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WAITING FOR THE SUN

AN EXAMINATION OF MARKET INFLUENCES IMPACTING VIRTUAL POWER PURCHASE AGREEMENTS

2021 Renewable Energy Market Analysis

CONTENTS

In 2020, global renewable electricity sources grew at their fastest pace in 20 years, with immense renewable development expected to continue.[1] Increasing 10% year-over-year, Q1 2021 was the strongest quarter on record for renewable installations. Rapidly improving technology, consumer and business demand for clean power, and policy support drove industry-wide growth for wind, solar, and energy usage.

Both public policy initiatives and voluntary purchasing by corporate buyers drives demand for renewables. Across the US, 38 states have some form of clean energy goals in place, nine of which are for 100% renewable energy by 2050. These renewable targets are only continuing to expand, with many states increasing their targets. Additionally, companies are facing pressure from their shareholders, customers, and employees to reduce emissions and procure renewable energy. Most recently, in a historic climate court case, Royal Dutch Shell was ordered to limit its greenhouse gas emissions 45% by 2030 from 2019 levels.[2] New climate goals are announced almost daily. Despite the unprecedented events of last year, 2020 was still a record year for corporate renewable procurements, with over 10,000 MW in the US.

Despite these long-term tailwinds, many projects are experiencing short-term headwinds that increase pricing to potential corporate partners. This white paper will explore current market dynamics affecting utility-scale renewable energy project developments.

The NRG Trading Advisors LLC (NTA) team has experience contracting and structuring over 4,000 MW of renewable, utility-scale transactions, and is advising multiple Fortune 500 companies on their energy and sustainability goals through the use of Virtual Power Purchase Agreements (VPPA). NTA expects the recent runup in VPPA pricing to start reversing course in the next 12 months and is therefore recommending a more patient approach to VPPA procurements for those with flexibility in their timelines. For customers with near term goals, the challenge is to find the needle in the haystack and structure the deal accordingly. Typically, in these cases, customers should prepare their management teams to expect greater economic risks.

[1] *"Global renewables grow at fastest pace in 20 years in 2020." S&P Global Platts. 12 May 2021.*
[2] *"'Monumental Victory': Shell Ordered to Limit Emissions in Historic Climate Court Case." Forbes. 26 May 2021.*

Supply chain

Renewable energy projects are facing upward pricing pressures due to tariffs, COVID-19, a recent ban on polysilicon from highly-sourced areas, raw material costs, and shipping cost increases.

TARIFFS

In 2018, tariffs were placed on imported solar panels under Section 201 of the Trade Act of 1974. These tariffs were to be in place for a four-year period starting at a rate of 30% then declining by 5% each year. In October 2020, import tariffs rose from 15% to 18% due to the inclusion of previously excluded bifacial modules in the tariffs. The tariffs on solar panels are currently set to expire on February 6, 2022, though it is possible that tariffs in some form could be extended. There are also additional import tariffs and duties on steel, aluminum, and certain semiconductors manufactured in China.

A recent petition by companies accusing solar manufacturers of circumventing tariffs has led to further uncertainty. A group of unnamed companies comprising the group "American Solar Manufacturers Against Chinese Circumvention" asked the Department of Commerce to implement antidumping and countervailing duties on solar equipment from a group of major solar manufacturers for products from Malaysia, Thailand, and Vietnam. The Department of Commerce has delayed ruling on the complaint while it gathers more information.[3] This tariff uncertainty has led to a temporary freeze on projects as developers no longer have enough certainty to price on projects. While the issue may be addressed soon, it serves as another example of the volatility to which the renewables market is subjected.

[3] *"US Delays Ruling on Solar Trade Complaint, Seeks Names of Petitioners." Reuters. 29 September 2021.*

COVID-19

The COVID-19 pandemic has disrupted development timelines for many projects with work stoppage and delays. Not only have projects faced delays in construction due to stay-at-home orders, but also from disruptions in global supply chains. While progress is being made worldwide to combat the COVID-19 virus, we are still seeing negative impacts related to the pandemic. This has disrupted production in many important regions where panels are sourced.

PANEL IMPORT BAN DRIVEN BY HUMAN RIGHTS CONCERNS

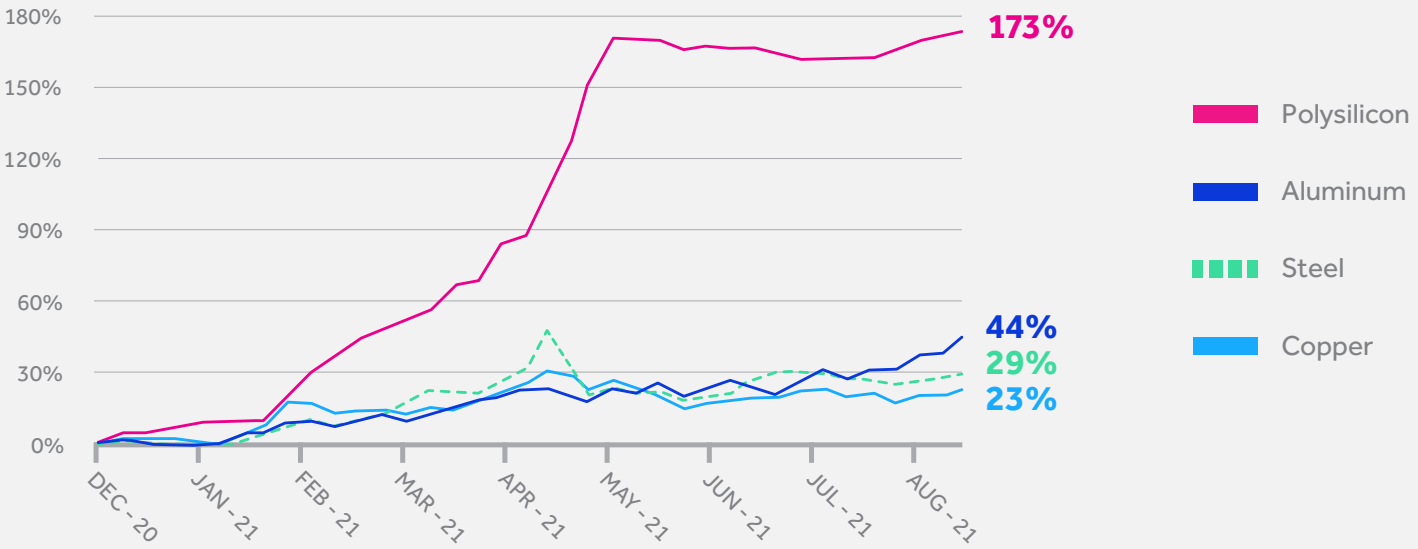
In the last year, there have been increasing concerns around solar equipment sourced from China's Xinjiang province. Nearly 45% of all polysilicon used in solar modules has been sourced from Xinjiang. The solar industry believes it has moved aggressively to ensure that its supply chain is free from ethical and human rights abuses.[4] Nevertheless, in June, the U.S. issued a ban on solar imports that contain polysilicon from Xinjiang.[5] This has resulted in a supply crunch while new supply chains are established, and existing supply chains are audited.

RAW MATERIALS

As economies have started to regain strength, raw material costs have skyrocketed. The global economic recovery post-COVID has caused upstream raw materials value chains to be constrained with demand outpacing supply. Additionally, the recent ban on polysilicon has further tightened an already constrained supply. Costs for raw materials to develop solar assets have spiked, including costs for modules (polysilicon, at 9-year highs), trackers (steel, over 25% YTD), inverters (transport, 3-6x higher; copper, over 20% YTD), and aluminum (over 40% YTD). These spikes are impacting costs for renewable projects downstream.[6] While the duration of high prices is difficult to predict, much of this volatility is expected to settle down in the next year, as global supply chains shift and scale to meet demand.

Figure 1

Essential materials for solar projects: Price movement of key commodities since December 2020



Source: BloombergNEF, LME PV Infolink, Shanghai SteelHome E-Commerce, Antaike (China Nenferrous Metals Association)

[4] *"Solar Industry Statement on Supply Chain Concerns in Xinjiang." Solar Energy Industries Association. 14 May 2021.*
[5] *"US Bans Imports of Solar Panel Material from Chinese Company." Reuters. 24 June 2021.*
[6] *"Solar Value Chain Inflation & Demand: Asian Perspectives." Bank of America Global Research, 11 June 2021.*

Policy uncertainty

In addition to the market dynamics affecting the supply chain of renewable energy projects, developers are pricing projects higher due to concerns around future policy changes. Drivers of uncertainty which may result in long-term impacts to renewable development include potential market changes related to the infrastructure bill, the Minimum Offer Price Rule (MOPR) in the PJM market, reforms in the Electric Reliability Council of Texas (ERCOT) market following winter storm Uri, and local legislation. Until the dust has settled on these pending changes, the uncertainty will continue to exert upward pressure on VPPA pricing.

FEDERAL INFRASTRUCTURE POLICY

While Congress recently passed a bipartisan infrastructure bill that includes funding for upgrades to the transmission system and changes to transmission siting policy, federal policymakers continue to consider further legislation that could impact the renewable energy market by expanding and extending clean energy tax credits for several years to come.

Renewable energy tax credits

If enacted, a 10-year extension and phase-down of an expanded direct-pay investment tax credit, a production tax credit for wind and solar, and new tax credits for battery storage and transmission projects, would reduce the need for tax equity, which is currently one of the most difficult financing hurdles for renewable developers. Projects are already factoring in a decreasing tax credit so an extension would be a boon that could bring down pricing. As potential legislation is being negotiated by Congress, developers are reluctant to price in tax credit extensions until the bill is finalized and passed.

PJM

PJM's Board of Managers recently approved a proposal addressing concerns surrounding the MOPR. MOPR initially required state-subsidized resources like renewables and nuclear, to bid into the PJM wholesale capacity market at higher prices than they otherwise would have. This raises the risk of not clearing the market and reducing these resources' revenues. PJM selected the proposal over nine others because they believe it "accommodates state policy and self-supply business models, addresses attempted exercises of buyer-side market power, and creates a sustainable market design by keeping clearing prices consistent with supply and demand fundamentals."[7] In July, PJM filed the proposal with the Federal Energy Regulatory Commission (FERC).[8] On September 29, the proposed changes to MOPR went into effect as FERC was deadlocked and did not act on the proposal.[9] Though PJM's proposal went into effect, FERC may still seek changes to the structure in the future which could impact clearing prices. Given the changes to underlying rules, capacity market uncertainty remains a headwind for renewable generators in PJM. In the near-term, capacity market prices are likely to be determined by factors other than the presence of MOPR. Renewable projects significantly impacted by the presence of MOPR are large-scale, state-policy resources such as offshore wind.

ERCOT

After Texas experienced disruptions in electricity and gas services during Winter Storm Uri,[10] numerous bills were introduced during the recent Texas legislative session dealing with issues such as reliability, communications, energy and ancillary services repricing, market rules and price formation, and weatherization.

As of June, Senate Bills (SB) 2 and 3 have been signed into law. These bills include the creation of a statewide emergency outage system, changes to ERCOT's board structure and eligibility, and resource weatherization. Following the legislative session, Governor Greg Abbott called on the Public Utility Commission of Texas (PUCT) to further increase power generation capacity and ensure a reliable grid.[11] The PUCT has an omnibus proceeding on market-design changes that is likely to culminate in a decision by mid-December. In the nearer term, the regulations the PUCT has passed have focused on hardening the system for winter conditions and ensuring that the ERCOT price cap is set to a manageable level.

LOCAL LEGISLATION

Local legislation also affects renewable development. For example, Ohio's SB 52 would grant local townships the ability to approve or deny solar or wind development projects in their area. This would impact all renewable projects greater than 50 MW, potentially limiting the future of renewable development in Ohio, which has historically been an attractive state for solar development.

[7] *"PJM Board of Managers Approves Proposal to Address Capacity Market Reform." PJM Inside Lines. 8 July 2021.*
[8] *"PJM Interconnection L.L.C., Docket No. ER21_2582_000 Revisions to Application of Minimum Offer Price Rule." PJM. 30 July 2021.*
[9] *"PJM MOPR Proposal Takes Effect by Notice of FERC." PJM Inside Lines. 30 September 2021.*
[10] *"The Timeline and Events of the February 2021 Texas Electric Grid Blackouts." The University of Texas at Austin Energy Institute. July 2021.*
[11] *Governor Greg Abbott to Commissioners of the Public Utility Commission of Texas. 6 July 2021.*

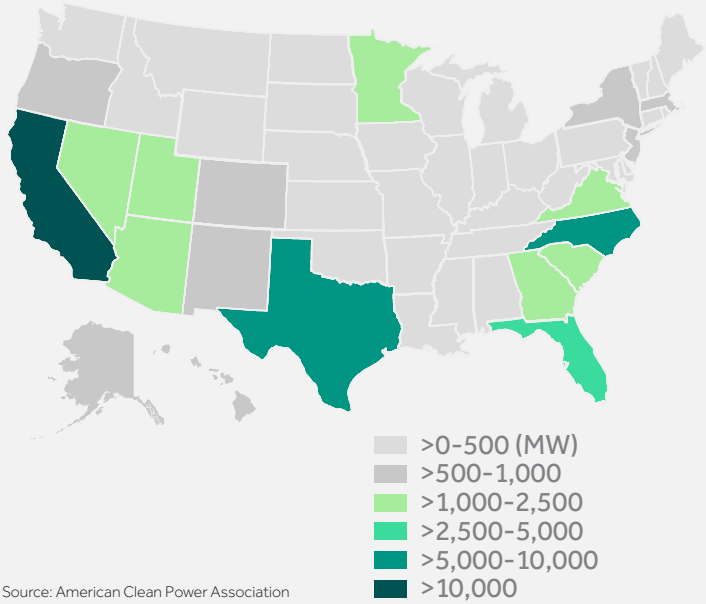
Interconnection and congestion

Despite lower electricity demand, solar set a record for new builds in 2020 in the U.S. with nearly 12,000 MW built and over 15,000 MW of new capacity expected in 2021.[12] California currently leads the U.S. in solar capacity, with almost three times that of any other state. Solar within the state accounts for nearly 30% of all solar in U.S.[13] ERCOT is currently ranked second behind California for most installed utility-scale solar and could outpace California in new solar builds. In addition, Texas currently leads the nation in total renewable capacity, the majority of which is made up of wind. However, with recent technology cost declines, the focus has increasingly been on solar which can be seen in the generation in queue. In 2021, ERCOT is expected to see the most amount of new capacity ever, with an expected 17,000 MW of new resources comprised mostly of wind and solar.[14]

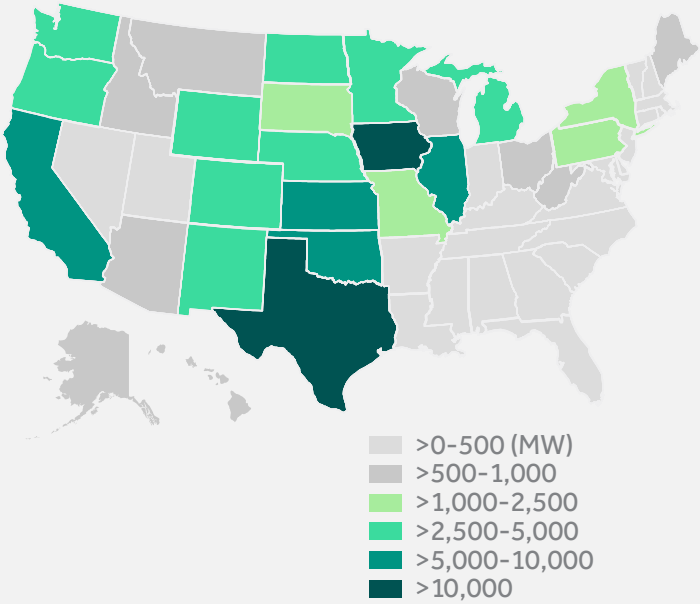
The Southwest Power Pool (SPP) leads the U.S. in wind generation market share with five out of the top 10 states for wind capacity falling within the SPP footprint. In 2020, wind supplied 22% of electric power in the region and SPP set a record as the first ISO/RTO to have wind generation lead its fuel stack. Wind continues to drive SPP capacity additions, representing approximately 90% of the projected 4,300 MW of net capacity slated for 2021.[15] Additionally, the Midcontinent Independent System Operator (MISO) expects a net addition of 8,400 MW in 2021, with nearly 90% coming from wind and solar.[16] Combined, the two regions are expected to add more than 10,000 MW of wind generation in 2021. High concentrations of renewable asset buildouts in only a few critical markets create significant risk related to congestion pricing and interconnection availability, adding economic pressure and interconnection risk to any new development. Further renewable buildouts also tend to shift wholesale market value away from hours with renewable generation, therefore decreasing the value of any asset that does not have the ability to arbitrage hours via battery usage.

Figure 2

Solar installed capacity by state



Wind installed capacity by state



Source: American Clean Power Association

[12] *"Solar expected to see more records in 2021 despite facing challenges." S&P Global Platts. 4 March 2021.*
[13] *"Continued strong renewables growth expected for 2021 coming off record year." S&P Global Platts. 1 March 2021.*
[14] *"Outlook 2021: ERCOT could add more than 19 GW, largely wind and solar." S&P Global Platts. 28 April 2021.*
[15] *"Outlook 2021: Wind continues to drive SPP capacity additions." S&P Global Platts. 4 May 2021.*
[16] *"Outlook 2021: MISO expects net addition of 8.4 GW, mostly wind and solar." S&P Global Platts. 29 April 2021.*

Conclusion

NRG Trading Advisors is not communicating the same sense of urgency as other advisors. We recommend a 6-12 month pause on executing new VPPAs to our clients. Over this time, we expect that less policy uncertainty and more stability in supply chain cost increases will create a more favorable market dynamic for those seeking VPPAs. For first-time buyers, this period should be used to prepare for a VPPA, as the internal approvals needed for such a transaction can easily take over a year. For others who have sustainability goals that require immediate action, NTA offers customized structuring solutions to help reduce the risks associated with the myriad market disrupters influencing pricing and project availability.

Contact us to learn more.

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