Published Gas Price Indices Causing Concerns

Thomas N. Russo

The past year was unusual due to major efforts to reform renewable energy and environmental policy laws that will affect the cost and environmental effects of renewable energy and natural gas facilities. Both the Federal Energy Regulatory Commission (FERC) and the President's Council on Environmental Quality started to reform the 40-year-old Public Utility Regulatory Policies Act (PURPA) and the 50-year-old National Environmental Policy Act of 1969 (NEPA), respectively. Both laws have had a good run; however, today's electricity and natural gas markets—as well as viewpoints regarding the use of fossil fuels, renewable energy, and climate change—are very different from what they were when Congress passed both bills. The reforms may take away the competitive advantages long enjoyed by new renewable energy projects that receive state subsidies, lower the cost of payments to wind and solar power by electric utilities, and roll back a growing trend calling for the effects of federal actions on climate change. All the while, electric battery storage is beginning to establish a beachhead in wholesale electricity markets, which could accelerate the clean energy transition and have significant implications for the renewable natural gas, hydrogen, and carbon capture and storage technologies initiatives being proposed by the oil and gas industry.

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This column is the first in a series that will provide an overview of regulatory and industry actions and proposals regarding PURPA, the PJM Capacity Market, NEPA, natural gas decarbonization efforts, and carbon capture, use, and storage (CCUS). In subsequent columns, I'll delve into the pros and cons of proposed regulations and efforts to decarbonize oil and gas and how they may affect the energy transition.

PURPA REFORM

The growth of the renewable energy industry in the United States was catalyzed by the Public Utility Regulatory Policies Act of 1978, which set forth a framework to encourage the development of alternative generation resources that do not

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rely on fossil fuels. PURPA also encouraged the development of cogeneration facilities that make more efficient use of the heat produced from fossil fuels that were then commonly used in the production of electricity.

As a result of PURPA, the growth in renewable energy has increased and costs have declined dramatically. Lazard's 2019 annual Levelized Cost of Energy Analysis showed that onshore solar and wind power can compete with gas-fired power plants and are less expensive than coal and nuclear power plants. However, without storage, wind and solar lack the dispatch characteristics and associated benefits of a gas peaker or combined-cycle gas turbine.[1] Lazard's cost-of-storage analysis showed significant cost declines across most use cases. However, there is industry concern about rising costs for future deliveries of lithium-ion systems due to higher commodity pricing and challenges related to storage module availability.

After FERC issued PURPA regulations in 1980, many states encouraged the use of renewable energy through their renewable energy portfolio standards (RPSs). Electric utilities and their ratepayers have also contributed to the growth of renewables, because they have been paying high prices for solar and wind power projects as a result of PURPA and state RPS programs. The tradeoff has been cleaner air and few environmental impacts. In some cases, electric utilities continue to pay above-wholesale market prices for wind and solar power even though competitive electricity markets have evolved in North America, and market prices are much lower as a result of the creation of regional transmission organizations (RTOs) and independent system operators (ISOs) where all power generators, including renewable energy, must compete against one another to be dispatched.

FERC's proposed new PURPA regulations issued in October 2019 reflect the new reality of the electricity markets and the role natural gas currently plays in electricity generation. FERC believes states should be basing prices that electric utilities pay for solar and wind qualifying facilities (QFs) on competitive market prices and not on PURPA or prices administered by the states. Electricity consumers should benefit from the regulations, because the rates paid to wind and solar QFs in power purchase agreements have been much higher than competitive market prices.

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A recent Concentric Energy Advisors study[2] showed that electric utilities have been paying a premium for renewable energy. The study reviewed, on an annual levelized-cost basis, solar and wind QF contracts signed between 2013 and 2019 in seven states (**Table 1**).

The study found that solar QF contracts exceeded a competitive market rate by between $6.27/MWh and $10.79/MWh in 2018 dollars. Hence, electric utilities and their ratepayers paid between $67.9 million and $116.8 million per year *more* for solar QFs than what the market would have paid. The estimated overpayment for the full term of the solar QF contracts is between $1.05 billion and $1.87 billion.

[1] Lazard's latest annual Levelized Cost of Energy Analysis (LCOE 13.0) and Lazard's latest annual Levelized Cost of Storage Analysis (LCOS 5.0) at https://www.lazard.com/perspective/lcoe2019.

[2] Nicholson, E., & Kagan, M. (2019, November). *An empirical analysis of avoided costs: Rates for solar and wind QFS under PURPA.* Prepared for Edison Electric Institute. Marlborough, MA: Concentric Energy Advisors.

Table 1. Summary of QF Contract Sample

	Solar	Wind
Number of QF contracts	629	79
Total capacity	6,311 MW	1,670 MW
Average QF capacity	9.2 MW	21.14 MW
Sample period	2009–2019	2009–2019
States	7	7

Source: Nicholson, E., & Kagan, M. (2019, November). *An empirical analysis of avoided costs: Rates for solar and wind QFS under PURPA.* Prepared for Edison Electric Institute. Marlborough, MA: Concentric Energy Advisors.

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Wind QF contracts were also consistently higher than competitive market prices indicated. Wind QF contract rates were between $17.66/MWh and $21.19/MWh higher on an annual levelized basis than comparable market-based contract rates. The estimated premiums relative to a market-based alternative were between $82.9 million and $99.4 million per year. The estimated premium for the full term of the wind QF contracts is between $1.65 billion and $1.99 billion.

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FERCs new proposed PURPA regulations seek to address these overpayments. In effect, FERC is requiring solar and wind QFs to compete with other fossil fuel–fired and nuclear power plants in these competitive markets and not rely on out-of-market payments traditionally paid by the states. As expected, electric utilities largely support the proposed rules, due to the fact they allow utilities to pay lower rates rather than the avoided cost of generation for those QFs. Utilities further argue that FERC's proposal also lowers the 20-MW threshold to 1-MW so that utilities can now buy power from smaller projects. The proposed regulation also modifies the "one-mile rule," allowing utilities to argue that facilities less than 10 miles apart could constitute a single facility. However, clean energy and legal groups state the new regulations could hurt small renewables in noncompetitive markets. These groups also believe the proposed regulations exceed FERC's authority and will likely take FERC to court.

PJM CAPACITY MARKET

If reforming PURPA was not enough, FERC issued an order on December 19, 2019, that made modifications to the PJM Capacity Market, which is the largest capacity market in the country. FERC's order takes aim directly at the state's clean energy goals, because these programs interfere with FERC's goal of ensuring just and reasonable rates. The order is very significant in that it pits clean energy, which receives federal and state subsidies, against existing fossil fuel power plants that also receive subsidies and credits for exploration, extraction, and environmental remediation, in addition to the federal investment tax credit. It also deals with leveling the playing field between renewable and conventional power resources at a time when the costs of renewables have declined steadily. Thus, the notion of why renewables should continue to receive subsidies is relevant.

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The order would impose a Minimum Offer Price Rule (MOPR) on new generating resources receiving state subsidies. These resources include solar, wind, small hydro, and possibly electric storage in the future. FERC's reasoning is that new solar and wind resources receiving state out-of-market subsidies could submit low- or zero-priced offers into the capacity market, resulting in price distortions and cost shifts.

While the order is complicated, the MOPR raises the price floor for those new resources receiving state subsidies that are attempting to sell their power into the wholesale market. The move is intended to prevent potential "unacceptable market distorting effects" caused by state clean energy policies, according to FERC Chairman Neil Chatterjee.[3] While the order focuses on PJM's capacity market, it likely will affect other capacity markets in regions with growing state clean energy goals like New York, Massachusetts, and California. Some states like New Jersey and Illinois threatened to leave PJM altogether if the order was not overturned.

[3] Morehouse, C. (2019, December 20). *FERC move to raise PJM capacity market bids shows 'clear bias' against new, clean generation: Glick.* Utility Dive. Retrieved from https://www.utilitydive.com/news/ferc-move-to-raise-pjm-capacity-market-bids-shows-clear-bias-against-new/569483/.

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NEPA REFORM

FERC's approval of natural gas pipelines and liquefied natural gas (LNG) export terminals have become increasingly lengthy, controversial, and litigious. Most of the controversy surrounds FERC's environmental review required by NEPA, and specifically the analysis of cumulative effects and greenhouse gas (GHG) analyses. FERC's position is not a matter of being able to analyze such GHG impacts, but rather questions the legality of having to include such analyses in their decision-making. Unless a case is remanded by a court, FERC's policy is to analyze the site-specific impacts of natural gas and LNG terminal projects only, and to ignore upstream and downstream GHG impacts of such projects. FERC commissioners have largely voted along party lines, with the exception of former Commissioner Cheryl LaFleur, who voted with the majority in approving natural gas projects after doing her own independent GHG analysis. The NEPA reforms being undertaken by the Council on Environmental Quality (CEQ) should bring some clarity to this question.

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Hydropower licensing at FERC is a very slow process due to the required NEPA environmental reviews. The current process seems to be "one size fits all"[4] regardless of whether the proposal is to add hydropower to existing nonpower dams, existing projects that have operated for 30–50 years that are undergoing relicensing, or new pumped storage projects that would add significant electric storage capacity to the electricity grid, such as closed-loop pumped storage hydro.[5]

The CEQ has nearly completed work in reforming the *Guidelines for Implementing NEPA* and is now seeking public comment on new regulations. CEQ's proposed rulemaking[6] would narrow existing NEPA oversight using a new "nonmajor" category and redefine a "major federal action" to exclude privately financed projects with minimal government funding. The proposed regulations would redefine cumulative environmental effects. The regulations would make it harder to address climate-change impacts from upstream or downstream effects on natural gas pipelines and LNG export terminals. However, the proposed regulations might benefit closed-loop pumped storage projects and other proposals that construct power plants at nonpower dams across the country, since these projects do not emit GHG and provide renewable electric storage to the electricity grid.

Comments on the proposed regulations are due by March 10, 2020. When the CEQ published an advanced notice of proposed rulemaking in 2018, it received more than 12,500 comments. It is very likely that a similar number of comments will be received on the proposed regulations and that the regulations may not be finalized until the end of 2020 or early 2021. Of course, the outcome of the 2020 presidential election will determine the ultimate fate of NEPA reforms.

CARBON CAPTURE, USE, AND STORAGE

The National Petroleum Council (NPC) and American Gas Association (AGA) have recognized that decarbonization of oil and natural gas is an imperative rather than an option. The NPC's report[7] provided recommendations on actions needed to deploy commercial carbon capture, use, and storage technologies into the US energy and industrial marketplace. At the heart of the NPC report recommendations are the

[4] Hartman, D., & Russo, T. N. (2017, August 24). *Ebbing the flow of hydropower red tape.* R Street Institute. Retrieved from https://www.rstreet.org/2017/08/24/ebbing-the-flow-of-hydropower-red-tape/.

[5] Russo, T. N. (2019). Pumped storage hydro: Reliable choice for the new electric storage era. *Natural Gas & Electricity, 36*(2), 25–32. Retrieved from https://onlinelibrary.wiley.com/doi/full/10.1002/gas.22138.

[6] Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act, https://www.federalregister.gov/documents/2020/01/10/2019-28106/update-to-the-regulations-implementing-the-procedural-provisions-of-the-national-environmental.

[7] National Petroleum Council. (2019, December 12). *Meeting the dual challenge: A roadmap to at-scale deployment of carbon capture, use, and storage.* Washington, DC: Author.

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industry's requests for more carbon dioxide CO_2 subsidies to promote using CCUS technologies to address GHG emissions and to ensure that global economies have affordable, reliable energy while addressing climate change.

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The NPC prepared the documents at the request of former Energy Secretary Rick Perry. The report is not a typical oil and gas industry document. Approximately 300 participants with diverse backgrounds, with 67 percent employed outside of the oil and gas industry, developed the report. The entire concept of CCUS is a hard sell for environmental groups, which may view it as just a means to continue reliance on oil and gas.

The report indicates the oil and gas industry is best prepared to lead efforts to deploy CCUS at scale. Currently, the United States deploys 80 percent of the world's CO_2 capture capacity, or 25 tonnes per annum (Mtpa), which is less than 1 percent of US CO_2 emissions from stationary sources.

The NPC study outlines three phases of deployment—*activation, expansion, and deployment at-scale*—that would support the growth of CCUS over the next 25 years and contains detailed recommendations for each phase. The activation phase would double existing US CCUS capacity by simply clarifying the existing tax policy and regulation to incentivize more companies to build more CCUS projects. The expansion phase would see CCUS of 75–85 Mtpa within the next 15 years by expanding the legal and regulatory framework around CCUS. The last phase, achieving CCUS deployment at scale with 350–400 Mtpa, would be achieved during the next 25 years, largely driven by the implementation of national and regulatory policies.

DECARBONIZING NATURAL GAS

The AGA, the leading trade association of the US natural gas industry, and its research arm, the American Gas Foundation (AGF), believe that renewable natural gas (RNG) could reduce GHG emissions in the residential gas sector. Under a high-resource-potential scenario, a reduction of 235 million metric tons of GHG emissions would occur and affect 95 percent of the natural gas residential sector. Under a low resource potential, 101 metric tons of GHG emissions would occur.[8]

The AGF has taken a similar approach by advocating the capture of methane from anthropogenic emissions from the agricultural sector, which is the second-largest source of methane after wetlands. The AGF also believes methane emissions waste such as landfills and wastewater treatment plants are viable sources (**Figure 1**).

The energy sector produces methane during drilling and when oil wells flare gas (burn it) for safety reasons and when there is insufficient gathering capacity, or processing plants and pipelines to transport the gas to market. The remainder of the methane emissions comes from leaks in pipelines and distribution systems.

Natural gas utilities need incentives and regulatory approval to explore and develop biogas and RNG.

The AGA and its members would use three methods to produce biogas and, ultimately,

[8] American Gas Foundation. (2019, December). *Renewable sources of natural gas supply and emissions reduction assessment.* Washington, DC: Author. Retrieved from https://www.gasfoundation.org/2019/12/18/renewable-sources-of-natural-gas/.

Figure 1. Percentage of Global Methane Emissions by Source

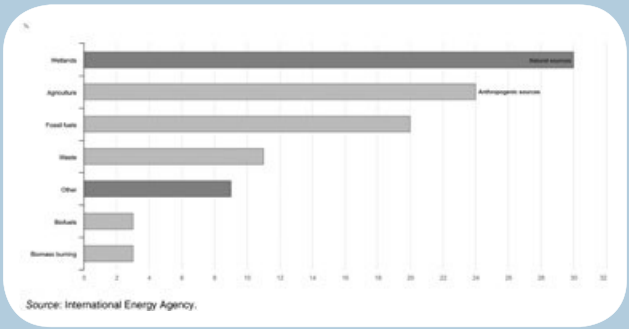

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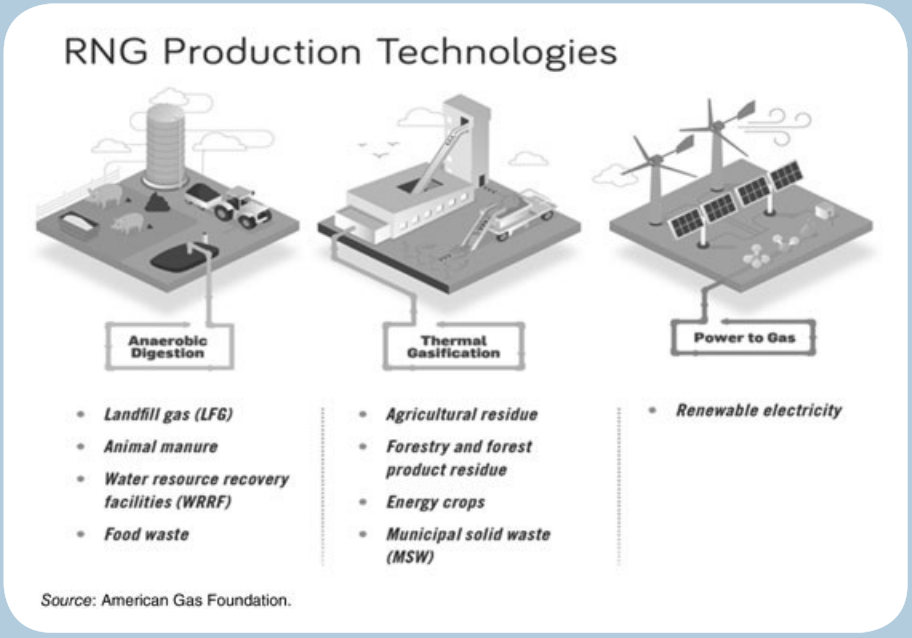
Figure 2. RNG Production Technologies That Would Be Used by Natural Gas Utilities



Source: American Gas Foundation.

RNG, once the biogas was treated and processed: (1) anaerobic digestion, (2) thermal gasification, and (3) power-to-gas (**Figure 2**). Natural gas utilities need incentives and regulatory approval to explore and develop biogas and RNG. Some state public utility commissions are already providing regulatory incentives to gas utilities to produce RNG and also to use power-to-gas technologies to produce hydrogen, which can be blended with natural gas to reduce the carbon emissions when natural gas is used for heating.

Power-to-Gas

With the increase in renewable electricity, many policymakers and companies have begun to explore using excess renewable energy to produce green hydrogen H_2 and to blend it with natural gas to reduce CO_2 emissions. H_2 has shown great promise as a fuel given its abundance and that it does not emit any carbon when burned. However, higher nitrogen oxides are produced during combustion. When H_2 is available, refineries and power generators blend it with natural gas to reduce CO_2 emissions. General Electric Corporation has 70 gas turbines that have operated (or continue to operate) on fuels that contain H_2. This global fleet has accumulated more than 4 million operating hours and over 300 terawatts of power generation.[9]

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CONCLUSION

The regulatory reform efforts started by the Trump administration on PURPA, the PJM Capacity Market, NEPA, and initiatives started by the NPC and AGA on CCUS and RNG will have significant effects on current electricity and natural gas markets. Along with recent advances and decreased costs of electric battery storage technologies, the energy transition may accelerate or decelerate. Whether the reforms and initiatives go forward depends largely on the outcome of the 2020 presidential election and whether the federal government and states pass laws granting higher CCUS and RNG subsidies, much like they did for renewable power projects.

[9] Goldmeer, J. (2019, February). *Power to gas: Hydrogen for power generation: Fuel flexible gas turbines as enablers for a low or reduced carbon energy ecosystem, GEA33861.* Boston, MA: General Electric.

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