RRA Regulatory Focus
Corporate Renewables in the United States

One of the most rapidly growing trends in the renewable energy industry and the electricity market as a whole is corporations aiming to go green by increasing the percent of energy they consume that comes from renewable resources. A company can accomplish this in multiple ways. A historically popular option that continues to be highly utilized today is on-site generation, via mostly rooftop solar photovoltaics, or PV, and other renewable sources such as battery storage. Distributed generation remains a foundational aspect of the corporate renewables world, but it is slowly being nudged aside by utility-scale renewables. Large corporations have realized that in order to make a significant dent in their carbon footprint, installing small behind-the-meter, or BTM, single-digit-megawatt solar projects alone will not cut it. As a result, many companies across multiple industries have begun entering into multiyear contracts with large utility-scale wind and solar power plants to offset their energy usage. This has caused a seismic shift in the way renewable developers and utilities approach new generation and funding for projects.

Currently, 166 companies have committed to going 100% renewable. This includes 53 Fortune 500 companies as of the end of 2018, which more than doubles the 23 Fortune 500 companies committed just one year earlier. On top of this are many other companies with established goals of renewable energy. These companies are making the largest impact in the renewables market worldwide and are the focus of this paper.

Since 2014, over 70 companies have signed power purchase agreements, or PPAs, for projects around the world or entered into similar long-term agreements such as a green tariff. Contracted capacity for these deals has surpassed 16,000 MW as of the end of 2018 and is expected to continue in the future. Thanks to dropping costs of renewable energy, entering into long-term PPAs with wind and solar projects can not only help reduce a company's carbon footprint but also be economically lucrative. As will be discussed, corporate renewable contracts became more sophisticated over the last five years as companies have learned the risks involved and found ways around them.

Companies that aim to boost their commitment to clean energy and increase their percentage of generation coming from renewables need to consider multiple factors when deciding how to accomplish these goals. These factors include location of the project, the specifics of the company's renewable goals, the type of contract they will enter into, and how much the agreement will help spur future renewable development — a concept known as additionality. The following sections will outline key drivers and considerations for entering into a renewable contract and the type of potential agreements companies can enter into, and finally some noteworthy companies will be examined in detail.

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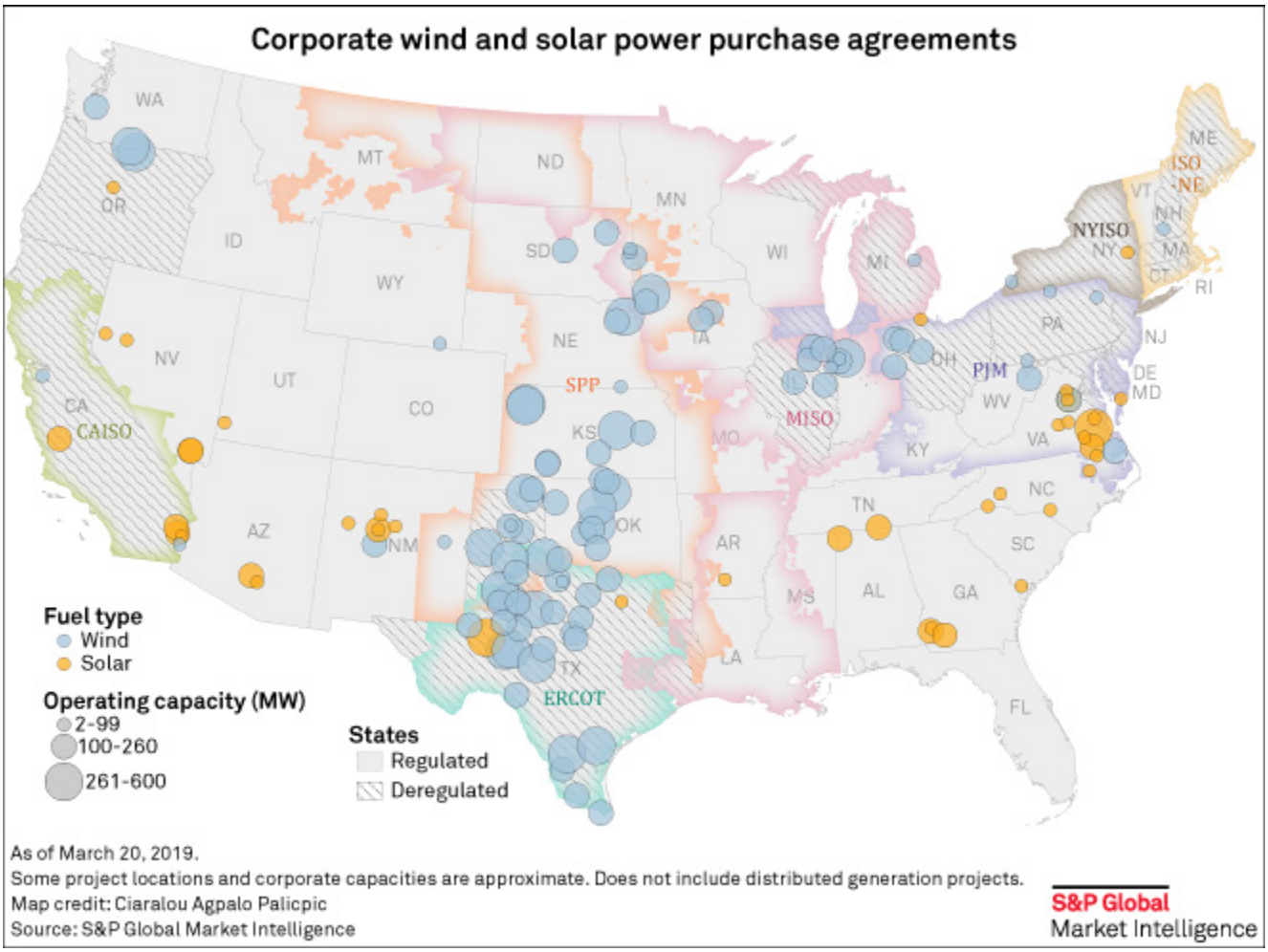


Factors to consider

Specific goal of the company

The level of commitment a company makes to renewable energy will translate proportionally to the scale of projects they want to contract with. Companies with no tangible goal of renewable energy generation or carbon footprint reduction may be perfectly content with BTM generation such as rooftop solar that simply lowers peak-demand charges while making little significant impact in their energy portfolio. Conversely, many companies have announced goals to be 100% reliant on renewable energy. The RE100 is a collaboration of hundreds of companies worldwide who have committed to sourcing 100% of their electricity from renewable sources. This does not mean that every single electron that powers the company's facilities is generated by a renewable resource — such a thing is not currently feasible for the majority of companies. What it does mean is that via a combination of PPAs, green tariffs and renewable energy certificate, or REC, purchases, a company can offset its energy consumption by owning the same amount of renewable energy as the megawatt-hours consumed in a year. Therefore, while the company is not directly powered by 100% renewable energy, it is still displacing its demand on the grid with renewable energy that would otherwise have been filled with fossil fuel generation.

RE100 companies

Ikea	CaixaBank	Envipro Holdings Inc.	Interface Inc.	Nomura Research Institute	Tata Motors
Swiss Re	Califia Farms	Equinix	Iron Mountain	Hair O'right	TCI Co.
3M	Canary Wharf Group	Estee Lauder	Johnson & Johnson	Organic Valley	TD Bank Group
AB InBev	Capital One	Etsy	Johnan Shinkin Bank	Pearson	Telefonica S.S.
Adobe	Carlsberg Group	Facebook	JPMorgan Chase & Co.	Proctor & Gamble	Tesco
AEON	CITI	FIA Formula-E	Jupiter Asset Management	Proximus	Tetra Pak
AkzoNobel	Cliff Bar & Co.	Fifth Third Bank	Kelloggs	Prudential	T-Mobile
Allianz Group	Coca-Cola	Firmenich	Kingspan	PwC	Toda Corporation
Alstria	Colruyt Group	Fujitsu	Konica Minolta	Rackspace	TRIDL
Amalgamated Bank	Commerzbank	Fuyo General Lease Co.	KPN	RB	UBS
Apple	Commonwealth Bank	Gatwick Airport Limited	L'OCCITANE Group	Royal Bank of Scotland	Unilever
ASKUL	Coop Sapporo	General Motors	La Poste	RELX Group	Vail Resorts
AstraZeneca	Corbion	Givaudan	Landsec	Royal DSM	Vaisala
Aurora Organic Dairy	Credit Agricole Group	Goldman Sachs	The LEGO Group	Philips	Vestas
Autodesk	The Crown Estate	Google	Lloyds Banking Group	RICOH Company	VF Corporation
Aviva	Daito Trust Construction Co.	Grupo Bimbo	Lyft	Salesforce	VISA
AXA	Daiwa House Group	Gurmen Group	Mace	SAP	VMWare
Bank of America	Dalmia Cement	H&M	Mahindra Holidays & Resorts India	SAVE S.p.A Group	Vodafone Group
Bankia	Danone	Hatsun Agro Products Ltd.	Marks and Spencer	Schneider Electric	Voya
BBVA	Danske Bank	Heathrow Airport	Mars	Schroders	Walmart
Bestseller	DBS Bank	Helvetia Group	Marui Group	Sekisui House	Watami Co.
Biogen	Decathlon	Hewlett Packard Enterprise	McKinsey & Company	SGS	WeWork
Bloomberg	Dentsu Aegis Network	HP Inc.	Microsoft	Signify	Wells Fargo
BMW Group	Diageo	HSBC	Morgan Stanley	Sky	The Wonderful Company
British Land	DNB	International Flavors & Fragrances Inc.	Nestle	Sony	Workday
BROAD Group	eBay	IHS Markit	NIKE Inc.	Starbucks	YOOX NET A PORTER GROUP
BT	Elion	Infosys	Nordea	Steelcase	
Burberry	Elopak	ING	Novo Nordisk	Swiss Post	

As of March 27, 2019.
Source: RE100

Companies that committed to going 100% renewable range from small businesses with a comparatively small energy demand to large multinational corporations who consume millions of kilowatt-hours of electricity annually. The latter are expectedly the ones making the largest impact and creating the most headlines, but the cumulative effort of all these companies will continue to grow as the corporate renewable market matures. Companies that are currently inactive in the renewables market may see the benefits of other companies' involvement and look to jump on the bandwagon, especially as PPA structures become more robust and renewables' costs decrease.

Location of project

If a company determines they need to go beyond on-site renewable generation and look toward contracting with a utility-scale renewable power plant, they then need to determine where and what type of project would best suit their needs. Contracting with a wind or solar farm close to their facilities is often an ideal scenario as the power generated from that plant will actually provide electricity to the company. This is, however, not always possible for a variety of reasons. First, if a company's particular load is located in a regulated state, establishing a PPA with a renewable project may not be possible since utilities are vertically integrated and control every aspect of the energy market from

generation to transmission and delivery. Second, if land availability and wind or solar resources are not adequate in the company's vicinity, it is difficult for developers to financially justify a renewable project.

More companies are getting around these constraints with virtual PPAs, in which the company can contract with a renewable project in a separate location. The power from the project will not directly serve any of the company's facilities, but the energy contracted to the company via the PPA counts to offset their electricity demand. Virtual PPAs have become a significant driver in the corporate renewables market.

Additionality

In the scope of corporate renewable energy, additionality refers to the concept that a company's involvement in a renewable project will help drive future renewable energy development. Most companies claim additionality is a major factor in their decision to contract with a renewable developer or project. These companies want to ensure that the money they invest continues the growth of renewable energy. For example, a company's decision to purchase the capacity of an existing wind farm from a developer that is no longer actively building new renewable projects would not fit the additionality requirement. The wind farm is already built and supplies power to the grid. While the company would be able to claim the power generated, it does not help displace more conventional generation on the grid since the project is already running. Further, since the developer is no longer building new renewable projects, the money from the purchase of the energy would not go toward future renewable investment.

On the other hand, a company that enters into a PPA with a new renewable project by an active developer who is looking for off-takers meets the additionality concept. First, the company would provide a long-term, steady stream of revenue to the developer through the PPA, and the project will more likely be able to secure the financial capital needed to get off the ground. Second, money from the PPA can be used for other future renewable energy projects since the developer is still active in the industry. In entering into such a PPA, the company is not only helping get new renewable generation onto the grid to displace fossil fuel generation —sometimes referred to as "emmissionality"— it is also driving potential new renewable development in the future. Companies that have committed to 100% renewables often want to ensure that the projects they engage in meet the additionality requirement.

Avenues to 100% renewable

Large multinational corporations with facilities in different countries will often use a combination of different methods to go 100% renewable. The type of avenue a company choses depends on a variety of factors such as their location, the amount risk the company is willing to take on and the desire for additionality.

REC purchase

One of the most fundamental ways for a corporation to enter the green power world is to purchase RECs. Anytime a renewable resource, be it a solar farm, wind farm, or other eligible renewable generation technology, generates one megawatt-hour of electricity two things happen: the wholesale electricity is sold to the grid and a REC is created. The REC is essentially the claim of green generation that comes from the renewable resource. RECs are a free market commodity that can be bought and sold by almost any entity that desires or requires it. For instance, utilities in jurisdictions with a renewable portfolio standard, or RPS, must retain the proper amount of RECs that corresponds to the required amount of renewable generation they must supply. If a utility with a 50% RPS sells 500,000 MWh of electricity in a year, they must own 250,000 RECs to comply with the RPS. Most utilities do this by bundling the electricity and the RECs. In a deregulated territory, the utility will contract with a renewable power plant to purchase both the wholesale electricity to put into the grid and the accompanying REC to retain for RPS compliance.

Corporations looking to make a green claim on their energy usage can purchase unbundled RECs. If a company claims to be 100% renewable and consumes 50,000 MWh of electricity in a year, it can purchase 50,000 RECs from wherever they chose to properly make this claim. Purchasing RECs is simple and involves little risk. For corporations that want to go green but do not want to deal with the complications of a PPA contract and navigate the wholesale power market, purchasing RECs can be a desirable option. The company will still have to purchase electricity from the local utility in

addition to purchasing RECs. REC purchasing is often viewed as a marketing expense because it is done solely for the purpose of boasting being 100% renewable and has little financial incentive.

Purchasing RECs from a renewable project offers some additionality in that the cost of the RECs goes towards the developer or initial owner of the power plant. However, unlike a PPA, a REC purchase is a one-time purchase that may not provide the amount of stable cash flow a developer needs to get a project up and running. This is particularly true in voluntary markets where REC prices are low due to the lack of an RPS. The lack of additionality in RECs is compounded if the REC has exchanged hands multiple times over its history and the new seller does not plan on using funds for renewable investment. As a result, many companies do not view REC purchasing as an ideal option to support renewable additionality.

Green tariffs

A growing trend in the utility and corporate renewable industry is the green tariff. With a green tariff, a company engages in a contract with its local utility to source all or a percentage of their energy from renewable resources at a specialized rate. For some utilities, this means parceling a percentage of a specific renewable energy project to prospective customers to use the electricity generated and own the accompanying RECs. Puget Sound Energy, or PSE, for instance, developed its Green Direct program to accommodate corporate customers in demand of renewable energy. Washington is a regulated state, so the utilities are vertically integrated and own any renewable assets. Therefore, PSE developed and built the Skookumchuck Wind Farm for its Green Direct program, and companies like Starbucks, Target and REI joined the program to purchase power from the wind farm to meet their renewable targets. In other regulated states where utilities haven't established specific green tariff programs, corporations can work out an agreement similar to a PPA to purchase all or a percentage of power from a utility-owned renewable project.

Green tariff programs in the United States

State	Green tariff name	Utility	Status
Colorado	Renewable*Connect	Xcel Energy	First 50 MW tranche fully subscribed
Georgia	Commercial and Industrial REDI Schedule CIR -1	Georgia Power	177.5 MW subscribed to by Johnson&Johnson, Google, Target and Walmart
Kansas	Direct Renewable Participation Service	Westar Energy	Enrollment Ongoing
Kentucky	Renewable Power Option Rider	Kentucky Power	Not used to date
Michigan	Voluntary Large Customer Renewable Energy Pilot Program	Consumers Energy Company	GM and Switch used full 35 MW available
Minnesota	Renewable*Connect	Xcel Energy	Pilot tranche fully subscribed
Missouri	Renewable Choice Program	Ameren Missouri	Enrollment closed Dec. 31, 2018
Nebraska	Schedule No. 261 M – Large Power – High Voltage Transmission Level – Market Energy	Omaha Public Power District	Facebook utilized program for 310 MW of wind
Nevada	Green Energy Rider	NV Energy	Apple utilized tariff for a total of 320 MW and Switch for 179 MW
New Mexico	Green Energy Rider	PNM	Facebook utilized program for a total of 296 MW
North Carolina	Green Source Rider	Duke Energy	Google and two additional anonymous companies have utilized program
North Carolina	Green Source Advantage	Duke Energy	Pending approval
Oregon	Green Future Impact	Portland General Electric	Pending approval
Utah	Service from Renewable Energy Facilities	Rocky Mountain Power	Solar Pilot Program introduced
Utah	Renewable Energy Purchases for Qualified Customers	Rocky Mountain Power	Facebook plans to use 400 MW from tariff
Virginia	Rider REO	Appalachian Power Company	Rejected by commission
Virginia	Schedule MBR	Dominion Energy	Amazon Web Services has entered into multiple contracts
Virginia	Schedule CRG	Dominion Energy	Rejected by commission
Virginia	Schedule RF	Dominion Energy	Enrollment open - Facebook plans to use tariff for 240 MW of solar
Virginia	Renewable Energy Supply Service	Dominion Energy	Pilot Rider not used
Washington	Green Direct	Puget Sound Energy	First tranche fully subscribed with multiple customers
Wisconsin	Renewable Energy Rider	Madison Gas & Electric	Dane County has expressed interest in utilizing the tariff
Wyoming	Large Power Contract Service	Black Hills Energy	Microsoft utilized tariff to supply its Cheyenne datacenter

As of March 27, 2019.
Source: World Resources Institute

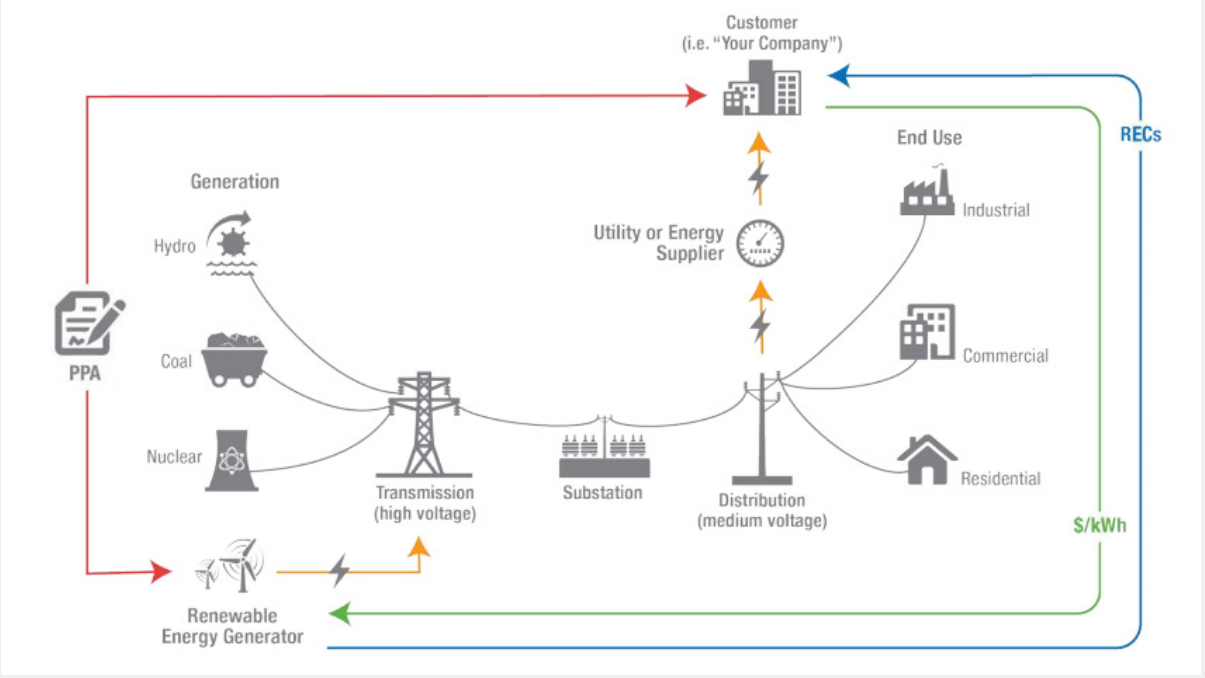
Green tariffs offer a number of advantages, including simplicity for the corporate buyer, low costs and little risk. Additionally, unlike a simple REC purchase, a green tariff provides buyers bundled RECs; in addition to RECs for the green energy claim, buyers are getting the electricity for their facilities as well. This is often more economically desirable than buying RECs and electricity in two separate transactions. Green tariffs might also be the best option in regulated territories where a corporation is not able to engage in a PPA with a third-party developer and must work directly with the utility. Regardless, green tariffs are typically favorable in terms of additionality. It helps provide utilities a tangible demand for renewable energy and will drive future renewable development as long as companies have a demand for it. According to the World Resources Institute, over 1,900 MW of renewable energy deals have been made through green tariff programs since 2014. Another 950 MW are under negotiation for 2019 and beyond.

PPA

Renewable PPAs have received the most attention in recent years in the corporate renewables market and for good reason. It is, by far, the biggest disruptor to the traditional utility model and has seen a significant increase in popularity over the last five years. Corporate PPAs can generally be split into two categories: physical and virtual. Both have been utilized by corporations looking to make large strides in their green energy claims, though virtual PPAs have emerged as a more popular option due to the greater flexibility they tend to offer over physical PPAs.

A physical PPA is an agreement between the owner of a renewable project and an end user, in this case, the company. The corporate off-taker signs a long-term agreement, usually between 10 and 20 years, to purchase power from the project at an agreed-upon price. The project is located within the corporate facility's local grid, and the power generated is either sent to the grid to become part of the overall grid mix or is physically delivered to a specific point on the grid such as the company's meter via a third-party power marketer. Depending on the project and the structure of the contract, the corporation may need to pay transmission costs as part of their PPA price. In a physical PPA, the corporation takes ownership of the portion of electrons produced from the renewable project that it is contracted to own. If the PPA

Direct PPA structure



As of March 27, 2019.
Source: EPA

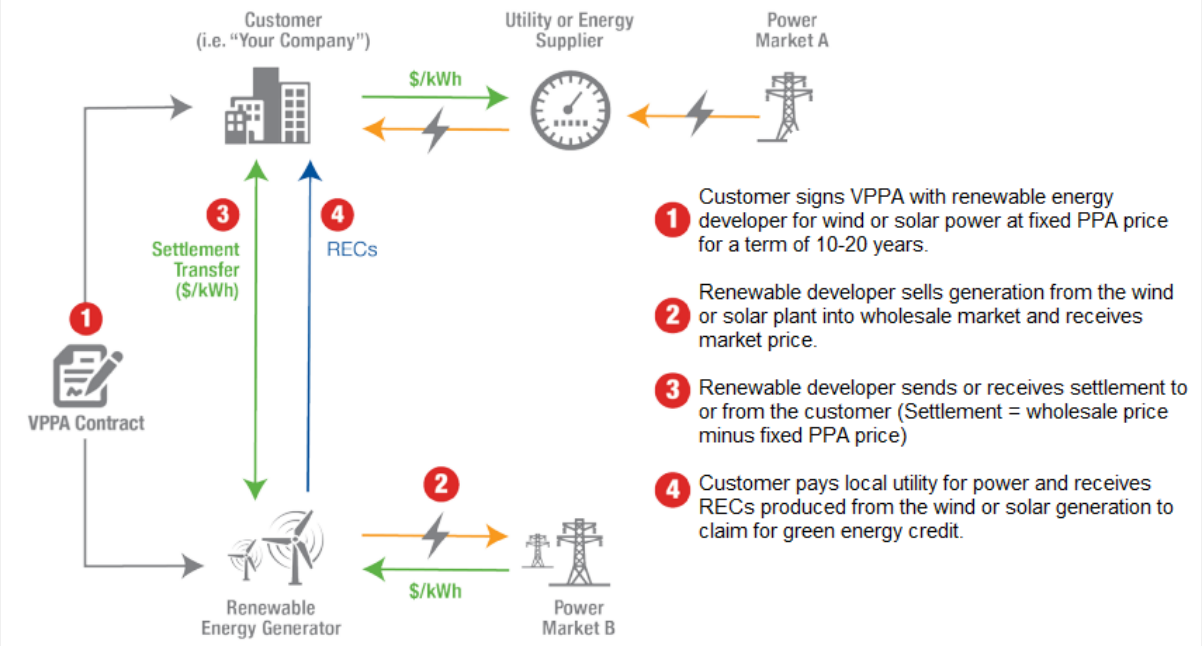
covers half the project's capacity, the corporation gets half the electrons produced. Most often, the corporation will then sell this electricity back to the grid at the locational marginal price, or LMP. If the LMP is higher than the settled PPA price, the corporation nets a profit. Otherwise, the corporation accepts a loss as a result of the deal.

For a physical PPA to be possible, the corporate facilities must be located in a deregulated state, which eliminates it as a possibility in many cases. A physical PPA also can be a less desirable option if the facilities are not located in an area conducive for a large, cost-effective renewable project. In addition to the general complicated nature of PPAs, in a physical PPA, the company deals with the electricity markets as the owner of the power generated from the renewable project. This requires the company to implement energy management services, which they frequently outsource to third-party power marketers. Even further, companies involved in the ownership and sale of electricity may be subject to additional wholesale market participation requirements that are outside the scope of their core business.

In general, physical PPAs can be a desirable option for corporations with a power-hungry facility like a corporate headquarter or data center in a single location. And by signing on with a project that is connected to the local grid, the company can more clearly boast being powered by renewable generation. For companies with operations in multiple locations that are looking to go 100% renewable, however, a virtual PPA has emerged as the preferred option.

In a virtual PPA, a corporation engages with the developer of a renewable project in a purely financial transaction. The corporation never actually owns or uses the power generated from the project like in a physical PPA. The corporation pays the project owner a fixed price for the power produced and in return receives the RECs associated with the generation and the variable price that the power is sold for on the open market. The corporation does not handle selling the power; instead the developer sells it at the LMP and gives that money to the company. This is known as a fixed-for-floating swap, as the corporation is exchanging the fixed PPA price it pays the developer for a "floating" price that is determined at the project's regional Independent System Operator, or ISO, hub.

Virtual PPA structure



As of March 27, 2019.
Source: EPA

A corporation is not tied to the regulatory constraints of the region or state where its facilities are located, and a company like Starbucks with thousands of stores across the U.S. can cover a large chunk of their electrical demand in a single virtual PPA. However, virtual PPAs are complex transactions that require many up-front costs and legal fees to negotiate that not many companies can easily absorb. Additionally, since the power from the renewable project is not directly going toward powering the company's operations, the claim that the company is powered completely by renewables is less tangible. Still, by providing developers with a stable, long-term revenue stream via a PPA, more renewable projects can get funded, and the power is sent onto the grid, displacing conventional fossil fuel generation. Overall, in terms of carbon footprint reduction, the global impact is the same.

Entering into a virtual PPA puts the buyer — in this case, the corporation — at a certain level of risk. There are five known risks associated with these contracts:

• Price risk — The difference between the PPA price and the market price the renewable generation is sold for at the ISO hub.

• Basis risk — The difference between the market price and the retail price the company pays its utility for electricity.

• Shape risk — The variance of the actual project output compared to the modeled project output.

• Volume risk — If the project does not produce the amount of megawatt-hours that were contracted for.

• Operational risk — If the project equipment underperforms.

To hedge against these risks, a number of mechanisms have emerged. To address basis risk, some PPAs will require that the generation be sold into the hub market, which is likely to be higher priced than the node market. This is known as a hub-settled virtual PPA. Basis and shape risk can be countered with floor and collar pricing to protect against extreme market volatility. If the price is between the floor and collar, nothing needs to be done, but if the price falls below the floor price, the project owner gets paid the difference, and if the price goes above the collar price, the project owner pays the company an agreed-upon additional amount — typically a share of the excess.

Some companies will hire a third-party insurer to counter these risks and implement a volume firming agreement to hedge against shape and volume risk. The insurer guarantees constant renewable generated electricity delivery for a fee on top of the virtual PPA price. Proxy generation requires the developer to supply the contracted amount of generation in the PPA even in the event of equipment failure. This combats operational risk. Microsoft has used both strategies in its virtual PPA deals.

Physical and virtual PPAs are the most popular form of utility-scale corporate renewable purchases in the market currently, allowing companies to obtain RECs so they can claim green credits for the generation, and, in well-structured deals, they can be financially lucrative as well. They provide additionality by ensuring steady revenue streams to developers to help build new renewable projects and are an effective way for companies with massive global demand for electricity to go 100% renewable.

Notable companies

While there are hundreds of companies involved in the utility-scale corporate renewable market, a handful of companies have established themselves as leaders in the space, securing hundreds, even thousands of megawatts of renewable generation through various avenues. Tech companies in particular have announced their commitment to renewables, and with a huge demand for electricity with facilities like data centers and server farms, they have proven to be popular suitors for renewable developers. The most active tech companies as well as a couple of massive retail chains are examined in more detail in the following sections.

Amazon

As of January 2018, Amazon achieved 50% renewable energy usage with an end goal of 100% by 2030. Currently, Amazon has an estimated 1,200 MW of utility-scale wind and solar generation in its portfolio, with more likely on the way, not including the large amount of rooftop solar PV and other distributed generation on its facilities around the globe. In Virginia, Amazon has installed 260 MW of utility-scale solar capacity across six locations working with Dominion as part of the Schedule MBR green tariff.

Amazon utility-scale wind and solar projects

Project name	State	Technology	Total project capacity (MW)	Amazon contracted capacity (MW)	Year commissioned	Contract type
Eastern Shore	Virgina	Solar	80	80	2016	PPA
Buckingham	Virgina	Solar	20	20	2017	PPA
New Kent	Virgina	Solar	20	20	2017	PPA
Sappony	Virgina	Solar	20	20	2017	PPA
Scott	Virgina	Solar	20	20	2017	PPA
Southampton	Virgina	Solar	100	100	2017	PPA
Fowler Ridge	Indiana	Wind	150	150	2016	PPA
Desert Wind	North Carolina	Wind	208	208	2016	PPA
Timber Road	Ohio	Wind	100	100	2016	PPA
Amazon Wind Farm Texas	Texas	Wind	253	228	2017	PPA
Amazon Wind Farm US Central 2 (Scioto Ridge Wind Farm) (Hardin)	Ohio	Wind	241.7	241.7	2017	PPA

As of March 27, 2019.
Source: S&P Global Market Intelligence

In addition, Amazon is under contract for over 680 MW of wind capacity across five projects in Indiana, Ohio, North Carolina and Texas. The largest is the 253-MW project in Texas commissioned in 2017 with developer Lincoln Clean Energy, of which Amazon is purchasing roughly 228 MW. Other notable wind projects are the 208-MW Desert Wind farm in North Carolina, the 150-MW Fowler Ridge wind farm in Indiana and the 100-MW Timber Road wind farm in Ohio. All of these projects were commissioned between 2016 and 2017. With Amazon only halfway to its renewable target as of a year ago, it is reasonable to expect the growing internet retail giant to contract and develop much more renewable capacity in the near future.

Apple

Apple set a requirement of being 100% renewable and met that goal, according to an announcement the company made in April 2018. The Silicon Valley company has accomplished this target with the help of on-site generation like the 17-MW rooftop solar array and 4-MW of biogas fuel cells installed at its headquarters in Cupertino, Calif., and numerous other rooftop solar and other distributed generation. With a large presence around the world, Apple has installed on-site generation or contracted with a utility-scale project in 11 countries. Apple has over 485 MW of installed wind and solar capacity in China in multiple locations as well as large distributed generation projects in Japan and Singapore. Two data centers in Denmark also claim to run on 100% renewable generation.

In the U.S., Apple has engaged in multiple forms of renewable procurement. It has worked with Nevada utility NV Energy to source 320 MW of solar generation through Nevada's Green Energy Rider program. A virtual PPA was signed for 201 MW of the 404-MW Montague Wind farm in Oregon, which is set to come online by the end of 2019. Apple also signed virtual PPAs for 111 MW of wind energy from a project in Illinois developed by Geronimo Energy and 134 MW from a large solar farm developed by sPower Energy in Virginia. As Apple continues to grow, it will need to expand its renewable portfolio to maintain its 100% renewable claim and so should be expected to remain active in the corporate renewables market.

Apple utility-scale wind and solar projects

Project name	State/country	Technology	Total project capacity (MW)	Apple contracted capacity (MW)	Year commissioned	Contract type
Canadian Flats Solar 130	Caifornia	Solar	130	130	2013	PPA
Gala Solar Plant	Oregon	Solar	56.3	56.3	2017	PPA
Chinese Portfolio	China	Solar and Wind	485	485	2016	N/A
Turquoise Nevada	Nevada	Solar	60	60	2018	Green tariff
NV Energy Portfolio	Nevada	Solar	260	260	2018	Green tariff
Montague Wind Facility	Oregon	Wind	404	201	2019	PPA
Geronimo IL Wind Project	Illinois	Wind	125	111	2019	VPPA
sPower VA Solar Project	Virginia	Wind	165	134	2020	VPPA

As of March 27, 2019.
Source: S&P Global Market Intelligence

Facebook

Facebook has been one of the more prolific companies in the corporate renewables market since it signed its first contract for 141 MW of power from the Wellsburg wind project in Iowa in 2013. In 2018, the tech company set a target to be 100% renewable by 2020. The original target of 50% was set in 2015 and achieved in 2017. After being relatively quiet in the utility-scale renewable market from 2014 through 2016, Facebook became very aggressive in the space, engaging in 22 different renewable projects in 2018 alone. They signed deals for over 3,000 MW of renewable capacity as of the end of 2018, most of which was contracted between late 2017 and 2018. The majority of this capacity is located in the United States, though the company does have projects located in Norway and Sweden among others.

Facebook utility-scale wind and solar projects

Project name	State/country	Technology	Total project capacity (MW)	Facebook contracted capacity (MW)	Year commissioned	Contract type
Wellsburg Wind	Iowa	Wind	140.8	140.8	2014	PPA
Colbert County Solar Facility	Alabama	Solar	227	227	2020	PPA
Lincoln County Solar Facility	Tennessee	Solar	150	150	2020	PPA
Silicon Ranch	Georgia	Solar	102.5	102.5	2019	PPA
Calhoun County Solar Project	Georgia	Solar	80	80	2019	PPA
Colquitt County Solar Project	Georgia	Solar	20	20	2019	PPA
Cove Mountain	Utah	Solar	58	58	2020	PPA
Los Lunas Data Center II	New Mexico	Solar	100	100	2019	Green tariff
Torrance County Wind Farm	New Mexico	Wind	166	166	2020	Green tariff
Quay/DeBaca County Wind Farm	New Mexico	Wind	50	50	2018	Green tariff
Headwaters II	Indiana	Wind	200	139	2020	PPA
Cibola County Wind Farm	New Mexico	Solar	50	50	2021	Green tariff
Los Lunas Data Center I	New Mexico	Solar	30	30	2018	Green tariff
Henrico Data Center	New Mexico	Solar	300	300	2020	Green tariff
Britton Energy Center	New Mexico	Solar	50	50	2020	Green tariff
Encino Solar Energy Center	New Mexico	Solar	50	50	2020	Green tariff
Bjerkreim Wind Cluster	Norway	Wind	294	294	2019	PPA
Rattlesnake Creek Wind	Nebraska	Wind	318.2	200	2018	Green tariff
Unknown Nebraska Wind Project	Nebraska	Wind	110	110	2019	Green tariff

As of March 27, 2019.
Source: S&P Global Market Intelligence

Like Apple, Facebook is planning to reach its goal through a combination of PPAs, green tariffs and on-site distributed generation. Green tariff deals include 320 MW of wind power in Nebraska, most notably the 200-MW deal with the Rattlesnake wind farm. Almost 800 MW of renewable capacity is either commissioned or planned to be installed by the end of 2020 in New Mexico, which Facebook is procuring through green tariff arrangements. Facebook also is planning to engage in green tariff deals in Utah and Virginia for a total of 640 MW. Aside from the Wellsburg wind farm, Facebook signed a 139-MW PPA deal with the 200-MW Headwaters II wind farm in Indiana, which is set to come online in 2020. The most notable international deal for Facebook is the 294-MW cluster of wind projects in Norway and Sweden. It is unclear at this point if this rush of new renewable capacity puts Facebook in position to reach its 100% renewable goal, but as the company continues to expand, it will continue to sign more agreements for renewable generation.

Google

Before Facebook made its impressive run of renewable deals from late 2017 to 2018, Google was the clear leader in the corporate renewables market. Its first deal was signed in 2010 and was a PPA for all the generation from the 114-MW Story County II wind farm in Iowa. Google set a goal of being 100% renewable and achieved it in 2017. Google has contracted for just over 3,000 MW of capacity distributed among 27 projects across five countries, including Chile, the Netherlands, Norway and Sweden. PPAs seem to be the preferred option for Google, though they have engaged in a handful of green tariff arrangements as well. Wind is also the preferred technology with over 2,600 MW of their 3,000 MW acquired from wind projects.

Google utility-scale wind and solar projects

Project name	State/country	Technology	Total project capacity (MW)	Google contracted capacity (MW)	Year commissioned	Contract type
Bethel Wind Energy Facility	Texas	Wind	276	225	2017	PPA
Bluestem Wind Project	Oklahoma	Wind	198	198	2016	PPA
Cimarron Bend	Kansas	Wind	200	200	2016	PPA
Golden Hills	California	Wind	85.9	43	2015	PPA
Great Western Wind Project	Oklahoma	Wind	225	225	2016	PPA
Wind VIII	Iowa	Wind	490.9	407	2015	PPA
Minco II	Oklahoma	Wind	100.8	100.8	2011	PPA
Story Country II	Iowa	Wind	150	114	2009	PPA
Coyote Ridge	South Dakota	Wind	98	98	2020	PPA
Tatanka	South Dakota	Wind	98	98	2020	PPA
Glacier's Edge	Iowa	Wind	200	200	2019	PPA
Rutherford Farm	North Carolina	Solar	74.8	61	2016	Green tariff
Douglas County Google Data Center	Georgia	Solar	78.8	78.8	2019	PPA
Red Dirt Wind Farm	Oklahoma	Wind	300	140	2017	PPA
Canadian Hills	Oklahoma	Wind	298.5	48	2012	PPA
El Romero Solar Farm	Chile	Solar	196	80	2015	PPA
Lehtirova	Sweden	Wind	148	103	2018	PPA
Jenasen	Sweden	Wind	76	76	2018	PPA
Tellenes	Norway	Wind	160	160	2017	PPA
Bouwdokken	Netherlands	Wind	29.4	9	2019	PPA
Krammer	Netherlands	Wind	102	26	2019	PPA
Maevaara	Sweden	Wind	72	72	2015	PPA
Eolus Wind Farms	Sweden	Wind	59	59	2015	PPA
Delfzijl	Netherlands	Wind	62	62	2016	PPA
Sunport Delfzijl Solar Park	Netherlands	Solar	30	30	2017	PPA
Dougherty County+Tanglewood projects	Georgia	Solar	177.5	45.5	2019	Green tariff

As of March 27, 2019.
Source: S&P Global Market Intelligence

Google has wind projects in eight different states, most notably Iowa where it has signed virtual PPAs for over 700 MW of wind across multiple projects. The company owns most of the generation from the 276-MW Bethel Wind farm in Texas with a PPA for 225 MW of capacity from the project. The tech company prefers to buy its power in larger chunks with several agreements for 200 MW of capacity or more, such as the 225-MW Great Western and 198-MW Bluestem wind farms in Oklahoma and the 200-MW Cimmarron wind farm in Kansas. Google, along with Johnson & Johnson, Target and Wal-Mart, joined the green tariff program in Georgia, with the companies sharing an output of 177.5 MW of solar capacity in the state. Google also participates in North Carolina's Green Source Rider program with a 61-MW solar farm that was signed in 2015. As one of the leading tech companies in the world with a clear and dedicated commitment to renewable generation, Google will remain a key player in the corporate renewable space for years to come.

Ikea

Ikea has been very involved in the corporate renewable market with projects in at least nine different countries in addition to numerous on-site rooftop solar generation installed at their various retail locations around the world. Based in Sweden, the massive retail furniture supplier is mostly active in Europe with projects in Finland, France, Germany, Lithuania, the Netherlands, Poland, Sweden and the United Kingdom. In North America, Ikea has worked with developer Apex Clean Energy to purchase wind power from four different wind farms — two in the U.S. and two in Canada. In 2014, the company announced they were purchasing all the power from the 165-MW Cameron Wind Farm which began operating in 2015. It also purchased all 98 MW of the Hoopeston Wind project in Illinois. Overall, the company has contracted an estimated 900 MW of wind capacity alone and is planning to be 100% renewable by 2020.

Ikea utility-scale wind and solar projects

Project name	State/country	Technology	Total project capacity (MW)	Ikea contracted capacity (MW)	Year commissioned	Contract type
Hoopeston	Illinois	Wind	98	98	2015	PPA
Pincher Creek	Canada	Wind	46	46	2013	PPA
Wintering Hills	Canada	Wind	88	88	2018	PPA
Cameron Wind	Texas	Wind	165	165	2015	PPA
Veja Mate	Germany	Wind	402	100.5	2019	PPA
Glötesvålen	Sweden	Wind	90	90	2015	PPA
Polish Portfolio - 6 projects	Poland	Wind	145	145	2014	PPA
Ajos	Finland	Wind	42.4	42.4	2017	PPA
Ramsberget	Sweden	Wind	21	21	2014	PPA
Mazeikiai	Lithuania	Wind	45.6	45.6	2016	PPA
Corpe	France	Wind	11.1	11.1	2010	PPA
Flechtdorf	Germany	Wind	13.8	13.8	2009	PPA
Les Rochers	France	Wind	12	12	2010	PPA
Lihus 2	France	Wind	10	10	2016	PPA
Oberende	Germany	Wind	4.25	4.25	2009	PPA
Weststad-III	Netherlands	Wind	7.5	2.5	2008	PPA
Zettingen I and II	Germany	Wind	14	14	2011	PPA

As of March 27, 2019.
Source: S&P Global Market Intelligence

Microsoft

Microsoft set a goal of being 100% renewable and reached this target back in 2014. This has helped the company be a prominent player in the corporate renewables space since 2012, with over 1,200 MW of renewable capacity across 12 projects. The majority of Microsoft's utility-scale corporate capacity is in the U.S., but it also has projects in Europe and

Asia. Both the 180-MW Wieringermeer wind farm in the Netherlands and the 37-MW Tullahennel wind farm in Ireland sell all their power to Microsoft. A 60-MW solar facility in Singapore helps power a nearby data center. In the U.S. Microsoft has engaged in mainly PPA and virtual PPA contracts for nine different projects in six states.

Microsoft utility-scale wind and solar projects

Project name	State/country	Technology	Total project capacity (MW)	Microsoft contracted capacity (MW)	Year commissioned	Contract type
Keechi Wind Project	Texas	Wind	110	110	2015	PPA
Pilot Hill Wind Project	Illinois	Wind	175	175	2015	PPA
Wieringermeer	Netherlands	Wind	180	180	2019	PPA
Tullahennel	Ireland	Wind	37	37	2018	PPA
Singapore Data Center	Singapore	Solar	60	60	2019	PPA
Bloom Wind Project	Kansas	Wind	178	178	2017	PPA
Happy Jack and Silver Sage	Wyoming	Wind	71	59	2009	Green tariff
Dominion Solar Project	Virginia	Solar	20	20	2017	PPA
Big Level Wind Project	Pennsylvania	Wind	90	90	2018	PPA
Pleinmont Solar 1	Virginia	Solar	75	75	2020	PPA
Pleinmont Solar 2	Virginia	Solar	240	240	2020	PPA

As of March 27, 2019.
Source: S&P Global Market Intelligence

The largest project Microsoft has signed with is the 315-MW Pleinmont solar facility in Virginia, which is split in two different phases. The project will come online in 2020. The 20-MW solar facility Microsoft owns with Dominion Energy was completed in 2017. Other projects include the 175-MW Pilot Hill wind project in Illinois with developer EDF Renewables, a 110-MW wind farm in Texas with Keechi Energy, the 90-MW Big Level Wind farm in Pennsylvania which came online 2018 under developer TransAlta Renewables Inc., the 178-MW Bloom Wind Farm in Kansas and a combined 59-MW with the Happy Jack and Silver Sage wind farms in under Black Hills Energy's green tariff program in Wyoming. The latter two projects are located adjacent to a data center and will produce enough power to cover the annual energy consumption of the facility.

A third-party insurer, Allianz Risk Transfer, was brought in to implement a volume firming agreement to protect Microsoft from the risk associated with the variable price and output of the Bloom Wind farm in Illinois. The overall agreement is known as a Proxy Revenue Swap agreement and enables the owner, in this case Microsoft, to secure long-term predictable revenues and mitigate any power generation volume uncertainty that the wind farm might face. Microsoft pays Allianz a premium for this transfer of risk. This slowly growing market of third-party insurers and risk transfer in corporate PPA contracts was led by Microsoft who wanted to boast a commitment to renewable energy but did not want to deal with the risks associated in a long-term contract with a wind or solar power plant.

Walmart

Walmart has established a goal of 100% renewable with a target of 7 million MWh of renewable energy procurement by 2020 to help reach this goal. A combination of a vast network of rooftop solar generation at its locations around the world, PPAs with utility-scale renewable power plants and green tariffs is used to accomplish this ambitious generation target. All of Walmart's PPAs have been with projects located in the U.S., with the earliest being signed in 2008 for 90 MW of the 153-MW Notrees Wind Farm in Texas. Walmart's strategy has been to engage in PPAs to own only a percentage of a wind or solar farm's total capacity and generation. Walmart has signed eight PPAs to date for projects in four different states and has participated in the green tariff program in Georgia.

Walmart has signed deals for over 800 MW of renewable capacity in the U.S. with over 500 MW of this capacity coming from recent deals for projects expected to come online in 2019 or 2020. The two largest deals are located in South Dakota: the 200-MW Crocker Wind Farm, where Walmart is purchasing three-quarters of the generation, and the Triple H wind project, with Walmart purchasing 150 MW of the 250-MW project. In Texas, along with the aforementioned Notrees wind farm PPA, Walmart signed a deal to purchase 50 MW of the 149-MW Val Verde wind farm which was commissioned in 2017. The two projects in Illinois are the 205-MW Bright Stalk project and the 200-MW Harvest Ridge wind farm, which are both expected to come online in 2019. Walmart is contracted to purchase 123 MW and 50 MW respectively from the two wind farms. Lastly, the Arkansas-based retail giant signed a PPA to secure 60 MW of the 200-MW Headwaters II wind project in Indiana, which will begin operating in 2020. It is unclear how much these deals add up to reach the 7 million MWh goal Walmart has set for 2020, but it is likely they will remain active in the renewable industry by both contracting with utility-scale wind and solar projects and building on-site distributed generation.

Walmart utility-scale wind and solar projects

Project name	State	Technology	Total project capacity (MW)	Walmart contracted capacity (MW)	Year commissioned	Contract type
Crocker Wind Farm	South Dakota	Wind	200	150	2019	PPA
Bright Stalk Wind Farm	Illinois	Wind	205	123	2019	PPA
Headwaters II	Indiana	Wind	200	60	2020	PPA
Harvest Ridge	Illinois	Wind	200	50	2019	PPA
Val Verde Wind	Texas	Wind	149.3	50	2017	PPA
Logan's Gap	Texas	Wind	200.1	116.06	2015	PPA
Notrees Wind Farm	Texas	Wind	152.5	90	2009	PPA
Triple H Wind Project	South Dakota	Wind	250	150	2020	PPA
Dougherty County+Tanglewood projects	Georgia	Solar	177.5	44	2019	Green Tariff

As of March 27, 2019.
Source: S&P Global Market Intelligence