

SHELL ENERGY WHITE PAPER

Renewables Deal-Making Is in a State of Flux— and Here's Why That Matters for the Power Sector





While the last decade has been profoundly transformative for the global power landscape, no energy segment carved out as definitive an upward trajectory as renewables. But underpinning that growth is a set of trends stakeholders must weigh as they seek to take advantage of the evolving opportunities renewables offer.

Over the past decade, heightened concerns about climate change propelled energy transformations across the world, resulting in a clear shift in power portfolios away from coal and toward low- or zero-carbon resources. Effecting a notable cultural change, the decarbonization movement has been internalized by power company shareholders and customers, and some of the biggest coal generators in the world have announced ambitions to go net-zero by mid-century. However, the shift has also benefited from a hard economic edge. Transformations have been enabled by technology innovations that cracked open a vast new realm of natural gas supply, sent the prices of solar panels plummeting¹, and battery storage shrinking², and made small-scale decentralized generation possible, while the uptake of digitalization has soared, mainly to prioritize efficiency gains.

Amid this backdrop, renewable generation – including utility-scale hydro, wind, solar, biomass, geothermal and waste-to-energy – surged 77%³ over the past decade. Growth of utility-scale wind and solar projects and rooftop solar systems is even more remarkable if viewed from a capacity perspective: Between 2010 and 2019 total installed wind tripled to 108 GW, while solar capacity surged 80 times to 75 GW⁴. Buildout of these technologies was at first incentivized by state-level mandates for renewables and federal tax credits, but over the past five years, projects have increasingly won power-delivery contracts on economic merits alone.

Despite hurdles posed by the COVID-19 pandemic, forecasts for renewables over the near- and long-term remain optimistic. The International Energy Agency's (IEA's) Renewable Market Update report⁵

suggests that renewable power capacity additions will continue an upward climb and are expected to increase by 167 GW in 2020, or 6% compared to 2019. Notably, in its World Energy Outlook 2019⁶ report, which was released before the pandemic roiled markets, the agency projected that by 2040, solar photovoltaics (PVs) share of the world's total generation could soar to 11% (compared to about 2% today), while wind's share could reach 13% (compared to 5% today).

WHAT IS DRIVING RENEWABLES UPTAKE?



Falling Costs.

The dramatic decline in renewable power generation costs is perhaps the biggest factor undergirding their widespread uptake. A recent cost analysis from the International Renewable Energy Agency (IRENA)⁷ suggests the global weighted-average levelized cost of electricity (LCOE) of utility-scale PVs plunged 82% between 2010 and 2019, while that of concentrating solar power (CSP) fell 47%, onshore wind 39% and offshore wind 29% (Figure 1). Declines have been driven most prominently by improving technologies, economies of scale, increasingly competitive supply chains, and growing developer experience. As a result, renewable power generation technologies have evolved into the least-cost option for new capacity in almost all parts of the world.

In 2019, 56% of all newly commissioned utility-scale renewable power generation capacity provided electricity at a lower cost than the cheapest new fossil fuel-fired option.⁹ Meanwhile, nine-tenths of the newly commissioned hydropower capacity in 2019 cost less than the cheapest new fossil fuel-fired option, as did three-quarters of onshore wind capacity and two-fifths of utility-scale solar PV. Cost declines for wind and solar PV, specifically, show no signs of abating. With the global weighted-average LCOE of utility-scale solar PV and onshore wind potentially set to fall to \$0.039/kWh and \$0.043/kWh in 2021, new renewable power projects are cheaper than the marginal operating costs¹⁰ of an increasing number of existing coal-fired power plants.

FIGURE 1

Global weighted average levelized cost of electricity from utility-scale renewable power generation technologies, 2010 and 2019. Source: IRENA⁸



Note: This data is for the year of commissioning. The thick lines are the global weighted-average LCOE value derived from the individual plants commissioned in each year. The project-level LCOE is calculated with a real weighted average cost of capital (WACC) is 7.5% for OECD countries and China and 10% for the rest of the world. The single band represents the fossil fuel-fired power generation cost range, while the bands for each technology and year represent the 5th and 95th percentile bands for renewable projects.

WHAT IS DRIVING RENEWABLES UPTAKE? CONTINUED



Expanding Clean Energy Standards.

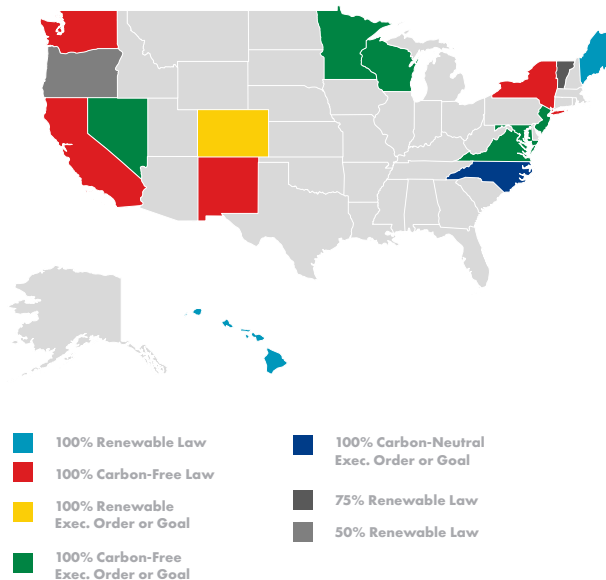
The number of U.S. states implementing high-penetration renewable and clean energy targets is also on an upward trend. As of September 2020, a total of 29 states and the District of Columbia¹¹ have legally binding renewable or clean energy standards, and the level of ambition for state programs has accelerated dramatically in recent years. About 14 of these states and the District of Columbia have 100% renewable or carbon-free energy mandates or goals, while many more have similar non-binding commitments (Figure 2). On the local level, more than 100 cities and ten counties have adopted 100% clean energy goals. Meanwhile, 25 U.S. utilities so far have carbon-free or net-zero emission goals, which are expected to drive additional utility demand beyond state renewable energy standards.

While renewables' cost-competitive posture and state backing has fueled their uptake in organized wholesale markets, how state policies will align with the existing wholesale market structure in deregulated states is still being ironed out. On the regulated side, state policymakers are grappling with how to craft policies that promote cost-effective investment in the electric system while

allowing innovative technologies and new energy management approaches to flourish and compete in a rapidly shifting environment. Several states are finding that technologies and practices are outpacing regulatory policy and that changes are needed to appropriately value their contributions, or costs, to the grid.¹³

FIGURE 2

State High-Penetration Renewable and Clean Energy Standards. Source: ACORE¹²



Federal Tax Incentives.

The federal Production Tax Credit (PTC) and Investment Tax Credit (ITC) have been critical drivers in the financing and widespread deployment of wind and solar power. But, absent any change in current policy, the PTC will phase out completely after 2020, and the ITC will phase out for residential uses and phase down to a permanent 10% rate for commercial and utility-scale projects after 2021.

ESG Priorities.

Institutional and individual investor interest in sustainable and Environmental, Social and Governance (ESG) investment has grown substantially over the last few years, with investment priorities focusing on societal benefits in addition to financial returns. In 2019, sustainable funds saw \$20.6 billion of inflows—which is four times the \$5.5 billion seen in 2018, the previous record.¹⁴

WHO IS DRIVING RENEWABLES UPTAKE?



Corporate Buyers.

Increasingly obligated to shareholders, customers, and employees, corporations have emerged as the renewables segment's most prominent backer. Interest in long-term wind and solar power purchase agreements (PPAs) have been gathering momentum for years. This development has played out prominently in the commercial and industrial sector (C&I), which made up 72% of all U.S. electricity consumption in 2018,¹⁵ and which has increasingly sought localized, low-cost power options. In 2019, companies like Facebook, Google, AT&T, Microsoft, T-Mobile, Walmart, and Amazon publicly announced a combined 9.33 GW of U.S. renewable capacity procurement deals (as of May 2020, 1.76 GW had been contracted).¹⁶

At the end of 2019, U.S. companies had signed contracts, largely for wind and solar projects, totaling 33.6 GW. Corporate purchasers are prominently investing in wind power not only to lower emissions and meet sustainability goals, but also to secure fixed, low-cost energy that is protected from fuel price fluctuations. According to the American Wind Energy Association (AWEA),

the volume of corporate wind purchases grew substantially in the past six years, from less than 800 MW in 2013 to more than 16.8 GW at the end of 2019.¹⁷ An analysis by WoodMac and AWEA suggests that because renewable energy accounts for just 5% of the total power mix of Fortune 1000 companies, potential demand for these and related corporate deals could surge to 85 GW through 2030.¹⁸ Globally, the demand for renewables is even bigger, with around 200 corporations pledging to reach 100% renewables targets as part of the RE100 initiative.¹⁹

The U.S.-based Solar Energy Industries Association (SEIA) says the rapid rise of community solar has boosted the non-residential segment in recent years, coupled with increasing numbers of rooftop installations by major corporations. Both sub-segments are expected to drive growth in non-residential markets going forward.²⁰ But while the COVID pandemic's impact on business demand is expected to set non-residential deals back by 23% in 2020 compared to 2019, SEIA anticipates solar uptake will generally be offset by soaring demand



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WHO IS DRIVING RENEWABLES UPTAKE? CONTINUED



Utilities.

While utilities have been slow to bank heavily on solar owing to years of uncertainty pegged to solar module tariffs, declines in tariff rates combined with state clean energy goals have recently jumpstarted utility-scale procurement. At the end of the second quarter of 2020, U.S. utilities had a contracted pipeline of a record 62 GW,²¹ with most projects slated for completion before 2024, ahead of step-downs to the ITC. Utilities set new records for wind power purchase volumes in 2019 as well, securing 5.2 GW in new power purchase agreements (PPAs), representing 60% of the sector's U.S.-based PPA activity for the year.²²

Municipal Purchasers.

This emerging segment mainly comprises cities, but it also includes counties, tribal governments, municipal utilities, and community choice aggregators, all of which are increasingly adopting sustainability goals. According to the American Cities Climate Challenge Renewables Accelerator's Local Government Renewables Action Tracker,²³ these entities have sealed more than 9 GW of renewables transactions across the U.S. through a variety of mechanisms since 2015. Procurement vehicles include community solar, green tariffs, onsite PPAs, and offsite physical and virtual PPAs. U.S. cities made up the bulk of these deals, signing 335 renewable energy contracts totaling 8.28 GW—which is as much electric capacity as Alaska, Hawaii, Rhode Island, and Vermont have combined.

Institutional Investors.

One of the most lauded indicators of late that the renewable energy segment has approached maturity is the intense interest and competition it is generating among institutional investors—companies or organizations that invest on behalf of other people—and specifically, those associated with pension and infrastructure funds. While institutional investors represent one of the largest capital pools in the world, they often manage assets conservatively, frequently seeking out propositions that offer low risk profiles. The number of direct renewable energy projects globally involving institutional investors has grown markedly over the last 10 years, with annual investments jumping from \$2 billion in 2015 and 2016 to around \$6 billion in 2017 and 2018.²⁴



THE VAST LANDSCAPE OF RENEWABLES PROCUREMENT EXPLAINED



As renewable energy prices continue to fall and entities adopt increasingly aggressive sustainability goals, stakeholders are faced with an ever-expanding array of mechanisms with which they can purchase renewable power. But choosing the right procurement vehicles is a complex undertaking that could require specialized expertise, such as the buyer's objectives to meet targets, reduce costs, and/or slash exposure to variable energy prices. Understanding how common procurement mechanisms work, and how they may be applied within ever-fluctuating regulated, organized wholesale, and retail power markets may also be helpful.

Renewable Energy Certificates (RECs).

An REC represents the environmental attributes associated with 1 MWh of renewable generation. Under state renewable portfolio standards, regulated utilities must hold RECs equivalent to a specified amount of electricity, which is often represented as a percent of delivered power. However, they can also be purchased by entities outside of the compliance markets as a way to own the environmental attributes of generated power, making them attractive to corporations.

Standard Power Purchase Agreement.

Sometimes known as a "direct" PPA, a standard PPA is essentially an agreement between a renewables project developer or generator and an end-user (or "off-taker"). The purchaser agrees to pay the developer a fixed rate for the power generated under a multi-year contract, which typically spans between 10 to 20 years. The off-taker, which could be a corporation or another party, takes legal title to both the electricity generated and REC. However, standard PPAs aren't readily accepted in states that do not participate in a competitive electricity market.

Utility Green Tariffs.

Green tariffs have evolved as a direct response by entities looking to engage in the quickly expanding renewables market, and specifically, as a means to meet soaring corporate demand for renewables. At the end of 2019, at least 18 regulated utilities offered these optional tariff programs, while nine states had taken actions to offer voluntary tariffs for renewable natural gas to homes and businesses. Utility green tariffs typically offer corporate off-takers RECs from a portfolio of projects, a specific project, third-party contracted projects, and even unbundled RECs (which are called utility green pricing programs). These offerings allow corporate off-takers to meet sustainability goals while also shielding them from long-term power price volatility.

THE VAST LANDSCAPE OF RENEWABLES PROCUREMENT EXPLAINED

CONTINUED



Virtual Power Purchase Agreement (VPPA).

In a virtual (or “synthetic”) PPA, companies have more procurement flexibility, especially if not located in a competitive market, mainly because this mechanism does not require physical renewable power to be delivered to an off-taker. The renewable project may also be located outside of the purchaser’s electricity market, even if the renewable power is sold directly into the power grid in which it is located and it receives that market’s price for electricity. However, because VPPAs are typically considered “swaps” or “derivatives”—which are essentially transactions that are settled financially—they can be subject to regulations under the Commodity Futures Trading Commission. Under a typical VPPA, a renewables developer passes on the difference between the wholesale power price and a fixed PPA price to the off-taker if the wholesale price is higher than the negotiated fixed price. When the wholesale price is lower than the negotiated fixed price, the corporate off-taker pays the developer the difference.

Corporate Competitive Wholesale Purchasing.

Several corporations, including Google, Apple, and Walmart, have secured authority from the Federal Energy Regulatory Commission to directly buy and sell power obtained in competitive wholesale markets – typically purchased through PPAs – into the retail market, while still retaining ownership of the RECs from the generation.

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Some utilities, notably, also offer “sleeved” PPA tariffs, in which an off-taker pays for an offsite PPA through their utility bill that includes both the PPA and utility service costs. Some utilities also offer “subscriber programs,” in which a utility creates an energy product offering supplied by one or more renewable projects within its portfolio, and one or more buyers enroll to receive a percentage of the total product offering.

However, there is clearly no “one-fits-all” solution. Experts suggest that because market shifts are ever-evolving, to find the best-suited or customized opportunity the renewable segment’s diverse players in the commercial and industrial, utility, cooperative, municipality, and generator space should seek out a team with deep expertise encompassing the whole market.



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The Shell Energy Solution

Shell Energy has the scope, scale, and trading power to offer competitively priced wholesale products, including power, natural gas, and renewable solar and wind energy, in nearly all organized markets across North America.



Solution Spotlight: Long-Term PPAs

Shell Energy can provide retail customers (end users) with renewable energy at a fixed rate through long-term PPAs. This solution allows the customer to claim the renewable attributes and share in the renewable project, while avoiding the basis and time of use risk associated with typical PPA and VPPA solutions.

Committed to becoming a net-zero energy company by 2050 or sooner, Shell Energy also provides forward-thinking solutions for on-site generation, storage, and demand response. Backed by local experts in regional offices, Shell Energy is your local link to global trading power and market expertise.



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