The Energy Transition and the Search for Energy Security: Implications and Opportunities for Listed Infrastructure

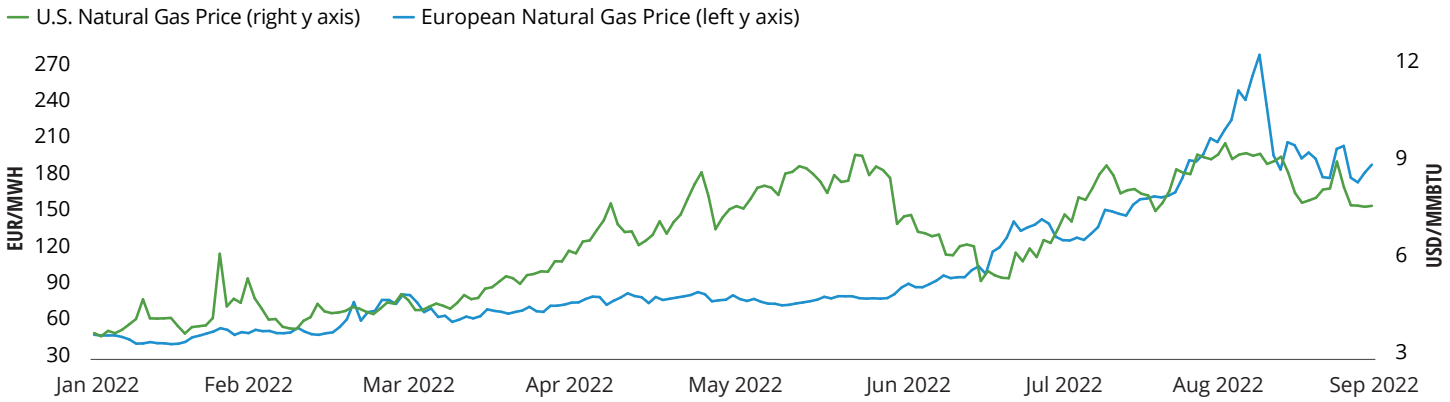
Amid the recent global energy crisis, governments around the world are seeking more safe and secure sources of energy supplies. They seek to ensure resilience and reliability of essential energy services, such as electricity and heat, while trying to manage increasing costs and balance the need to push forward lower emissions and decarbonization. We believe the efforts to address these concurrent complex challenges will have wide-reaching implications across global listed infrastructure, creating potential opportunities for investors in renewables and sustainable infrastructure, global diversified utilities, and energy infrastructure companies.

THE ENERGY CRISIS IS DRIVING THE PUSH FOR ENERGY SECURITY

Natural gas prices have surged in recent months. Acute supply concerns in Europe have predominantly driven the surge, which has been exacerbated by severe heat waves that have increased demand for power and reduced traditional power generation capacity.

In late July, Russia decreased its gas deliveries to Europe via a key asset, the Nord Stream 1 pipeline.[1] Then, in early September, flows were cut off completely. While Russia said technical issues forced the shutdown, industry analysts speculated the shutdown signaled Russia's possible weaponization of energy supplies ahead of winter, when natural gas demand is at its highest.

NATURAL GAS PRICES HAVE SURGED IN 2022



Future prices are as of September 21, 2022. Source: Bloomberg. U.S. natural gas prices reflect month-ahead generic futures (Generic 1st 'NG' Future). European natural gas prices reflect year-ahead prices for natural gas delivered to the Virtual Trading Point Netherlands Title Transfer Facility (Netherlands TTF Natural Gas Forward Year 1). "MMBTU" refers to Metric Million British Thermal Unit, and "MWH" refers to megawatt hour. **Past performance is not indicative of future results.**

The impacts of the European natural gas crunch have reverberated across the globe. In the U.S.—a net exporter of natural gas—domestic natural gas prices have more than doubled in 2022, as U.S. liquefied natural gas (LNG) production has been running at full capacity. As the energy crisis has worsened, politicians have been scrambling to shield consumers and businesses from the impact of substantially higher gas and electric bills, and have been searching for ways to ensure adequate gas supply for critical functions such as home heating and hospital power. We believe the challenges facing world economies today create substantial opportunities for investors in globally listed infrastructure companies due to:

- A heightened urgency to accelerate renewables adoption to not only combat climate change but also provide regional energy security
- A recognition that substantial utility grid development is needed to connect demand centers with new sources of supply
- A growing call on U.S. LNG to support renewables intermittency, displace coal and offset losses of Russian supply

POLICYMAKERS GLOBALLY RECOGNIZE THAT DEVELOPING CLEAN ENERGY IS KEY FOR ENERGY SECURITY

REGION	POLICY
The European Union	In March, the European Commission rolled out its "REPowerEU" plan to achieve more affordable, secure and sustainable energy. Specifically, the plan calls for wind and solar deployment to increase by almost 3x by 2030. The directive also seeks to enable faster and simplified permitting, which has been one of the key obstacles to increased renewables deployment in the region. Additionally, it calls for incremental LNG supply.
The United Kingdom	Progress toward a 2050 net-zero target continues at a healthy pace, with renewables holding a roughly 45% share of electricity generation in the first quarter of 2022. This is only the beginning. Offshore wind deployment is playing a critical role in decarbonization and energy security for the UK, as its oil and gas reserves are shrinking rapidly and it is increasingly dependent on imports from overseas suppliers. Recently, the U.K. government increased its offshore wind development target to 50 gigawatts (GW) by 2030, and there is a significant backlog of projects in the works off the coast of the North Sea, given that location's favorable wind conditions. This would be a significant positive for utilities.
The United States	The recently passed Inflation Reduction Act in the U.S. includes about $369 billion of climate- and clean-energy-related initiatives to be implemented over the next decade. The bill extends the current tax credit program for wind and solar development projects and restores these credits to their pre-phase-down levels. In practice, this means that companies that are developing projects will have better economics and potentially improved internal rates of return. The legislation also includes new incentives for nuclear generation, stand-alone storage, hydrogen and renewable natural gas, among other key new initiatives that will make the power sector less dependent on natural gas and improve its production cost visibility.

OPPORTUNITIES FOR INVESTORS

Opportunities in Well-Positioned Renewables and Sustainable Infrastructure Companies

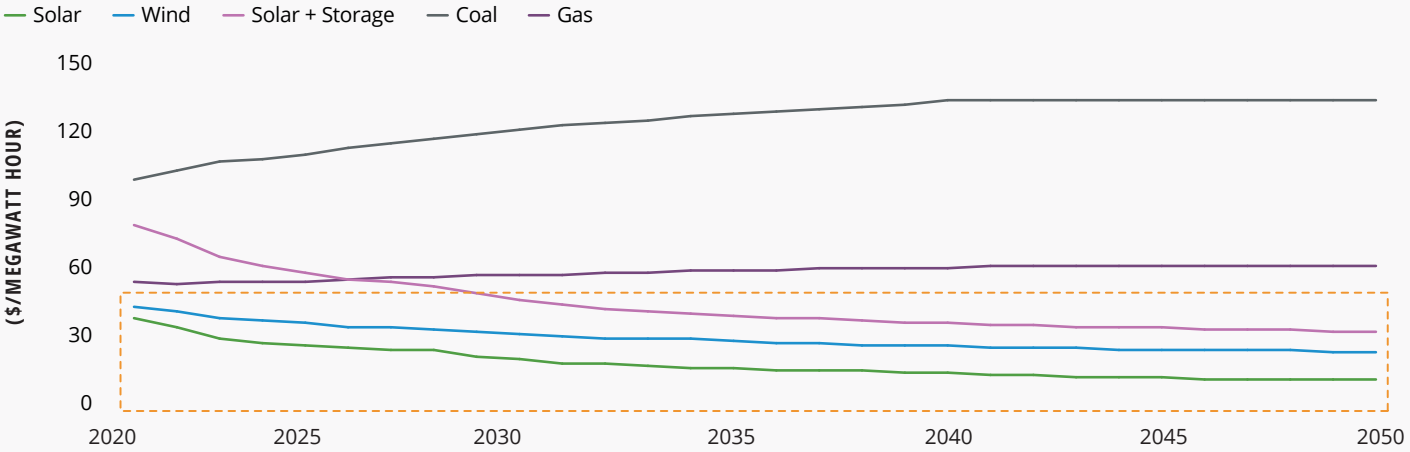
Policy support for renewables generation is accelerating at the same time that renewable energy costs continue to decline and fossil fuel costs are soaring. Renewable power generation is now nearly 50% cheaper to run than natural gas power plants in the current environment.

As a result, we expect renewable capacity additions (e.g., deployment of new renewable energy plants) to meaningfully accelerate through the end of the decade, creating investment opportunities in well-positioned renewables and sustainable infrastructure companies.

Wind and solar energy have historically received pushback because of their intermittent generation. However, we believe intermittency concerns could be largely mitigated as battery storage becomes more affordable through recently enacted tax incentives in the U.S. and support for existing nuclear generation as a key form of baseload power.

RENEWABLES ARE THE WORLD'S LOW-COST POWER PROVIDER

Technology improvements are expected to further decrease costs, which should further increase demand



As of December 31, 2021. Source: Bloomberg New Energy Finance, Brookfield Public Securities Group LLC. Reflects the U.S. levelized cost of electricity (LCOE), which is defined as the net present value of the unit-cost of electricity over the lifetime of a generating asset and is often taken as a proxy for the average price that the generating asset must receive in a market to break even over its lifetime.

Opportunities in Utilities Supporting the Energy Transition

We believe the utilities that own electricity transmission and distribution assets will play a key role in a successful energy transition, as they connect sources of renewable supply with power demand.

Traditional sources of power generation, such as gas plants and coal-fired plants, are often located close to population centers; these power generation sources simply require proximity to rail lines or pipelines to supply fuel. Wind and solar farms, on the other hand, need to be located where environmental conditions support the deployment of these electricity generation technologies at scale: effectively, in areas with reliable wind speeds and adequate levels of sunshine.

Additionally, the amount of land needed for these sites is considerably greater than what is required for traditional power plants.

These constraints mean renewable energy supply sources are generally located farther away from power consumers than traditional energy sources. As the energy transition progresses and is increasingly viewed as a way to create the foundation for secure energy supply, we expect substantial investment will be needed to build and upgrade transmission and distribution infrastructure so it can connect sources of renewable supply with power demand. This should support the capital investment and earnings growth outlook for related utilities. We are already seeing such opportunities emerging in the U.S., the U.K. and Europe.

OPPORTUNITIES ARE EMERGING ACROSS GLOBAL UTILITIES THAT SUPPORT THE ENERGY TRANSITION—AND ENERGY SECURITY

REGION	POLICY
U.S. Midwest	Significant investment is required to build and upgrade transmission systems to connect wind and solar projects in the Midwest with power consumers. The required investment could be up to $130 billion through 2039, according to Xcel Energy, a company within the regional transmission system operator Mid-Continent System Operator (MISO). MISO is an interstate organization that handles functions such as regional grid management in 13 states and is regulated by the Federal Energy Regulatory Commission (FERC), an independent agency regulating the interstate transmission of energy in the U.S. MISO has been proactive in establishing a road map for future transmission needs, with initiatives to address urgent challenges to grid reliability. Projects to address MISO's future transmission needs would be awarded, and bid out, to utilities that have assets in the impacted areas, representing a large potential uplift in future capital investment. This should translate into future cash flow and earnings growth. Utilities that are awarded related contracts will be allowed returns by FERC that should increase earnings (a return on equity of roughly 10.5% and equity capital structures of up to 60%). The outlook for utility companies exposed to this opportunity is quite favorable, in our view.
The U.K.	Increased offshore wind capacity targets in the U.K. require investment in transmission infrastructure, both offshore and onshore, in order to deliver the electricity produced. We expect large owners of transmission and distribution assets in the U.K. will benefit from this projected growth in offshore wind installations. They will be key conduits for transporting energy produced to the more populated areas in the U.K., requiring significant amounts of capital deployed to improve its transmission capabilities. This growth should help drive earnings growth over the next several years. For instance, one such company, SSE Plc, recently increased its growth expectations for its regulated asset base to a 10% compound annual growth rate (CAGR) through 2026, while also expecting even more growth toward the end of the decade.
Europe	The recent turmoil in European energy markets has caused significant stock price dislocations in certain European utilities relative to their intrinsic value. We expect several of the large integrated utility players in Europe will play a critical role in helping Europe achieve its renewable deployment targets, a role that should support these companies' long-term earnings growth. In addition, certain utilities have been proactive in reducing their exposure to Russian gas through hedging actions—risk reduction not necessarily reflected in their stock prices. While we are mindful of current energy dynamics across Europe, we believe the long-term value proposition is intact for many European utility companies, and we are looking to take advantage of attractive opportunities that may arise from short-term market volatility.

Opportunities in Energy Infrastructure Amid the Search for Energy Security

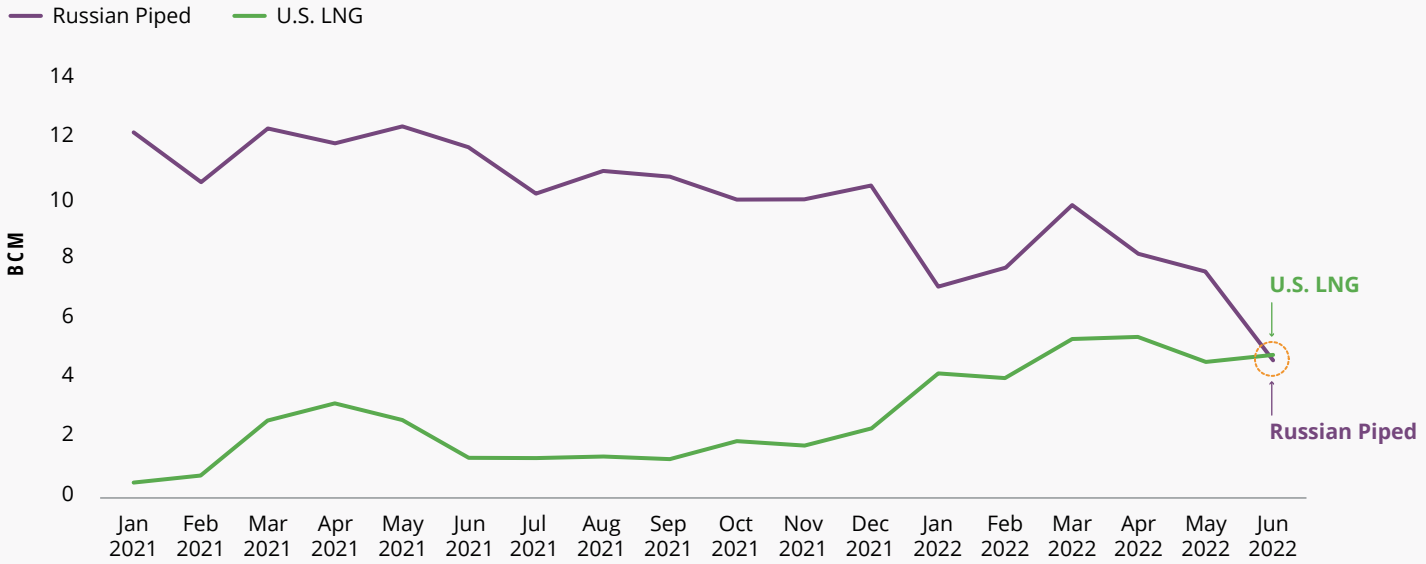
We believe North American energy infrastructure provides an attractive way to gain exposure to the search for energy security and other opportunities related to the energy transition.

While there is no doubt that the world will continue to push forward with energy transition initiatives, the push for secure energy means that natural gas is now all but certain to have a key role in the global energy mix for decades to come. North American energy infrastructure companies will be at the forefront, ensuring the flow of natural gas to demand centers in the EU and Asia, as the world seeks steady supply from predictable and reliable trading partners such as the U.S. and Canada.

In the short term, Europe remains reliant on gas as a key source of power. Russia accounted for 40% of the European Union's total gas consumption in 2021, as well as 46% of the EU's coal imports.[2] Yet Europe's energy dynamics have changed so significantly, and so fast, that in June 2022 the EU imported more LNG from the U.S. than piped gas from Russia for the first time, as the chart below shows.

U.S. NATURAL GAS (LNG) HAS OVERTAKEN RUSSIAN PIPED GAS IN EU GAS IMPORTS

International Energy Agency Analysis of EU Gas Import Components, January 2021 – June 2022



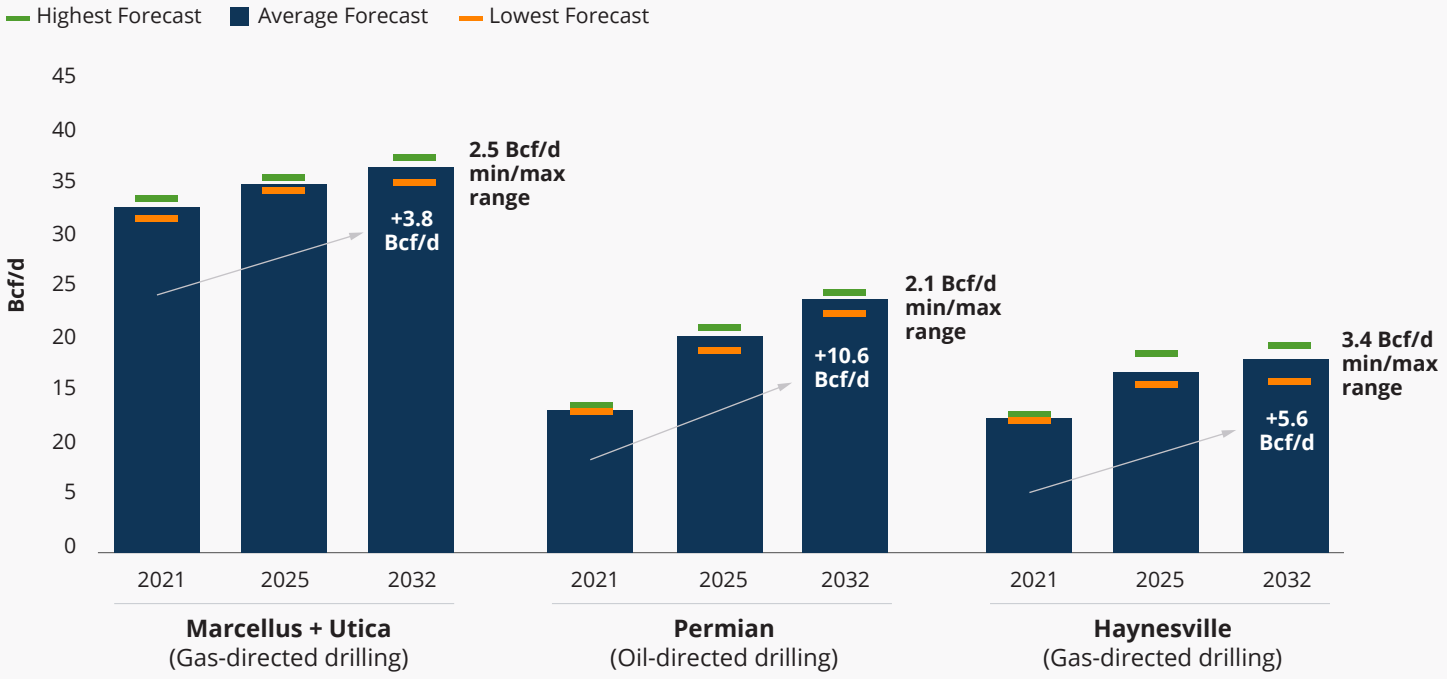
As of July 1, 2022. Source: International Energy Agency (IEA) analysis. "BCM" refers to billion cubic meters of natural gas.

This dynamic has much more to do with lack of Russian supply than increased LNG capacity from the U.S., as U.S. exports are constrained by capacity levels. Facilities are running near 100% utilization rates and long lead times are required to add new capacity. The EU, however, is working to secure future access to U.S. LNG supplies. The REPower EU plan calls for 50 billion cubic meters (BCM) of incremental LNG supply, and we believe there is ample room for North American producers to play a key role in achieving that target.

Midstream projects under construction indicate a substantial change in long-term export demand over the next several years. Total LNG capacity currently under construction in the U.S. is about 62 million tonnes per annum (Mtpa), which would equate to around 8 billion cubic feet per day (Bcf/d) of incremental natural gas production required in North America. To put this in perspective, the U.S. currently produces about 90 Mtpa of LNG today. Further, in the first half of this year, North American LNG developers signed 23 binding purchase agreements totaling 28 Mtpa of long-term LNG offtake—just these contracts would increase U.S. export capacity by more than 30% and roughly require an incremental 5% of additional North American gas supply.

Perhaps surprisingly, European counterparties have yet to sign up for substantial long-term capacity to replace Russian gas en masse. We believe this will change going forward. We see the robust contracting environment continuing as global economies—particularly those in Europe—seek to shore up their long-term energy supplies and energy security. Given this growing demand, we believe that North American producers will have to increase natural gas production to keep domestic markets balanced in the coming years while also supplying critical volumes to European allies. In addition, we expect they will be able to accommodate growing volumes in a cost-competitive manner.

NORTH AMERICAN GROWTH IS EXPECTED PREDOMINATELY FROM THREE KEY SUPPLY AREAS



Source: The Williams Companies Inc. (Barclays CEO Energy Power Conference, Sept. 7, 2022).

While certain companies stand to benefit most directly as the developers of new LNG export capacity, the entire midstream value chain should see an uplift in future cash flows and growth prospects. Over the standard 15-20 year life of an LNG export contract requiring construction of a new facility, the resulting gas supply will need key energy infrastructure assets to export facilities via local gathering systems close to the wellhead, processing facilities used to remove impurities and natural gas liquids, and, finally, long-haul gas transmission pipelines connected to export facilities. Each of these steps represents an opportunity for midstream companies to earn incremental margin along the way.

Opportunities in Energy Infrastructure Related to the Energy Transition

There also are signs emerging that energy infrastructure companies will have a role to play in future energy transition initiatives, such as hydrogen transportation and storage, and carbon capture and storage ("CCS"). In the U.S., the Inflation Reduction Act provides new tax incentives that should serve to meaningfully accelerate adoption of these technologies and further drive down costs, helping to make these projects economically competitive.

Hydrogen can be used for numerous purposes, including as a blend with natural gas streams to generate power, as a replacement for natural gas in industrial processes, and as energy storage for excess power produced by wind and solar. Critically, the most economical way to transport hydrogen is through pipelines, leaving current natural gas pipeline operators potentially well-positioned to repurpose their assets for hydrogen use in the future. They should be able to leverage their expertise operating, constructing and permitting pipelines in order to play a key role in the evolution of this burgeoning energy market.

On the CCS front, expanded and new U.S. tax credits should materially enhance the prospects of these projects. The benefits for midstream companies are twofold: increased adoption of CCS means carbon-based sources of energy may be used longer into the future without the negative impact of CO_2 emissions, and there could be opportunity to repurpose existing assets for use in transporting and storing carbon.

CLOSING THOUGHTS

Determining the necessary balance between decarbonization and security of supply will require cooperation between policymakers and the private sector—as well as management of consumer expectations. It is a delicate balance that will succeed only if the right regulatory constructs are designed and implemented to incentivize sizable investments from the private sector.

We believe that only the private sector will have the financial capacity to make the large investments that we project are necessary in the coming years. This is because government finances globally are under pressure amid the severe energy crisis and large public initiatives taken to protect consumers during the COVID-19 pandemic.

Listed infrastructure provides investors with numerous ways to participate in, and potentially benefit from, this evolving energy landscape. We see opportunities across renewables and sustainable infrastructure, global diversified utilities, and energy infrastructure.

We believe an active approach is key for capitalizing on these opportunities, with deep understanding and analysis of regulatory contracts, policy initiatives, and company-level risk/reward and cash flow potential critical to identifying potential winners and losers in the coming years. While uncertainty remains, skilled active managers can potentially help investors find value as the world seeks to transition to cleaner energy while achieving secure and diverse energy supply.

ENDNOTES

[1] Source: Bloomberg, "Europe Gas Prices Jump as Gazprom Cuts Nord Stream Flows Further," July 25, 2022.

[2] Source: European Commission, "REPowerEU: Joint European Action for more affordable, secure and sustainable energy," March 8, 2022.

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