial direct uses for cooking and heating. According to Eurostat, in 2019 households accounted for 26% of final energy use in the EU, with 32% of that coming from natural gas.

It is important to recognize that the options depicted in Figure 3 carry uncertainty with regard to their full measure. So, the data, as presented in Figure 3, represent a best estimate based on the information gathered. As such, in outlining each option in what follows, we also highlight some of the uncertainties that persist.

To begin, surging gas production from domestic assets—primarily the Groningen field in the Netherlands—and increasing pipeline imports from Norway, North Africa, and possibly Azerbaijan via the Southern Gas Corridor serve as rather obvious buffers to a sudden disruption of Russian supply. The Dutch government is considering allowing additional production at the Groningen field, with a total annual increase of 3.7 bcm (bringing the total to 7.6 bcm from the prior level of 3.9 bcm).[22] On the import front, Platts estimates that Algeria could deliver an additional 7 bcm of gas and Norway an additional 13 bcm in 2022.[23] Azerbaijan's ambassador to the UK said in late January 2022 that in the event of "an urgent need … some volumes of course would be made available."[24] It remains unclear how large these Azeri volumes could be and how quickly they could come online, so they are not included as potential "surge" volumes in Figure 3. Moreover, a production surge is not instantaneous, so there would be some short-term pain as this option ramps up to offset lost Russian volumes.

Figure 3. Emergency Energy Sourcing Alternatives for Europe
(bcm equivalent, annualized)



Sources: BP Statistical Review of World Energy (nuclear), Global Energy Monitor (fuel switching), Platts (Algeria and Norway estimates), Reuters (Groningen estimate), subsea cable operators (electricity import capacity), World Nuclear Association, authors' estimates.

Fuel switching presents an additional potential option. However, data from Global Energy Monitor indicate that only about 5% of European gas-fired power plant capacity outside of Belarus and Ukraine (about 10 GW in total) can switch to alternative fuels.[25] As such, fuel switching could only offset a very small slice of a very large energy deficit pie.

Insofar as alternative energy sources are concerned, wind and solar are ruled out for short-term surge capacity, because wind and solar generation resources are non-dispatchable and are outside policymakers' control. This does not mean they wouldn't be able to increase output at times, but given their variability, they would not be available during other periods. In the long term, electric storage options may help to enable wind and solar as energy security response mechanisms, but long-duration storage is not yet available nor is the ability to store energy as hydrogen from electrolysis. Hence, we do not include them as a viable policy lever in the short term.

Hydropower is not a particularly scalable resource for long periods of time due to the need to manage reservoir levels. Additionally, the largest sources of supply in Scandinavia and the UK face transmission bottlenecks because of the limited number of submarine HVDC cables that connect to continental Europe.[26] This means hydro is limited in its response capabilities for the whole of Europe.

European countries have steadily retired coal capacity due to facility age and environmental preference, and there are now approximately 134 GW of operational plants remaining in Europe (excluding Belarus and Ukraine), according to Global Energy Monitor.[27] Moreover, the existing coal fleet already ramped up to a meaningful extent in 2021 as a response to high natural gas prices, and it likely lacks the headroom to meaningfully offset the loss of gas supplies.[28] Europe is also structurally short on coal, and Russia is by far the continent's largest source of supply. Given the bulk nature of coal shipments and the logistical challenges associated with rapidly shifting sources of supply, it is not very likely that Russian coal imports could be offset by Australia, Colombia, the US, or other seaborne suppliers in a reasonably short timeframe.

Nuclear may be able to fill *part* of the gap. For the past five years, Europe's nuclear power plants (excluding units in Ukraine) have run at an average capacity utilization rate of 78%.[29] American plants during that same timeframe often managed to run at greater than 90% of rated capacity. This may indicate that European nuclear capacity could increase output to help compensate for the loss of gas-fired generation if Russia curtails supplies.

A key challenge is that reactors in France, Europe's nuclear stalwart and home to about one-half of European nuclear capacity (excluding Ukraine), may not be physically up to the task. A January 2022 report from Bloomberg indicates that French electric utility company EDF, which holds a monopoly over nuclear power, could experience production falls in 2022 by nearly 10%, relative to its historic low in 2020, as the company moves to repair cracks and corrosion at five of its 56 reactors.[30] If other European nuclear generators do not face similar physical constraints, this suggests it might (with emphasis on the "possible" rather than the "probable") be able to deliver 120 to 150 extra terawatt-hours of electrical

power onto the grid. On average, this would offset between 16% and 20% of the electricity generated by natural gas-powered facilities between 2015 and 2020, the last year for which we have full data.

While far from sufficient by itself, if done in conjunction with demand rationing and a "Berlin Gaslift" resupply effort, nuclear's role as the only non-gas generation resource scalable on a timeframe measured in days and weeks could be critical, as long as transmission constraints do not prevent the power from reaching consumers, either directly or by displacement. However, there is another complicating factor. Specifically, European nuclear capacity lacks gas capacity's ability to ramp up and down in response to short-term supply and demand imbalances. This means additional nuclear generation would likely necessitate the curtailment of intermittent renewables at various times. So, the net impact of nuclear generation as a near-term response option, while likely positive, is uncertain.

Domestic Option 3: Demand Rationing

Demand rationing will be critical for both extending EU-wide energy endurance and ameliorating human hardship. It will also be challenging given that the lion's share of EU natural gas usage occurs outside the industrial sector. Market-mediated demand destruction has been playing out for several months across Europe as record high natural gas prices push industrial consumers past economic breaking points.[31] If Russia cuts off gas supplies, EU officials (and their US interlocutors) should push to accelerate what market forces have already set in motion (i.e., ration demand to non-essential uses with a distinct aim of preserving near-term human health and well-being).[32]

The highest-impact objectives lie in the most energy-intensive industries. For instance, a plant making 1,000 metric tons per day of ammonia requires approximately 1 million cubic meters of natural gas per day.[33] Assuming a daily wintertime household gas usage of 10 cubic meters per day (twice the annual US average), the hypothetical ammonia plant shutdown could free up enough gas to supply at least 100,000 homes.[34] At a macro level, significant industrial curtailments could potentially extend existing EU gas inventory life by 20% to 25%. Stay-at-home orders that allow commercial establishments to curtail HVAC energy demand could extend supplies even further. Such steps would presumably be politically acceptable in extenuating circumstances, particularly if it helped avert blackouts, water outages, and other dire consequences of an uncontrolled energy shortage. Political interventions to expand the pool of available gas and energy supplies by managing demand would also amplify the impact of international response options.

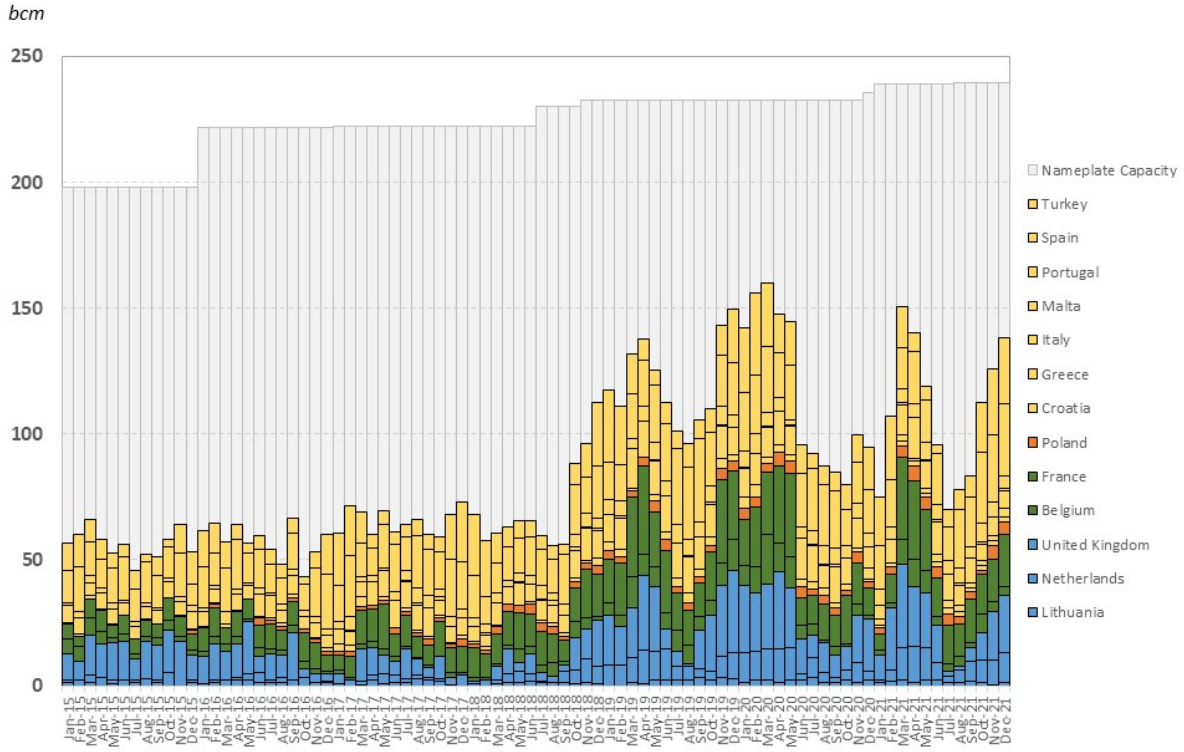
III. "Berlin Gaslift": International Response Options and Potential Consequences

International responses would dynamically impact decisions taken by European nations in the event of a Russian gas supply crisis. More laissez-faire approaches unleash competitive forces that, in the context of such an unprecedented disruption, would initially lead to massive price spikes as European consumers, bereft of supply, bid against Asian buyers for whom LNG supplies are often structurally irreplaceable at large scale, at least in the short term. It is important to note that such a gas supply crisis could arise from a cutoff of supplies by Russia, the imposition of sanctions by the US and its European allies that effectively prevents the sale of natural gas by Russia to Europe, or physical damage or other events.

Because of the breadth of potential outcomes—and the significant consequences engendered by each approach—we analyze the full spectrum of options for a "Berlin Gaslift" from market forces to full-scale government intervention supported by multiple levers of US and partner country national power. The next three scenarios discussed—referred to as "Market Forces," "Bully Pulpit," and "Government Action"—are near-term solutions geared toward the next six months or so. In a later section, we will discuss potential solutions for longer-term scenarios, including an intensified focus on gas geoeconomics. Each of these scenarios relies heavily upon seaborne LNG deliveries. There are other potential outcomes more inimical to long-term European and American interests, for instance a unilateral rush completion of the Nord Stream 2 (NS2) pipeline by Germany. Even if done with the intent to rescue German consumers from the cold and dark, putting NS2 into operation under duress would reward Russia for weaponizing gas supplies. The Biden administration has said that "if Russia invades Ukraine, one way or another, Nord Stream 2 will not move forward."[35] While NS2 is controversial, it does not square with US interests or with reducing Europe's dependence on Russian gas supplies. As such, we do not address it as an option for short- or long-term security of supply.

Europe currently has about 240 bcm per year (or 175 million tonnes per annum) of LNG regasification capacity (Figure 4). This capacity is split between Southern Europe (123.3 bcm), Eastern Europe (5.2 bcm), Northern Europe (66.1 bcm), and Western Europe (45.0 bcm). Southern Europe is, by far, the largest importer of LNG, accounting for just over half of all LNG imports into Europe in 2021. Within Southern Europe, Spain and Portugal (the Iberian Peninsula) accounted for about half of imports in 2021, while Turkey accounted for another quarter. Altogether, LNG imports into the Iberian Peninsula and Turkey accounted for about 38% of all LNG imports into Europe. However, there are pipeline bottlenecks, especially from the Iberian Peninsula to France, that limit the capability of LNG imports into these countries to serve the rest of Europe.

Figure 4. LNG Regasification Nameplate Capacity vs. Imports (Jan. 2015–Dec. 2021)

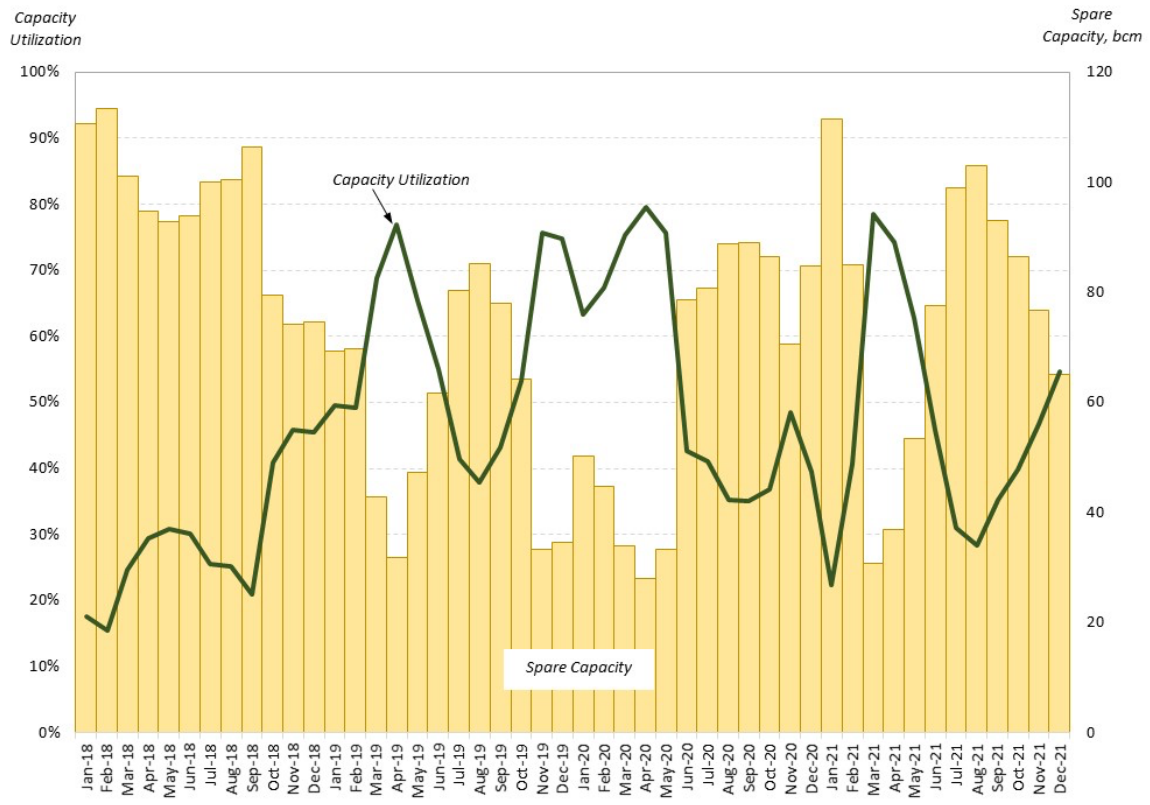


Sources: Cedigaz, authors' analysis.

Accordingly, a macro-level accounting of nameplate LNG regasification capacity appears to be theoretically sufficient—in tandem with the surge options discussed above—to backstop disruptions in Russian supply. However, reality is more complicated. Europe's LNG regasification capacity does not neatly align with regional demands. In fact, the Iberian Peninsula is virtually disconnected from the rest of Europe. Thus, additional vaporizers, increased pipeline or trucking capacity, and/or a reversal of flow on multiple transnational pipelines would be required to allocate regasified LNG where it is needed.

LNG regasification terminals will be critical for gas supplies in regions of Europe that are the most vulnerable to a sudden disruption of Russian gas supplies—basically all countries except Turkey and the Iberian Peninsula. Monthly data from Cedigaz indicate a seasonal pattern to LNG terminal capacity utilization, such that spare capacity will tend to be lowest in the winter heating season (Figure 5). Thus, the available headroom for LNG supplies in winter months to balance the European gas market is limited with regard to a sudden surge capability.

Figure 5. Spare Capacity and Utilization, ex-Turkey/Iberian Peninsula (Jan. 2018 – Dec. 2021)



Sources: Cedigaz, authors' analysis.

In the longer term, however, LNG terminal capacity utilization can be significantly increased during off-peak seasons (spring, summer, and fall) to deliver volumes that can fill storage. An increase in capacity utilization year-round would allow greater flexibility to European gas markets by facilitating a more robust gas inventory, thereby allowing for greater physical arbitrage capabilities and abating the need for Russian volumes.[36] In sum, it would enhance energy security in Europe.[37]

There is an important caveat to the use of nameplate capacities to predict short-run surge capabilities of regasification terminals. In practice, regasification facilities can be operated above 100% of nameplate, but the extent to which this is possible varies by facility due to engineering and design specifications and downstream infrastructure constraints. This is an important caveat to consider when evaluating surge LNG import capability, especially since some facilities have been observed in the data to operate at more than 100% of nameplate, even if only for a very short time. However, operating for long-term, sustained periods above nameplate capacity could compromise the integrity of facilities, which would be damaging to the facility and the market, especially in the event of a prolonged disruption of Russian supplies.

"Market Forces"

In the case of LNG, even without governmental action there will be a net increase in the flow of LNG to Europe as prices rise in the wake of a reduction or termination of natural gas supplies from Gazprom. Natural gas markets in Europe and elsewhere have evolved over the past couple of decades to become more liquid and flexible, even as Gazprom has become more dominant as a supplier to Europe. This ongoing evolution has precipitated much discussion about the role of long-term contracts, destination flexibility, and market liquidity[38] and has tremendous bearing on the LNG import surge capabilities in Europe.

Twenty years ago, almost all LNG was sold on a long-term, dedicated "point-to-point" basis with dedicated shipping to match. By 2020, 125 million tonnes of LNG (172 bcm), or 35% of all LNG delivered worldwide, was sold on a "spot" basis, allowing the seller to direct volumes to a buyer on relatively short notice.[39] We estimate that 25% or more of longer-term contracts include some destination flexibility, allowing one or both parties to change the destination of the cargo based on market or other salient factors. Together, these two components indicate that about 50% of all LNG cargoes worldwide could potentially be redirected in a short period of time. Physical and futures market prices for LNG have developed to incentivize buyers and sellers to make such decisions to redirect cargoes before or after loading—including, on occasion, long after departing the port of loading in order to take advantage of changes in relative prices across regional markets.[40]

If Russia were to significantly reduce or terminate deliveries of natural gas to Europe, natural gas prices would be expected to rise substantially. In the following days and weeks, LNG cargo deliveries to Europe would increase significantly. If left to market forces, LNG market responsiveness would only be tempered by available liquefaction capacity to export LNG, flexibility provisions in contracts, spot volumes, available LNG import terminal capacity in Europe, and competing demands in other parts of the world, most notably Asia. As a result, LNG prices would likely rise in Asia as well, although the impact would propagate from Europe, the location of the primary disruption, meaning price response in Europe would be greater than in other locations.[41] Nevertheless, market forces alone would reallocate available LNG supplies to a point where all *possible* arbitrage opportunities are captured. This may not be enough to avoid significant gas shortages in Europe.

"Bully Pulpit"

The next step is for the United States and its allies to use their political suasion to encourage LNG suppliers—both sovereigns and companies—to redirect cargoes to Europe. Indeed, there are reports that such discussions are already under way.

It is important to note that the US does not stand alone in this effort. Presumably the EU and the UK have very strong interests in joining with the US to encourage other friendly nations to support them in alleviating the energy crisis potentially caused by the loss of Russian gas supplies. To the extent other suppliers, such as Nigeria, Qatar, and Australia, have additional cargoes that they can produce or have the right to redirect, they may be willing to assist (as Qatar was willing to send additional cargoes to Japan following the 2011

tsunami and subsequent nuclear reactor shutdowns). But they would be contractually limited from redirecting cargoes committed to other markets merely because they are requested to do so. The US could play an instrumental role in facilitating discussions between LNG sellers and buyers, particularly those from major consuming nations who are allied with the US, such as Japan and South Korea, to discuss collaboration and the possible release of some cargoes for redirection to Europe. Such collaboration on energy issues among the US and its European and Asian allies is not unprecedented. Past examples include the 1973 OPEC oil embargo, sanctions on Iran, and various episodes during the Cold War with the Soviet Union.

Indeed, the US government has reportedly begun attempting to play precisely this role. President Biden invited Emir Tamim bin Hamad al Thani, the ruler of Qatar, to the White House to discuss cooperation in diverting LNG cargoes to Europe, proposing to designate Qatar as a "major non-NATO ally," a move that would have much farther-reaching implications than just Europe.[42] Similarly, US government officials have been meeting with officials of Japan, who have agreed that their companies will divert some LNG cargoes to Europe, so long as Japan retains a "stable" supply.[43] This reveals Japan's willingness to entertain allied assistance, but not at the cost of compromising its own energy security.

"Government Action"

Most likely, the steps discussed above would result in the redirection to Europe of enough LNG cargoes that, together with other demand and domestic supply responses discussed above, would allow Europe to get through a short-term natural gas crisis. In 1949, the US and the UK chartered civilian aircraft, in addition to using military aircraft, to carry badly needed liquid fuel and coal into Berlin during the airlift.[44] The US relied on the legal authority it possessed under the predecessor of the Defense Production Act, and its use of civilian aircraft led to the creation of the Civil Reserve Air Fleet, which still exists and was used most recently in the evacuation from Afghanistan in 2021.[45] An air approach is obviously infeasible in the resupply of energy to all of Europe, and, in any event, the governmental use or requisition of physical assets would hopefully be unnecessary. But the legal and political precedents for these historic actions could offer a template for action if a gas crisis were to erupt in Europe.

Assuming governments wanted to take an assertive approach, a natural question emerges. In particular, if the combined effect of market forces and government persuasion is insufficient to redirect enough LNG to keep Europe adequately warm and functioning, could the US mount the functional equivalent of the 1948-1949 Berlin Airlift to supply Europe by redirecting LNG tankers? In short, it would be logistically challenging and carry numerous consequences, but the US has considerable tools at its disposal to implement and enforce such a resupply effort, should it decide to do so.

The United States has recently become the world's largest exporter of LNG and is scheduled for more growth,[46] which means it will likely retain this position in 2022.[47] LNG export authorizations issued by the US Department of Energy (DOE) are subject to the DOE's authority to amend or rescind such export orders as it finds necessary or

appropriate to satisfy its statutory responsibilities.[48] The DOE has understandably and appropriately clarified that it "does not foresee a scenario where it would rescind" an LNG export authorization.[49] Indeed, it is exceptionally unlikely that the DOE would ever rescind an LNG export authorization. However, citing the preceding language, the DOE has more recently stated that it "may be necessary to protect the public in the event there is insufficient domestic natural gas for domestic use. There may be other circumstances as well that cannot be foreseen that would require agency action."[50]

The bottom line is that the US government likely retains the authority to "amend" LNG export authorizations, should it conclude that the public interest requires using it. While the DOE's determination of the public interest starts with impacts on domestic customers, its analysis of the public interest has included whether an LNG export authorization promotes "energy security for US allies and trading partners."[51] Again, we think this will likely not be necessary if the other actions in this paper are employed, but the possibility that the DOE could amend certain existing export authorizations for a short period of time to impose conditions supporting the "Berlin Gaslift" cannot be entirely dismissed. All holders of LNG export authorizations are required to include language in their LNG sales agreements requiring all downstream purchasers of their LNG to include comparable language in their onward sales agreements.[52]

As noted, the US is unlikely to act alone. The second largest LNG exporter, Qatar, is adding capacity and may have unallocated or destination-flexible LNG. Qatar also has a multi-year dispute with the EU over Qatar's long-term LNG sales agreements to the EU. Resolution of such a dispute presents a potential diplomatic action opportunity that could bring Qatar alongside the US in supporting a reallocation of cargo deliveries to Europe.[53]

If the reduction or termination of natural gas supplies by Gazprom were accompanied by an invasion of Ukraine or other hostile activities by Russia, an additional set of tools becomes available to help encourage cargo owners to cooperate—and if they will not, then ultimately to encourage tanker owners to cooperate—to assist in the resupply of Europe. Charter Party Agreements typically authorize the vessel owner to decline to send the vessel into areas that it reasonably deems dangerous, including in the event of a blockaded passage, even if the charterer desires to proceed to the original destination. In such an event, the vessel may proceed to a safe destination to discharge its cargo. Under most Charter Party Agreements, the vessel owner continues to be paid "hire" (freight) plus any additional incurred expenses as a result of the rerouting, removing any incentive for the vessel owner to place its vessel in harm's way.[54] Similarly, vessel insurers, many of whom are based in the UK, the EU, or the US, have a powerful voice in telling vessel owners where their vessels may or may not transit if there is hostile activity (e.g., not running a blockade). In contrast, NATO forces could provide naval escorts for LNG tankers arriving into European ports if needed to ensure a higher level of security.

Of course, most of the cargoes redirected to Europe are being redirected away from other customers. In many cases, these customers are in Asia. How will Asian LNG consumers react to having less energy to accommodate Europe's needs? Less spot LNG flowing to Asia is easier to explain since there is no firm contractual arrangement. However, redirecting *contracted* flows would be far preferable if undertaken in a collaborative manner based on dialogue among all the relevant parties. While no one is likely to be pleased by getting less LNG than they had planned, there may be some silent appreciation for the idea of shared sacrifice in the face of aggression and the precedent it sets for potential future undesirable circumstances in other parts of the world.

Until recently, China has signed relatively few binding, long-term LNG sales agreements that are currently delivering cargoes. They have largely sought to take advantage of low spot LNG prices over the last few years and have thus avoided making large commitments. Indeed, although committing in the 2020 US-China Free Trade Agreement to purchase $50 billion of LNG and other natural gas liquid products from the United States by the end of 2021,[55] their recently announced contracts for US LNG have not begun deliveries and most will not do so until 2023 or much later. A few are for LNG projects that have not yet been built.[56]

The US and its partners could ask China to temporarily substitute Australian coal for the LNG it currently receives from Australia. If Beijing accepted, that would free Australia to join the US and others to supply LNG to the UK and the EU.[57] That would bring the world's three largest LNG producers on board. If the Chinese rejected such a deal, it would reinforce to Europe that the US is the only true "all weather" partner among China, Russia, and the US, and there would still be other options. For instance, the Australian government might still move to assist, given that China has already suspended imports of Australian coal and threatened to reduce its LNG imports from Australia due to Canberra's comments about human rights issues.[58]

As noted above, diverting (one way or another) LNG cargoes from Asia to Europe will raise spot LNG prices in Asia, acting as a buffer to the market incentive that Europe and the US are hoping will pull cargoes to Europe. Another complicating factor is that long-term LNG agreements for Asia deliveries are typically tied to oil prices (Japanese Crude Cocktail, or JCC, being the dominant index for LNG), usually determined three to six months in arrears.

To the extent that oil supply remains largely unaffected by the cutoff of Russian natural gas to Europe, the divergence between high spot LNG prices and much lower long-term LNG contract prices in Asia may create resistance among Asian buyers to releasing their cargoes under their lower-cost, oil-linked contracts. If these legacy contracts do not include destination flexibility provisions, one-off profit-sharing clauses may need to be negotiated with sellers to incentivize these buyers to release their cargoes into the much higher-priced European spot LNG market. It will be important to quickly issue standard clauses that parties can adopt so that transaction times do not slow the goal of getting LNG to Europe.

IV. Longer-term Gas Security Options After the Present Crisis Abates

The Soviet blockade of Berlin ended on May 12, 1949, when road and rail lines were reopened to Berlin, but the airlift and the changes it brought did not end at that time. The Allies maintained the Berlin airlift for several more months in case the Soviets changed their minds. More importantly, the West's response in mobilizing resulted in major infrastructure changes in Berlin and Western Europe, and in the creation of NATO itself.[59] Russian aggression toward Central and Eastern Europe also did not end in 1949, a fact evident to this day.

Europe's present gas security quandary features echoes of the pandemic in that there likely will not be a neatly defined endpoint, many of the external factors driving the situation are not necessarily within Brussels' control, and it is now late in the game for preventative measures that, with hindsight, should have been implemented with alacrity after Russia seized Crimea. Nevertheless, the present acute supply shortages—which may get much worse if Russia and Ukraine go to war and pipelines are physically damaged and/or sanctions are imposed—will fade. At that point discussion must turn toward addressing the chronic lack of gas supply diversity that helped set the stage for today's crisis to emerge with such sharpness.

Unlike the post-2014 period, there likely will not be seven years to tarry. US nation-state power could provide an unsubtle backdrop to ensure that history does not continually repeat itself. A fair part of this process will happen organically, as occurred after the 2009 gas shutoffs amid the gas pricing and payment dispute between Gazprom and Naftogaz Ukraina. But as the current situation illustrates, partial adjustment is not enough.

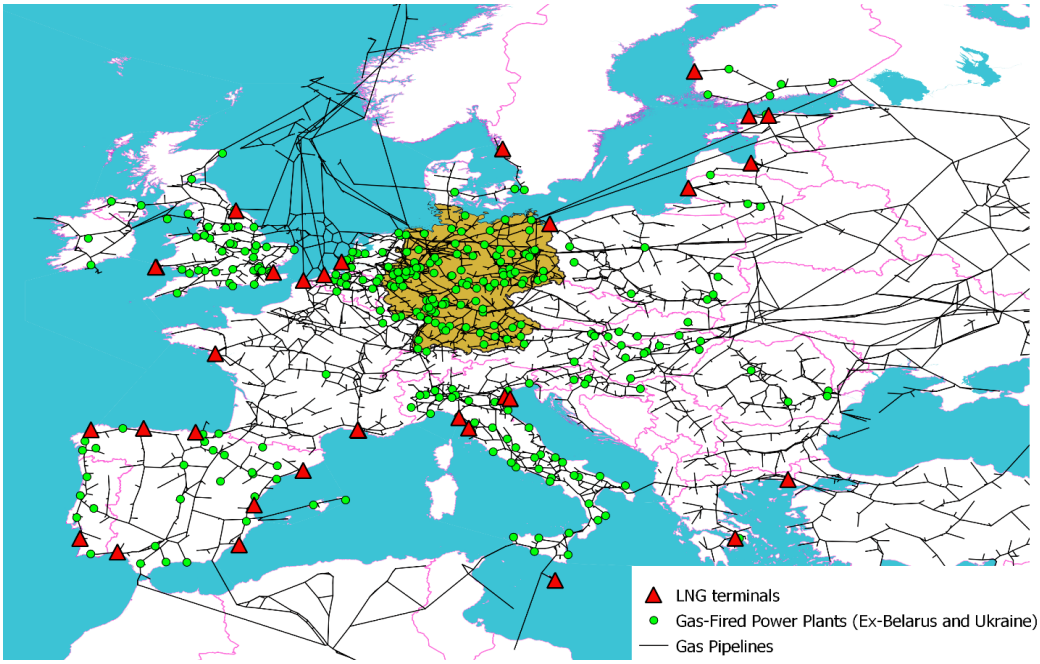
Gas geoeconomics offer a viable path forward as they could help resolve two questions central to Europe's gas 'schizophrenia' (where Russian supplies are recognized by governments to be geopolitically risky, but commercial firms tend to favor their long-dated arrangements with Gazprom, deepening Europe's dependency on Russian gas). The first question is why would a private commercial entity pay for gas infrastructure intended to deal with broader national—and continental—security concerns? The second is how can policymakers incentivize national decision-makers and monopoly gas distribution service providers in Europe to facilitate more rapid gas market liberalization?[60]

The challenges wrapped up in these two questions are enormous and penetrate the political, foreign policy, and commercial energy procurement dimensions in dozens of EU member states. At the same time, US domestic politics render Washington unable to act as the sole or prime funder of strategic gas infrastructure in Europe. Instead, US financial backing, coupled with diplomatic action, would aim to jump-start key infrastructure projects by removing barriers to private investment. At the risk of appearing to overly favor 1940s history, we remind readers that the US has made strategic financial investments in European security before—with excellent long-term payoff. As noted in Collins and Mikulska (2018):

> The Marshall Plan was controversial when it was first suggested, as it cost nearly 10% of the total federal budget at the time and offered no assurance of a positive return. The plan was not born of an abstract sense of American generosity, nor of a mercantilistic desire to obtain specific direct benefits for the US economy. Rather, it was a strategic investment to help America's partners in Western Europe revive themselves economically and strengthen their ability to resist Russian influence and communism. When Gen. George C. Marshall announced the plan in a June 1947 speech, he pointedly noted, "This is the business of the Europeans." The plan was structured to simultaneously advance American and European interests. Equally important, the preconditions for its success already existed in post-war Western Europe, including a broad experience with, and willingness to rely upon, markets as a way of allocating goods and services. As De Long and Eichengreen put it, "The Marshall Plan only tipped the balance."[61]

Gas geoeconomics should focus foremost on existing core demand centers that need the ability to offset Russian gas supplies (Germany and the Benelux countries), those with significant LNG terminal capacity that need better links to other parts of Europe (the UK and Iberian Peninsula), and those with a long coastline and access to trunk pipelines that in the future will likely carry less Russian gas and tie into core European markets (France and Poland).

Figure 6. Europe Gas Map



Sources: SciGRID_gas, https://www.gas.scigrid.de/downloads.html; GADM (Database of Global Administrative Areas), https://gadm.org/data.html; Marine Regions, https://marineregions.org/downloads.php.

Figure 6 illustrates these key areas of interest by showing Europe's gas pipeline networks, LNG import terminals, and gas-fired power plants. Note that power plants located in Belarus and Ukraine are excluded due to Belarus being a virtual vassal state of Russia and Ukraine being subject to physical Russian violence that could take facilities offline.

In addition to fixed land-based infrastructure, governments and energy companies in Europe should consider chartering existing LNG floating storage and regasification units (FSRUs). FSRUs are connected to shore-side facilities, typically using flexible hoses. Some FSRUs are available on the market and could potentially be onsite and operational before next winter if the parties act quickly. The key will be getting expedited siting and environmental permits for the FSRUs. This will require massive amounts of political will at multiple levels of government. However, expedited siting and permitting of the FSRUs offer a unique two-fold advantage for Europe. FSRUs can provide rapid energy security while at the same time not locking Europe into long-term fixed assets that might be opposed by those favoring lower-carbon goals. The FSRUs can be released when their charter is over, which could be for a single year. Thus, both 'Greens' and 'Energy Hawks' may be able to come together to support these valuable but flexible energy solutions.[62]

V. Conclusion: "Winter (2023) Is Coming"

Spring 2022 is approaching, but Europe's gas travails are poised to last much longer. The continent's gas inventories are at historic lows. This not only imperils near-term gas security, but if they cannot be replenished to normal levels during the summer of 2022, it also sets the stage for a repeat gas crisis next winter. Winter 2022-23 could be colder, and Russia-Ukraine tensions very likely will not be resolved. Gazprom will also likely continue withholding spot gas volumes from European buyers and instead insist that they enter additional long-term supply agreements.

If this confluence of factors is left unaddressed, two core pathways lie ahead: (1) chronic challenges with securing necessary physical gas volumes at the prices Europe needs to sustain economic growth and international competitiveness or (2) deeper dependence on Russian pipeline gas supplies that will further compromise the ability and willingness of key European leaders to uphold the rules-based order that underpins eight decades of peace and prosperity.

To meet the challenges in the first pathway, most or all of the "stop-gap" responses outlined herein will need to be implemented, at least to some degree. Some responses are already underway. On the supply side, LNG cargoes are being redirected to Europe in response to high gas prices. Energy diplomacy is starting to augment the natural function of market forces, with Japan's government recently requesting that domestic buyers divert some LNG cargoes to Europe.[63] The US is aggressively courting Qatar as a possible source of offset supplies,[64] as mentioned earlier, but Qatar's ability to redirect LNG flows from its mainly Asian customer base to Europe is limited.

Options closer to home are also important but collectively insufficient. Only a handful of Europe's gas-fired power plants can utilize alternative fuels. Europe's ability to increase production at the Netherlands' Groningen gas field or import extra pipeline supplies from Azerbaijan, North Africa, and Norway also falls far short of what is needed to compensate for the acute impacts of a Russian supply cutoff. The ability to surge alternative energy sources is limited by coal and nuclear shutdowns, beset by a high degree of technical uncertainty and constrained by the fact that electricity can only partially compensate for lost gas.

On the demand side, gas-intensive industrial facilities throughout Europe are also shutting down. If Russian supplies were curtailed, political authorities across Europe would also be able to impose politically unpopular—but necessary—demand curtailments such as further industrial and commercial shutdowns and physical rationing of remaining gas supplies.

If Russian gas supplies to Europe are interrupted, decisive US-led responses of the type we discuss in our "Government Action" scenario may become critical. But even drastic actions like the involuntary redirection of cargoes and emergency surge regimes at regasification facilities would only offer short-term relief. To yield true long-term security improvements, European polities at the local, national, and EU-level would need to respond decisively in ways that go far beyond the latest changes to the EU energy taxonomy and its quiet reacceptance of gas, nuclear, and relevant energy transition resources. US gas geoeconomics engagement can hopefully help accelerate multiple viable initiatives to enhance European gas and energy security, including the urgent charter and integration of FRSUs.

Such engagement would demonstrate that the US can execute on big, unorthodox ideas that support the rules-based global system. Concrete, systemically impactful actions led by the United States will impact thinking and behavior on the part of allies and adversaries alike.

As was the case in 1948, Russia starts this crisis from a position of both tactical and strategic initiative. And like 1948-1949, decisive action that demonstrates resolve and marshals allied states including Australia, Qatar, Japan, and South Korea can turn a contemporary energy crisis into long-term strategic resilience. Imagination operationalized through resolute action can create a more secure reality for gas consumers in Europe.

Endnotes

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[2] Such a cutoff could come from purposeful Russian actions, as a practical result of US sanctions, physical damage, or other pathways.

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[5] "The Berlin Airlift, 1945-1952," U.S. Department of State, Office of the Historian, https://history.state.gov/milestones/1945-1952/berlin-airlift.

[6] Ibid.

[7] Gabriel Collins and Jim Krane, *Carter Doctrine 3.0: Evolving US Military Guarantees for Gulf Oil Security*, Policy brief no. 04.27.17. Rice University's Baker Institute for Public Policy, Houston, Texas, 2017, https://www.bakerinstitute.org/media/files/research_document/e73ec9c9/BI-Brief-042717-CES_CarterDoctrine.pdf.

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[10] Anna Shiryaevskaya and Elena Mazneva, "How Europe has Become so Dependent on Putin for Gas," *Bloomberg*, November 9, 2021, https://www.bloomberg.com/news/articles/2021-11-10/how-europe-has-become-so-dependent-on-putin-for-gas-quicktake.

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[12] CEDIGAZ data show that between 2010 and 2019 (we use 2019 due to the Covid distortion in 2020), European imports of Russian pipeline gas rose by 42%, and Russia's overall market share, including LNG, rose from 25% to 42%. In contrast, LNG imports rose by 33%—a healthy growth number but one that ultimately revealed that as long as Gazprom offers gas at a competitive price, past geopolitical manipulation events affecting members of the European community tend to be rapidly forgotten, even if their other consequences (such as the ongoing conflict in eastern Ukraine) linger.

[13] Russia has strong incentives to maintain gas supplies to Europe even in the event of invasion, air and missile strikes, and other "hot war" scenarios in Ukraine. However, European and American contingency planning cannot assume supply continuity on the basis of apparent commercial rationality. Conflicts can—and often do—metastasize and escalate in unpredictable ways.

[14] For analysis of the history of Russia's use of energy as a leverage tool and how this potentially interfaces with the country's hybrid war philosophy, see Gabriel Collins, "Russia's Use of the 'Energy

Weapon' in Europe," Issue brief no. 07.18.17, Baker Institute for Public Policy, Houston, Texas, 2017, https://www.bakerinstitute.org/research/russias-use-energy-weapon-europe/. For German actions thus far in the Ukraine crisis, see Michael R. Gordon and Bojan Pancevski, "Germany Blocks NATO Ally From Transferring Weapons to Ukraine," *The Wall Street Journal*, January 21, 2022, https://www.wsj.com/articles/germany-blocks-nato-ally-from-transferring-weapons-to-ukraine-11642790772.

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[16] "Nuclear Power in Japan," World Nuclear Association, updated December 2021, https://www.world-nuclear.org/information-library/country-profiles/countries-g-n/japan-nuclear-power.aspx.

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[21] It's worth noting that Gazprom controls about 10% of working gas storage capacity in Europe, including at sites in Germany, the Netherlands, Austria, Czechia, and Serbia. Calculated as follows: 1,116 TWh of working European gas storage reported by Gas Infrastructure Europe ÷ 9.77 TWh/BCM = 114.3 BCM. Gazprom reported controlling approximately 11.7 BCM of European storage capacity as of December 31, 2019. See Gazprom Export, "Storage," http://www.gazpromexport.ru/en/projects/storage/.

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[23] Herman Wang and Manish Parashar, "As Europe seeks alternatives to Russian gas, Algeria has pipeline capacity to spare," S&P Global Platts, January 28, 2022, https://www.spglobal.com/platts/en/market-insights/latest-news/energy-transition/012822-as-europe-seeks-alternatives-to-russian-gas-algeria-has-pipeline-capacity-to-spare.

[24] Anna Shiryaevskaya, "Azerbaijan Is Ready to Provide Europe With Emergency Gas Supplies," *Bloomberg*, January 28, 2022, https://www.bloomberg.com/news/articles/2022-01-28/azerbaijan-ready-to-provide-europe-with-emergency-gas-supplies.

[25] "Global Gas Plant Tracker," Global Energy Monitor, https://globalenergymonitor.org/projects/global-gas-plant-tracker/download-data/.

[26] NordLink can move 1.4 GW from Norway to Germany, NemoLink can move 1 GW between the UK and Belgium, HVDC Cross-Channel can move 1 GW between the UK and France, BritNed can move 1 GW between the UK and Netherlands, and NorNed can move 0.7 GW between Norway and the Netherlands.

[27] "Global Coal Plant Tracker: Summary Tables," Global Energy Monitor, https://globalenergymonitor.org/projects/global-coal-plant-tracker/summary-tables/.

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[29] BP, *Statistical Review of World Energy 2021*, 2021, https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html.

[30] Francois De Beaupuy and Rachel Morison, "French Nuclear Giant's Fall Risks Energy Security for all Europe," *Bloomberg Quint*, January 23, 2022, https://www.bloombergquint.com/business/french-nuclear-giant-s-fall-risks-energy-security-for-all-europe.

[31] "Demand destruction hits European gas market," Argus, October 14, 2021, https://www.argusmedia.com/en/news/2263727-demand-destruction-hits-european-gas-market.

[32] In Europe, gas is used to power industry, generate electricity, and heat homes. We estimate based on data from BP, the EIA, and Eurostat that industrial activity consumes about 30% of gas used in the European Union (as a heat source, feedstock, and in the form of electricity). The corollary is that roughly seven of every 10 natural gas molecules consumed in the Eurozone support the sustainment of human beings in their homes or commercial businesses. Eurostat reports that as of 2019, households accounted for 26% of final energy consumption in the EU, with 32% of that coming from natural gas. Accordingly, household gas consumption accounts for almost 10% of total final energy consumption in the EU (which we treat as synonymous with consumption of "primary energy").

[33] "Ammonia and Urea Cash Cost," Yara Investor Relations, accessed January 24, 2022, https://www.yara.com/investor-relations/analyst-information/calculators/ammonia-and-urea-cash-cost/. One tonne of ammonia requires 36 million BTU of gas input. At 1,000 ft^3 per mmbtu, this equals 36,000 cubic ft^3 per tonne of ammonia. A cubic meter contains 34.3 cubic feet, thus (36,000 ft^3 ÷ 34.3 ft^3/M^3 X [1000 tonnes per day]= 1.048 million M^3/d).

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[36] Of course, the ownership structure of storage—and its link to operations—matters here. If the ownership of storage facilities is unbundled from capacity rights, then competition can drive greater participation in storage markets. This, as was witnessed in the US two decades ago, would also drive investments to increase turn rates at facilities, allowing inventory holders greater arbitrage

capabilities. So, the regulatory architecture of the European storage market should also be considered, in the interest of energy security.

[37] The role of trade, expanded physical liquidity, and the impact on energy security have been explored previously. For a short discussion, see Kenneth B. Medlock III, "Could trade help achieve energy security?" World Economic Forum, March 3, 2016, https://www.weforum.org/agenda/2016/03/could-trade-help-achieve-energy-security/.

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[39] GIIGNL (International Group of Liquefied Natural Gas Importers), *2021 Annual Report*, 2021, https://giignl.org/wp-content/uploads/2021/11/GIIGNL_Annual_Report_November2021.pdf. On page 7, true "spot" is defined as delivered within three months from date of contract. Cf. IEA (International Energy Agency), "Spot and short-term LNG volumes in total trade, 2015-2020," updated January 25, 2021, https://www.iea.org/data-and-statistics/charts/spot-and-short-term-lng-volumes-in-total-trade-2015-2020. (Spot plus short-term LNG sales estimated to be 37% of total LNG trade in 2020).

[40] The profitable roundtrip of the Hellas Diana LNG tanker from Texas through the Panama Canal to Hawaii, then back through the canal and eventually on to the UK, illustrates the impact of changing relative market prices on final delivery destinations. See Sergio Chapa, "LNG Vessel's U-Turn to U.K. From Hawaii Shows Draw of European Energy Crisis," *Bloomberg*, January 18, 2022, https://www.bloomberg.com/news/articles/2022-01-18/lng-vessel-s-u-turn-to-u-k-from-hawaii-shows-europe-crisis-draw?sref=6sIHUF2h.

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[49] Ibid. 28,843.

[50] "Venture Global Calcasieu Pass, LLC; Opinion and Order Granting Long-Term Authorization to Export Liquefied Natural Gas to Non-Free Trade Agreement Nations," U.S. Department of Energy, Office of Fossil Energy, Order No. 4346, March 11, 2019, 69n.264 (emphasis added), https://www.federalregister.gov/documents/2019/03/11/2019-04299/venture-global-calcasieu-pass-llc-opinion-and-order-granting-long-term-authorization-to-export.

[51] "Eagle LNG Partners Jacksonville II LLC, Opinion and Order Granting Long-Term, Multi-Contract Authorization to Export Liquefied Natural Gas in ISO Containers Loaded at the Eagle Maxville Facility in Jacksonville, FL, and Exported by Vessel to Free Trade Agreement and Non-Free Trade Agreement Nations," U.S. Department of Energy, Office of Fossil Energy, Order No. 4078, September 15, 2017, 28-29.

[52] Authorizations to export LNG to countries with which the United States has entered into a free trade agreement requiring national treatment for trade in natural gas may not be subject to such unilateral amendment or rescission. The only country affected by this exception that imports a significant quantity of LNG from the United States under a long-term agreement is the Republic of Korea.

[53] Andrew England, David Sheppard, and Derek Brower, "US in Talks with Qatar over Gas Supplies to Europe in Event of Ukraine Invasion," *Financial Times,* January 22, 2022, https://www.ft.com/content/1ac9a0b9-5e93-4d1c-8f9b-d3a16db2467a.

[54] See, e.g., Shell LNG Time 1, issued November 2005, https://www.sec.gov/Archives/edgar/data/1592910/000104746914007859/a2221056zex-10_4.htm.

[55] Steven R. Miles and Kenneth B. Medlock, III. *Trade War, Energy & Coronavirus: How to Make the US China Deal a Success*, Policy brief no. 04.01.20, Rice University's Baker Institute for Public Policy, Houston, Texas, April 1, 2020, https://www.bakerinstitute.org/research/trade-war-coronavirus-and-energy-how-achieve-success-us-china-phase-1-trade-agreement/.

[56] Harry Weber and Valarie Jackson, "Chenier to supply LNG to Sinochem in latest term US offtake deal with China," S&P Global Platts, November 5, 2021, https://www.spglobal.com/platts/en/market-insights/latest-news/lng/110521-cheniere-to-supply-lng-to-sinochem-in-latest-term-us-offtake-deal-with-china; Jessica Jaganathan and Chen Aizhu, "China signs huge LNG deals with U.S. Supplier Venture Global," *Reuters*, October 20, 2021, https://www.reuters.com/business/energy/us-venture-global-signs-lng-deals-with-chinas-sinopec-documents-2021-10-20/.

[57] China's participation with the US in opposing Russian aggression in Ukraine looks increasingly unlikely. See "Join Statement of the Russian Federation and the People's Republic of China on the International Relations Entering a New Era and the Global Sustainable Development," President of Russia, February 4, 2022, https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwizlde39_X1AhX3J0QIHVkXB04QFnoECAgQAQ&url=http%3A%2F%2Fen.kremlin.ru%2Fsupplement%2F5770&usg=AOvVaw221PaDsAgPxKRLW4Lf7-YR.

[58] "Unless diplomatic ties improve, LNG imports from Australia will surely decline, as predictability and trust have both sustained a negative impact for both the government and private sectors." — Quoted from "China, US Ink Largest Long-Term LNG Contract in Clear Progress for Phase 1 Trade Deal," *Global Times,* November 4, 2021, https://www.globaltimes.cn/page/202111/1238181.shtml.

[59] "The Berlin Airlift," NATO Information Service, The Atlantic Series, https://www.nato.int/cps/en/natohq/declassified_156163.htm.

[60] Gabriel Collins and Anna Mikulska, "Gas Geoeconomics in Europe: Using Strategic Investments to Promote Market Liberalization, Counterbalance Russian Revanchism, and Enhance European Energy Security," Baker Institute Working Paper, Rice University's Baker Institute for Public Policy, Houston, Texas, June 1, 2018, https://www.bakerinstitute.org/research/gas-geoeconomics-europe/.

[61] Ibid. 12.

[62] Russia understands the role that an FSRU can play in providing energy security. Gazprom recently redeployed an LNG FSRU back to Kaliningrad, ensuring that the Russian enclave would continue to have access to natural gas even if its pipeline access via Lithuania were to be cut off. See "Russian LNG vessel back in Baltic amid tensions over Ukraine, gas supplies," *Reuters*, January 26, 2022, https://www.reuters.com/article/power-prices-russia-lng-vessel/russian-lng-vessel-back-in-baltic-amid-tensions-over-ukraine-gas-supplies-idUSL1N2U60CC.

[63] Obayashi and Rashad, "Japan to divert LNG to Europe."

[64] "Remarks by President Biden and His Highness Sheikh Tamim Bin Hamad Al-Thani, Amir of the State of Qatar Before Bilateral Meeting," The White House, January 31, 2022, https://www.whitehouse.gov/briefing-room/speeches-remarks/2022/01/31/remarks-by-president-biden-and-his-highness-sheikh-tamim-bin-hamad-al-thani-amir-of-the-state-of-qatar-before-bilateral-meeting/.