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THE PERFECT STORM AHEAD FOR ENERGY MARKETS

Shifting US energy policies, increased costs of capital, the accelerating momentum of environmental movements, and profound challenges in attracting new talent are all combining to test the energy industry as never before.

When Cheniere loaded the first liquid natural gas (LNG) cargo from Sabine Pass, Louisiana in 2016 it marked the beginning of a direct linkage between the US and global natural gas markets, and created the first Henry Hub linked LNG pricing formulas that have subsequently carried over to virtually all US cargos destined for international markets. This price linkage has had little impact on US natural gas prices, even as LNG export capacity has grown. Ample – and relatively cheap – natural gas supplies recovered from US shale and tight sands thanks to technological advances have been able to support the US and now global market up to this point in time.

However, in the words of Bob Dylan, “the times they are a-changin’”. A multiplicity of global events and US domestic developments mean that the price linkage to international markets could soon play an important role in determining the future trajectory of US energy prices.

CURRENT EVENTS ARE DRIVING INCREASED DEMAND FOR GAS

When Russia invaded Ukraine, western European countries that had become reliant on Russian natural gas supplies found themselves facing a critical decision. These countries, particularly Germany, which had mothballed or even dismantled their coal and nuclear plants, were highly exposed as they joined other western countries in speaking out against Russia’s aggression and imposing economic sanctions. In response, Russia has cut gas flows into Europe by as much as 80%, driving up energy prices by more than 400% compared to a year ago and triggering the reactivation of coal-fired plants and radical conservation efforts.

With winter arriving, LNG buyers in Europe paid up for additional supplies, and sellers redirected cargos from the US to European ports as prices in western Europe traded near \$70/MMBtu at peak. Buyers in the Asia Pacific region, highly dependent on imported gas, have responded and pushed prices to slightly below those in Europe to compete for the spot, flexible destination supplies from the US.

This increased global demand has ensured that US LNG export facilities are running near operational capacity. Cumulatively the US LNG export facilities account for more than 11 Bcf/d in US market natural gas demand, even as domestic gas prices have continued to climb to well above \$8/MMBtu at Henry Hub.

With the war in Ukraine impacting Russian supplies, and demand in the Asia Pacific region growing, the development and construction of new LNG export capacity along the Gulf Coast is continues. With a total nameplate export capacity of approximately 13.3 Bcf/d , current LNG exports are not necessarily straining US production capacity, and projected near-term increases in export capacity can be met with somewhat minor increases in existing production levels.

However, new LNG liquefaction facilities that are under construction and scheduled to come online by the end of 2025 will add more than 6.5 Bcf/d in demand, requiring a significant increase in production. Beyond 2025, approved – but not yet under construction – LNG facilities are forecasted to add more than 23 Bcf/d of further new export capacity.

Should all these plants be built and come online as proposed in the next five to 10 years, US energy consumers could find themselves competing with gas-starved global markets for this vital resource, particularly if US producers struggle to increase production.

SUPPLY THAT DEMAND

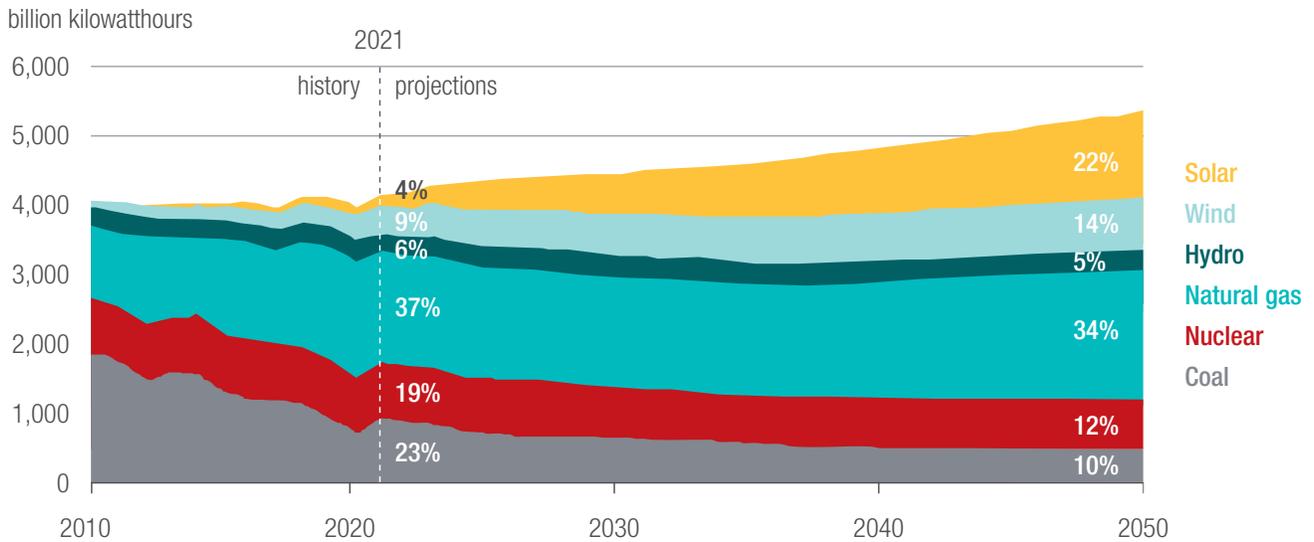
Continuing and indeed increasing domestic drilling will be necessary to meet the growing demand from European and Asian buyers alongside the need for reliable power generation in the US. The acceleration in the retirement of US coal plants has seen much of those plants' baseload capacity replaced by cheaper and cleaner natural gas. As the most significant contributor to energy production, natural gas provides both baseload and peaking capacity, thus playing a critical role in maintaining grid stability as more solar and wind resources come online.

The Energy Information Agency's (EIA) latest base case (or reference) forecast, released on March 2, 2022, indicates that natural gas will continue to be the primary fuel source for power generation for the foreseeable future. According to their forecast , in 2050 natural gas will supply 1.8 trillion Mwh of capacity

(34% of total power generation), equating to 32 Bcf/d of gas burned. Even though renewable energy capacity will continue to increase rapidly, particularly solar (forecasted to provide more than 1.2 trillion Mwh in 2050), natural gas will remain the leading component within the US energy mix through 2050 and beyond.

Though US residential and other retail consumption of natural gas is projected to grow only moderately, increased demand for power generation and increased LNG exports will require significant production increases. Based on EIA projection, US gas production – which stood around 94 Bcf/d at the end of 2021 – will need to increase to almost 98 Bcf/d by the end of 2022 and 117 Bcf/d by 2050 to meet total demand. For production to grow to meet the projected demand, continued investments by energy companies will be required.

Figure 1: US electricity generation from selected fuels AEO2022 Reference case



Source: U.S. Energy Information Administration, Annual Energy Outlook 2022 (AEO2022) Reference case

Note: Solar includes both utility-scale and end-use photovoltaic electricity generation

However, even with increased production, delivering that gas to markets across the US and LNG export facilities will also require additional investments in infrastructure, including pipelines and gas processing/treating plants. Given current regulations and policies, it has become increasingly difficult, if not impossible, to get interstate pipelines federally permitted and built.

For example, the Marcellus shale region, which has accounted for some 30% of the US gas production for the last several years, is near peak takeaway capacity. Though numerous producers and midstream operators have sought to increase pipeline capacity out of the region, intense opposition in the form of environmental protests and federal lawsuits have blocked all attempts to build any new interstate pipelines in the area for the last several years¹.

THE CHALLENGES

Despite the EIA's acknowledgment of the need to increase volumes of natural gas and oil, and the critical role these resources have to play in helping smooth the transition to renewable and net zero energy resources, social movements and political influence have sought to undermine and eliminate hydrocarbon energy resources from the mix. Given the size of investment required to develop new wells and construct infrastructure projects, producers and midstream operators often rely on external sources of capital to grow their operations. For many, these sources of funds include private equity companies, insurance companies, retirement funds, universities endowments, and other large scale investment firms.

The 'fossil fuel divestment movement', which first emerged as a loose coalition of environmental groups on college campuses in 2011, has sought to stigmatize hydrocarbon producers and force institutions to eliminate oil, gas, coal, and related industries from their investment portfolios. To date, the movement's efforts have resulted in more than \$40 trillion held by almost 1,500 institutions being pulled back from hydrocarbon industries globally². Though there is little hard evidence that this strategy has reduced carbon emissions, anecdotally at least it has forced some firms to seek new, higher-cost alternative funding sources. Aside from potentially increasing the cost of capital for some companies, perhaps the movement's most significant achievement has been casting the oil and gas industry as "dirty" and helping to motivate political action to end all future oil and gas development.

That political action was perhaps most sharply demonstrated when Joe Biden indicated on the campaign trail that he intended to end oil and gas lease sales, drilling, and fracking on federal, publicly held lands. He additionally promised that he would shut down construction of the Keystone XL pipeline, end "subsidies" for fossil fuel companies, and increase regulation and oversight

of the industry. True to his campaign promises, on his first day in office as President, Biden issued several Executive Orders that directly targeted the energy industry. These orders included blocking the development of the Keystone XL pipeline, rescinding federal lease sales, and mandating a review and recension of many of the previous administration's other energy policies, which had included a loosening of methane emissions standards.

Where US regulatory policy once emphasized energy reliability, affordability, and independence, the current focus is on prioritizing decarbonization at almost any cost. The Biden administration recently announced a goal of having 100 percent carbon-free electricity by 2035. In theory, eliminating carbon from the US power grid is physically possible – but doing so would require trillions of dollars of new investments in renewable generation capacity, utility-scale battery deployments, and research into new technology, accelerated retirement of the existing fossil fuel generation capacity, and the deployment of carbon capture technologies at natural gas generation plants. It would also require a massive upgrade of the electricity transmission and distribution grid to reliably absorb and manage the estimated 1,500 GWh of new widely distributed renewable capacity. Though this policy is unlikely to receive the necessary support in Congress to enact and fund it fully, it reflects the types of challenge now facing the US energy industry.

Social and political pressures also present a workforce-related challenge. Some estimates show that as much as 45% of skilled professional oil and gas employees are expected to retire over the next 10 years, representing a significant 'brain drain' across the industry. Experienced but younger employees are reluctant to stay onboard given a growing perception among media and policymakers that oil and gas is a "dirty business", which also means attracting new talent and fresh thinking to the space will be difficult and increasingly costly.

GATHERING STORMS ARE CONVERGING

The cumulative impacts of near-constant changes in US energy policies, the ever growing momentum behind environmental movements, increased costs of capital, and difficulties in attracting new talent to the industry are all conspiring to undermine and increase the costs of doing business in the 'oil patch'. Moreover, these pressures and challenges come at a time when much of the western world has been forced to reevaluate its energy mix and path to net zero with Russia, the world's second-largest gas producer, exacerbating the situation through its actions in Ukraine and its status as an unreliable and hostile business partner.

The US needs a healthy, clean, and efficient hydrocarbon industry to continue to meet the growing needs of its domestic market as we continue to transition to a 100% renewable energy grid while also acting as a reliable supplier of LNG to global markets to support their own energy transitions. Unfortunately, these developments are generating a perfect storm of negative influences that will undoubtedly force energy companies to reassess when, where, and how much to invest in drilling and infrastructure.

Investment decisions in this vexed environment must factor in a litany of growing – and sometimes interlocking – risks: regulatory, political, interest rates/costs of capital, asset availability (including human capital), inflation, global market developments, and the list goes on. Given such risks, and the price volatility each can contribute, investment decisions face a much higher bar than in the past, requiring increased confidence of acceptable returns for long-lived projects and even shorter-term investments, such as working over existing well sites. Price spikes are unlikely to stimulate new leasing, drilling, and infrastructure development due to the increased risk of both new regulations and activists'

lawsuits that endanger financial returns through extended project delays or even outright cancelation of previously approved permits.

Without shifts in the political and regulatory climate in which they operate, energy companies will increasingly sit on the sidelines until domestic energy prices reach and sustain a level that can support both the higher costs and increasing risks associated with investing in new productive resources. This narrowing of the investment window means that the sustained price floor at which they are willing to move forward will likely be much higher than today.

Even now, with energy prices consistently trading over five and 10-year highs respectively, the industry has been relatively slow to respond. According to the Baker Hughes rig count³, at the end of July 2022, 754 rigs were working, well below the highs of 2010-2015 when weekly counts averaged above 1,700 rigs, or the pre-pandemic period of 2017 – 2020 when rig counts averaged over 1,000 with oil trading consistently at \$50/bbl and natural gas at \$3/MMBtu or less.

Given the current growing market risks and uncertainties, it is unclear what price might stimulate significant production increases. However, with the existing (and deepening) linkage to global gas markets via LNG exports, much higher prices may be more than just a possibility. Should US LNG export capacity grow as projected and producers are unwilling or unable to respond to the increased demand in a timely manner, the US domestic market will be competing against European and Asia countries for natural gas where the markets pay prices four to five times higher than Henry Hub.

Given the impact that today's relatively high wholesale prices have had on US consumers' natural gas and electric bills, any additional increases will undoubtedly create further financial pain. With natural gas being a primary input into power generation, heating, chemical manufacturing, fertilizers, plastics, motor fuels etc, higher natural gas prices would be a key driver in increasing inflation and stifling economic growth.

To ensure the US can grow and sustain the additional 10 - 20 Bcf/d of natural gas that is projected to be required in the not-too-distant future – which is almost double the current US LNG export capacity – US regulators and policymakers need to provide producers and midstream operators a level of assurance that they will not be operationally and financially whiplashed. Furthermore, political leaders on both sides of the aisle need to work with their constituents, and the oil and gas industry itself, to turn down the rhetorical heat and stop demonizing an industry that the nation will continue to rely on for clean and affordable energy for decades to come – and one that will play a significant role in helping other countries continue their transition to net zero without enriching unreliable and occasionally hostile energy suppliers.



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