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A Bridge Over Troubled Water:[1] LNG FSRUs Can Enhance European Energy Security

Steven R. Miles, J.D., Fellow in Global Natural Gas
Gabriel Collins, J.D., Baker Botts Fellow in Energy & Environmental Regulatory Affairs

In our recent brief Strategic Response Options If Russia Cuts Gas Supplies to Europe,[2] we and our co-authors Kenneth Medlock and Anna Mikulska address options for supplying Europe with energy through the remainder of 2022 in the event that Russian natural gas supplies suffer interruption. Since we published the brief, Europe has formally proposed to reduce its reliance on Russian natural gas by two-thirds by year-end,[3] and Russia in turn has threatened to terminate all natural gas supplies to Europe.[4] Rising risk demands concrete, rapidly implementable gas supply solutions that can provide a bridge until longer-term infrastructure investments are in place. We address one such bridge in this follow-on brief.

THE GASLIFT

Our earlier brief called upon a variety of sources to fill the short-term gap that could be left by a cutoff of Russian gas supplies, including calling upon increased supply from Groningen and Norway, electricity imports, fuel switching, and demand side management. However, the bulk of the Russian gas shortfall would be made up through a Berlin airlift-style "GasLift" of LNG supplied by producers in the U.S., Qatar, and other allied nations, and often diverted from other destinations. We determined that, in extremis, global LNG supplies would be sufficient to support such an effort.

Furthermore, historical operational data for LNG terminals in Northern Europe—a key demand center—show that for short periods of time they regularly exceed their "nameplate" throughput capacity, and likely could do so again, particularly in a period of national emergency. For these and other reasons, we concluded that the GasLift could substantially and possibly completely fill the remaining gap left by other sources after a cutoff of Russian natural gas.

THE CHALLENGE: TO ADD ENERGY ASSETS BEFORE WINTER 2023 WITHOUT UNDERCUTTING THE EU CARBON TAXONOMY

But as we note in the GasLift brief, "Winter 2023 is Coming," and diverting LNG cargoes at a high economic and relationship cost from non-European buyers (many of them key U.S. interlocutors and treaty allies in Asia) is not a viable long-term strategy. Nor is running existing LNG receiving terminals beyond nameplate capacity. Sustainable interim gas solutions will thus be essential to bridge the gap between now and the mid-2020s, when parts of the recently unveiled EU 10-point plan for investments to reduce dependence on Russian natural gas may begin to kick in.[5] While laudable, many of the proposals either will take many years to site and build (such as new large-scale wind farms),[6] or risk running afoul of the EU's "carbon taxonomy" (such as certain new fossil fuel or nuclear facilities).[7]

FSRUs' optionality should make them a European energy security tool that energy security hawks and climate greens alike can unite over and support.

Our research indicates that probably 8–10 vessels, with an aggregate throughput capacity of approximately 45 to 80 BCM/year are available and could be relocated and used in the European market.

However, there is an alternative that allows Europe to bridge the gap between immediate energy security needs and long timeline climate priorities. Enter Floating storage and regasification units (FSRUs), which offer incremental and rapidly deployable energy intake capacity that can underpin near-term gas security while also not locking Europe into long-term fossil fuel or other infrastructure investments that could be adverse to the EU carbon taxonomy objectives. FSRUs anchor either at a pier or offshore and connect to existing onshore natural gas pipelines through pipelines running on a jetty—as is the case with the Port Qasim FSRU facility in Karachi, Pakistan, or via a subsurface pipeline attached to a fixed mooring point like the Independence FSRU in Lithuania or a turret mooring, like the Moheskhali FSRU facility in Bangladesh.[8]

FSRUs are typically chartered for a limited period, which could be as short as one to two years. The fixed infrastructure needed to move gas from ship to shore can cost in the range of $100-to-$130 million per facility based on the experiences of Bangladesh and Lithuania.[9] This is a fifth of what it could cost to build a comparable onshore regas facility; with more rapid amortization, it would require a much shorter time commitment to LNG or natural gas, after which vessel charters can be allowed to expire and associated facilities decommissioned if Europe transitioned fully to alternative energy sources.[10]

As such, they do not require capital investment commensurate with that needed for other long-term facilities, and do not require an extended political commitment to LNG or natural gas. If new renewable energy assets are expected to be available in a certain period of time, the charter can be designed with a term to expire at that time.

ADDITIONAL FLEXIBILITY

FSRUs bring an additional layer of flexibility in that the capacity owner can contract to purchase LNG for a fixed term (e.g., one or more years, or for a strip of months, such as November through April). Alternatively, the capacity owner can decide to only buy LNG on a spot basis when it is needed, recognizing the cargo will be purchased at prevailing spot prices but foregoing an ongoing purchasing obligation. In this latter scenario, the FSRU essentially acts as a peaker rather than a baseload unit, with the choice being that of the capacity owner. To a limited degree, the FSRU can even act as a seasonal arbitrage storage play, with the capacity owner purchasing LNG during a lower-cost summer month and selling natural gas during a higher-price winter month, though the limited amount of storage on board an FSRU greatly limits the amount of any such seasonal arbitrage.

MARKET AND AVAILABILITY

Currently there are over 45 FSRUs either deployed or under construction and expected to be completed in 2022. Most are under contract through 2024 or beyond. However, at least 19 are scheduled to become available at some point during 2022, either because their existing charter arrangements will expire or because their construction will be completed and they will become operational. While these 19 vessels have an aggregate throughput capacity of approximately 100 billion cubic meters (BCM) a year of natural gas, not all these vessels would be appropriate for the European market.[11] Some are too small, old, or inefficient to be helpful in solving Europe's energy security needs, and others have been uniquely designed for specific locations and cannot be readily relocated.

Nonetheless, our research indicates that probably 8–10 vessels, with an aggregate throughput capacity of approximately 45 to 80 BCM/year are available and could be relocated and used in the European market. Most FSRU vessels have a maximum send-out capacity of 15 to 22 million cubic meters/day of gas and an onboard storage capacity of at least 138,000 cubic meters of LNG (equivalent to about 79 million cubic meters of dry gas).[12] Vessels with smaller storage capacities also exist, but may need to be teamed with a separate floating storage unit for optimized use.

Would such a quantity make a difference? On the margin, if placed in the right locations, yes. Our earlier GasLift brief identified several short-term and longer-term steps that Europe could take to improve its energy security and reduce its dependence on Russian natural gas. The EU's recent 10-point plan proposes to adopt several of those plus others. If several FSRUs can be sited and installed in appropriate locations before year-end, and thus be available for the following year, they can make a critical difference. Chartering, relocating, and connecting an FSRU can be accomplished in less than a year—in "months" according to one industry CEO.[13] The key is whether the political will exists in government to site and permit the floating unit and onshore hookup on a temporary and emergency basis. Relative to an onshore terminal or even an offshore wind farm, much less permanent infrastructure is being created; when the charter is completed, the vessel weighs anchor and departs. Removal of short connector pipelines, mooring buoys, etc. can be accomplished at relatively low cost, especially given that unlike heavier carbon fuels, gas does not leave behind residual compounds of concern.

LOCATION, LOCATION, LOCATION

The optimal locations for these FSRUs are places that are near both demand centers and existing gas takeaway pipelines. Europe has 25 LNG receiving terminals; most have deep water ports and are connected to significant takeaway natural gas pipelines. However, those in the Iberian Peninsula (and Turkey) are not well connected to the north and need to be excluded for the purpose of considering alternatives to Russian natural gas. Several existing LNG receiving terminals in Northern and Western Europe are connected to existing takeaway pipelines with significantly higher capacity than the connected LNG receiving terminal's current nameplate capacity. As such, these LNG receiving terminals would be serious candidates for consideration for either a berthed or an offshore FSRU that would allow the terminal to quickly and efficiently increase its natural gas throughput capacity without major onshore infrastructure construction.

The landing site in Germany of the undersea North Stream 2 pipeline offers large-scale natural gas takeaway pipeline infrastructure with large unused capacity. NS2's Lubmin landing and the associated pipeline connections were designed to accommodate a gas inflow of 55 BCM annually prior to the project being sidelined in the wake of Russia's February 2022 invasion of Ukraine. In theory, this means that in purely volumetric terms, local pipelines would have space for gas injection by several FSRU units.

The severely curtailed Groningen gas field in the northern Netherlands likewise has existing natural gas infrastructure that could be used to move regasified LNG into the Northwest European market and beyond to offset reductions in Russian imports. Exmar and GasUnie announced on March 18, 2022, that they had reached a five-year charter agreement to station the FSRU S188 near the port of Eemshaven in Groningen province.[14] The barge-based FSRU S188 can regasify 6.4 BCM/year of gas.[15] The project serves as a useful proof of concept and the area may be able to dramatically scale up inbound gas volumes given that only a decade ago the Groningen field produced approximately 50 BCM/year versus contemporary levels of less than 5 BCM/year.[16]

The value of LNG FSRUs to energy security has not escaped the attention of Russia. The Russian outpost of Kaliningrad on the Baltic Sea is served by natural gas from Gazprom that must pass through a pipeline controlled by Lithuania, a NATO member country. Perhaps to ensure the energy security of its outpost, Russia has recently stationed an FSRU, the Marshal Vasilevskiy, off the coast of Kaliningrad, with two large LNG resupply tankers, the Energy Integrity and Velikiy Novgorod, waiting in the Baltic Sea.[17]

Chartering, relocating, and connecting an FSRU can be accomplished in less than a year—in "months" according to one industry CEO.

CONCLUSION

The "GasLift" is a vital part of any strategy for resupplying Europe with energy in the event of a cutoff of Russian natural gas for any reason. However, the breadth of the GasLift will be limited not by available LNG supply, but by available receiving terminal capacity near demand centers in Northern Europe. In the short-term, such terminals can be surged for limited periods above their nameplate capacities; other strategies, such as building new onshore LNG terminals and pipelines and onshore and offshore wind facilities, will take years.

To bridge the gap, Europe should consider deploying existing LNG floating storage and regasification vessels. Locations exist near demand centers and existing natural gas takeaway pipelines, and the vessels could be on station in a year or less if temporary siting is permitted. These FSRUs can be chartered for short or long periods to match EU energy and carbon policies and thus need not prejudice EU policy decisions regarding renewable investments. FSRUs' optionality should make them a European energy security tool that energy security hawks and climate greens alike can unite over and support.

ENDNOTES

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11. Calculated as follows: 9.5 billion cubic feet/d of regas capacity ÷ 35.3 cubic feet per cubic meter x 365 days/yr.

12. Converted using 571.45 cubic meters of gas per cubic meter of LNG, https://unit-converter.gasunie.nl/.

13. Steven Kobos, President and CEO, Excelerate Energy, speaking at CERAWeek, Houston, Texas, March 9, 2022.

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AUTHORS

Steven R. Miles, J.D., is the Fellow in Global Natural Gas for the Baker Institute Center for Energy Studies. His research includes energy transition issues related to LNG, natural gas markets, renewable energy, and energy storage. Miles also serves as senior counsel at Baker Botts LLP, where he headed the LNG team for much of his 35 years as a lawyer. In addition to LNG, his practice focused on natural gas, electric power, and renewable energy.

Gabriel Collins, J.D., is the Baker Botts Fellow in Energy & Environmental Regulatory Affairs for the Baker Institute Center for Energy Studies. He was previously an associate attorney at Baker Hostetler, LLP, and is the co-founder of the China SignPost™ analysis portal. Collins has worked in government and as a private sector global commodity analyst and investment advisor, authoring more than 100 commodity analysis reports for both private clients and publications.

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