Corporate Renewable Energy Procurement

Industry Insights

ACORE
American Council On Renewable Energy

June 2016

Corporate Renewable Energy Procurement: Industry Insights

June 2016

AMERICAN COUNCIL ON RENEWABLE ENERGY

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EXECUTIVE SUMMARY

The growing purchase of renewable energy by corporate end users is fundamentally remaking the model for electric power sales in the U.S. This report offers industry insights relating to corporations' procurement of renewable energy to simplify renewable procurement processes and provide realistic options for corporate players across the economy. It is organized into the following sections:

- **Market Overview:** Why corporates are procuring renewable energy and how this trend is affecting U.S. electricity markets and the renewable energy industry.
- **Contracting Insights:** Insights about different renewable energy procurement options available to companies, including power purchase agreements (PPAs) and renewable energy credits (RECs).
- **Policy and Legal Considerations:** Key federal and state policy issues and legal considerations corporates should consider when designing and implementing strategies.
- **Guidance on Financing:** Financing structures for renewable energy procurement and how to create financeable PPAs.
- **Integration and Storage:** Ancillary service technology solutions to abate costs and enhance resiliency and reliability of corporate electricity supply.

The report is intended to be a resource for companies as they design and implement sustainability and renewable energy strategies, for renewable energy companies and investors that are working with corporations to realize these strategies, and for other interested parties. We hope that you find it useful.

A group of prominent renewable energy developers, utilities, brokers, professional service firms, and other companies authored the fifteen articles in this report. It should be noted that corporations are using renewable energy via a number of diverse applications, and this report does not attempt to offer a comprehensive overview of every renewable energy technology or procurement option available.

The views and opinions expressed in this report are those of the authors and do not necessarily reflect the views of ACORE.

MARKET OVERVIEW

CORPORATE PROCUREMENT AND NEW FRONTIERS: SUSTAINABILITY AND ENERGY REGULATION

Elizabeth Sluder & Bob Fleishman
Morrison & Foerster LLP

Protection of the environment and promotion of sustainability are critical issues for the business community. As more of America's leading corporations procure power from renewable energy sources, they are discovering that it is good for the environment and for business. This article explores some of the best unkept secrets regarding renewable energy procurement, and provides helpful tips for corporate consumers navigating federal and state energy regulation in renewable energy markets.

What You Should Know

As demand for renewable energy continues to rise, project costs and power prices continue to fall; as a result, renewable energy has become mainstream. Power purchasers now actively pursue opportunities to buy power from renewable energy facilities to lower costs, diversify their portfolios and, in some states, satisfy legal requirements to procure a certain percentage of their energy load from sustainable sources, commonly referred to as renewable portfolio standards (RPS).

Historically, utilities have shouldered the burden of the RPS requirements. To satisfy these legal requirements, the utilities' demand for energy output from renewable energy projects increased. As utilities (and, later, corporate power purchasers) drove up the demand for utility-scale renewable energy power plants, the price of power derived from those plants (particularly wind and solar) has decreased in recent years due to lower construction costs and technology improvements. In some parts of the United States, the purchased cost of such power is now comparable to, or less than, power produced by other conventional energy sources.[1]

Policy considerations are also on the radar of corporate America. On a global level, on April 22, 2016, 175 countries signed the Paris Agreement, which requires signatories to institute domestic programs to reduce greenhouse emissions, regularly report on the status of such programs and measure how much such programs have reduced emissions.[2] In the United States, the Clean Power Plan (CPP)[3] would require each state to propose how it will cut emissions from generation. Major power consumers

[1]Lazard Ltd., Lazard's Levelized Cost of Energy Analysis — Version 9.0 (2015), https://www.lazard.com/media/2390/lazards-levelized-cost-of-energy-analysis-90.pdf.
[2] U.N. News Centre, '*Today is an Historic Day' says Ban as 175 Countries Sign Paris Climate Accord*, United Nations: Sustainable Development Goals, 17 Goals to Transform Our World (Apr. 22, 2016), http://www.un.org/sustainabledevelopment/blog/2016/04/today-is-an-historic-day-says-ban-as-175-countries-sign-paris-climate-accord/.
[3] *Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units*, 80 Fed. Reg. 64,662 (Oct. 23, 2015) (to be codified at 40 C.F.R. pt. 60) , https://www.gpo.gov/fdsys/pkg/FR-2015-10-23/pdf/2015-22842.pdf.

(including Amazon, Apple, Google and Microsoft) support the CPP,[4] which is currently stayed by the Supreme Court.

Why You Should Care

For a growing percentage of American businesses (and their investors), protection of the environment and sustainability are tenets of their corporate philosophy. Many companies have acknowledged that their operations could have an adverse effect on the environment and precipitate climate change, unless they take action. In a noble move to put the common good above their bottom line, many companies are seeking ways to reduce or offset their carbon footprints.

Corporate procurement under power purchase agreements (PPAs) is on the rise. The American Wind Energy Association reported that 52% of all wind energy PPAs executed in 2015 were with non-utility purchasers, up from 22% in 2013.[5] Procuring power under a corporate PPA can provide cost savings due to the relative low price of renewable energy. In fact, in many areas of the United States, it is now (or will soon become) more economical for a company to power its data centers, factories and office buildings under renewable energy PPAs, rather than their local utility rates, which may source power from other conventional energy sources. With a projected 250 gigawatts (GW) of renewable energy expected to be installed by 2030, it is not yet known when energy prices will bottom out, but non-utility offtakers will want to take advantage of the current climate before the demand for low price PPAs exceeds the available supply.[6]

Entering into a PPA also has the added benefit of reducing market price volatility risk for an extended period, since a traditional PPA typically has a term of 10-25 years. If the seller is unable to deliver the power (other than as a result of a true emergency), the corporate purchaser can negotiate PPA provisions so that the seller will be financially responsible for the costs of replacing the power that the purchaser would otherwise be entitled to receive under the contract.

If a company is interested in achieving its sustainability objectives through corporate procurement, but it is unable to purchase renewable energy from a nearby source, the company can enter into a hedge arrangement (commonly referred to as a virtual power purchase agreement). Under a virtual PPA, the purchaser agrees to buy an amount of power from its local utility or another entity for a fixed rate. Meanwhile, the power producer agrees to generate and sell the same amount of renewable energy into the grid at the variable market (or merchant) rate. When the market rate exceeds the fixed rate, then the producer will pay the excess amount to the purchaser. When the market rate is less than the fixed rate, then the purchaser will make a payment to the producer equal to the difference between the fixed and market rates. The virtual PPA is a popular alternative for companies sited in urban areas without ready access to renewable power sources. Before entering into any offtake arrangement, a purchaser should consult with counsel about the intricacies of such an arrangement and possible legal obligations that may arise (e.g., compliance with the Dodd-Frank Wall Street Reform and Consumer Protection Act).

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[4] Brief for Amici Curiae Amazon.com, Inc., et al. for Respondents, *West Virginia v. EPA*, No. 15-1363 (U.S. Apr. 1, 2016), http://acore.org/images/2016.04.01_AMICUS-FOR-RESPONDENT-BRIEF-filed-by-AMAZON.COM-INC-APPLE.pdf.
[5] Am. Wind Energy Ass'n, AWEA U.S. Wind Industry Annual Market Report Ending 2015 (2016), http://www.awea.org/amr2015.
[6] Trieu Mai, et al., Nat'l Renewable Energy Lab., NREL/TP-6A20-65571, Impacts of Federal Tax Credit Extensions on Renewable Deployment and Power Sector Emissions (2016), http://www.nrel.gov/docs/fy16osti/65571.pdf.

As an alternative to entering into a PPA, some companies have explored creative arrangements with their incumbent electric utility, such as opting to purchase power supplied from renewable energy sources. As more utilities offer such programs, customers may be able to arrange to purchase the renewable energy credits (RECs) associated with the renewable energy.

Some companies are taking their procurement and sustainability objectives a step further and constructing renewable energy projects on-site or adjacent to the facilities to be powered. In addition to the economic considerations discussed above, if the company owns the renewable energy project, it could be eligible for federal and/or state tax credits. An on-site facility also has many practical advantages. For example, because the facility is generating its own power, it is not subject to the same power outages that could affect a consumer if a distant power plant or the grid is affected by natural disasters or other emergency situations.

Promoting sustainability through corporate procurement can also open new doors for power purchasers, including access to additional sources of capital. In 2015, approximately $329 billion was invested in clean energy globally.[7] As environmental and sustainability issues gain momentum, new impact investment funds have emerged with the stated objective of investing in companies that promote environmental and social causes, among other areas.[8] These funds have the dual objectives of market returns and positive, non-monetary impact. If such a fund invests in a renewable power project, the fund will require monitoring, measuring and reporting to confirm such objectives are satisfied. If the project sells its electric output under a PPA, the fund can readily measure and verify the megawatts of generated energy sold, and extrapolate other impact indicators such as the reduction in greenhouse gases and the increase in the number of people with access to clean power resulting from such investment. Entering into PPAs is a quantifiable and easily verifiable means of achieving sustainability targets.

Energy Regulatory Challenges

In many instances, there is a “hazy bright line” between federal and state jurisdiction with respect to electricity markets,[9] which can complicate corporate procurement activities. Further, there can be difficult state energy regulatory shoals to navigate if retail customer choice is unavailable or limited, or utility tariffs are not structured in a manner conducive to corporate procurement of electricity.

Traditionally, the sale and transmission of electricity in most of the organized electricity markets in the United States is regulated exclusively by the Federal Energy Regulatory Commission (FERC) under the Federal Power Act.[10] State regulators have jurisdiction over retail service and rates as well as local distribution facilities and decisions about generation and other energy resources that should be developed in the state. It sounds straightforward, but in practice it is anything but.

[7] Press release, Bloomberg New Energy Finance, Clean Energy Defies Fossil Fuel Price Crash to Attract Record $329BN Global Investment in 2015 (Jan. 2016), http://about.bnef.com/press-releases/clean-energy-defies-fossil-fuel-price-crash-to-attract-record-329bn-global-investment-in-2015/.
[8] U.S. Partnership for Renewable Energy Finance, Relocating Energy Investments? Consider the Clean Energy Sector (2015), http://uspref.org/white-papers/36-reallocating-energy-investments-consider-the-clean-energy-sector.
[9] See Robert R. Nordhaus, “The Hazy Bright Line: Defining Federal and State Regulation of Today’s Electric Grid”, 36 Energy Law Journal 203(2015) .
[10] Federal Power Act , 16 U.S.C. ch. 12 (2013), http://www.ferc.gov/legal/fed-sta.asp.

For example, the U.S. Supreme Court recently ruled that where retail customers reduce their electric usage during peak demand periods, the reduction (demand response) can be sold into FERC-regulated wholesale electricity markets and compensated at FERC-set rates.[11] A corporate PPA with a third-party renewable supplier will have to take into account that the transmission and distribution parts of the delivery chain are under, respectively, federal and state regulatory regimes.

Many states have not restructured their electric markets and regulatory regimes to allow retail customers to choose electric suppliers, and other states that initially permitted retail choice later capped or substantially modified their programs. Utilities and regulators in these states may seek to collect exit fees from large customers that want their load served by third-party sustainable suppliers or perhaps by onsite solar or wind generation.

Even if the customer's facilities are in retail choice state jurisdictions, state laws and regulations may dictate the structure of its renewable supply arrangements. Most direct-access regulatory programs are built on the premise that the retail customer needs protection from harmful business practices and require that all buyers, even sophisticated corporate buyers, transact through a state licensed electric service supplier that will purchase power at wholesale and resell and deliver the power at retail to the corporate customer.

State regulation is also a key issue for a strategy that relies in whole or in part on generation sited at the corporate customer's facilities. In evaluating costs and benefits of on-site generation, it is important to understand, for example, whether a state allows net metering, meaning that retail customers may apply energy that they produce onsite to offset the retail charges by their utility in a billing cycle. The details of these programs and legislative and regulatory changes differ from state to state and can have significant impacts on corporate procurement strategies.

Conclusion

With environmental and sustainability initiatives on the rise, procurement of renewable energy will continue to draw the attention of corporate America. Understanding the benefits and structure of such arrangements is important for corporate purchasers to achieve their objectives and reap the rewards of renewable energy.

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[11] *FERC v. Elec. Power Supply Ass'n*, 136 S. Ct. 760 (2016), http://www.supremecourt.gov/opinions/15pdf/14-840_k537.pdf.

leading reputation in defending energy and financial industry participants and individuals in energy markets against charges of market manipulation and other issues before the FERC and Commodity Futures Trading Commission (CFTC) and advising on regulatory compliance issues.

WHY CORPORATE PPAS STILL MAKE SENSE WITH $2 NATURAL GAS

John Powers & Amy Haddon
Renewable Choice Energy

Some commercial and institutional (C&I) buyers have been reluctant to commit to long-term renewable energy contracts when natural gas prices are at historic lows. This article outlines four reasons why renewable power purchase agreements (PPAs) still make sense for corporate buyers:

1. **Price volatility:** Natural gas and other fossil fuel prices have historically been unstable. Unpredictable changes in fuel prices can result in operational risk exposure for C&I buyers, which procurement of renewable generation generally avoids, potentially saving buyers millions of dollars over the life of a renewable PPA contract.
2. **Price parity:** Wind and solar prices are competitive with, and in some markets even cheaper than, natural gas. Renewable energy prices are expected to continue declining over time as technologies improve and benefit from economies of scale.
3. **Policy support:** Mounting international, federal, and state policy commitments to carbon neutrality, such as the Paris Agreement and U.S. Clean Power Plan (CPP), will constrain the ability of natural gas to meet future U.S. energy needs, with the potential to impact both price and availability of conventional generation.
4. **Environmental commitments:** Many C&I buyers have carbon reduction commitments that are best met through renewable energy procurement.

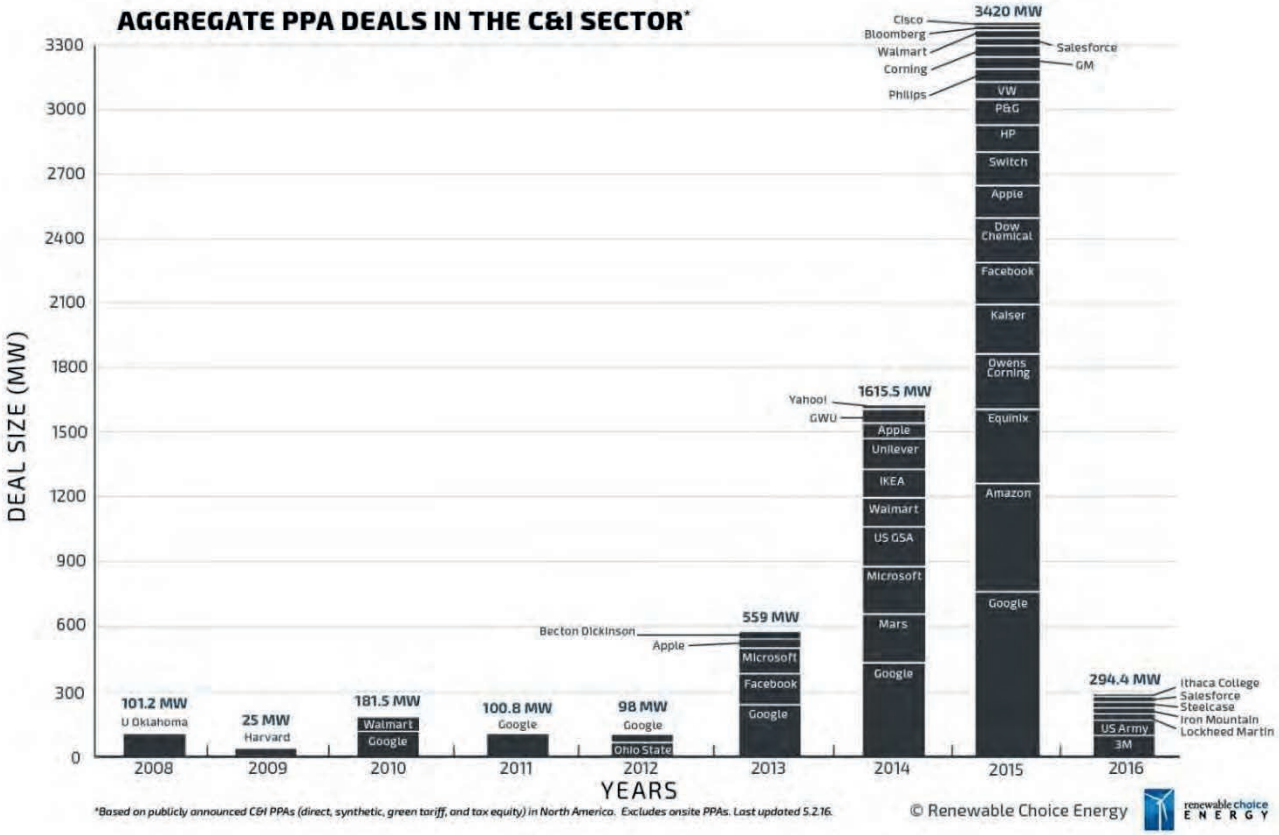
With the recently extended renewable energy Production Tax Credit (PTC) and Investment Tax Credit (ITC) and growing availability of renewable energy projects in need of creditworthy off-takers, now is an opportune time for C&I buyers to choose renewable energy.

Introduction

Historic shifts are underway across the U.S. energy landscape as a number of influential forces converge. Several recent national and international developments, including the EPA's Clean Power Plan and Mercury and Air Toxic Standards (MATS), as well as the Paris Agreement to reduce greenhouse gas emissions, have put downward pressure on the U.S. coal industry, which retired 18 gigawatts (GW) in 2015.[12] The scale back of coal-fired generation was aided by the rising availability—and swiftly falling price—of natural gas. In 2015, for the first time, electricity generation from natural gas and coal were approximately equal at 34% each.[13]

Simultaneously, renewables are experiencing unprecedented growth, spurred in part by the renewal of the PTC for wind and the ITC for solar. Renewables made up a record 61% of new capacity installations in 2015, nearly double new natural gas capacity. This substantial buildout of renewables in 2015 was

[12] http://www.eia.gov/todayinenergy/detail.cfm?id=25272
[13] http://www.environmentalleader.com/2016/03/21/american-energy-policy-over-time-favors-renewables-but-natural-gas-is-the-immediate-winner/



also supported by a rising customer class—commercial and industrial (C&I) buyers, which accounted for more than 52% of the new wind power capacity contracted in 2015 via PPAs.[14]

Price parity is one of the driving forces behind renewable energy growth in many markets. However, natural gas has hovered around the $2 per MMBtu mark,[15] which is attractive to C&I buyers in the short-term, despite the fact that low gas prices have not translated into lower retail electricity costs[16].

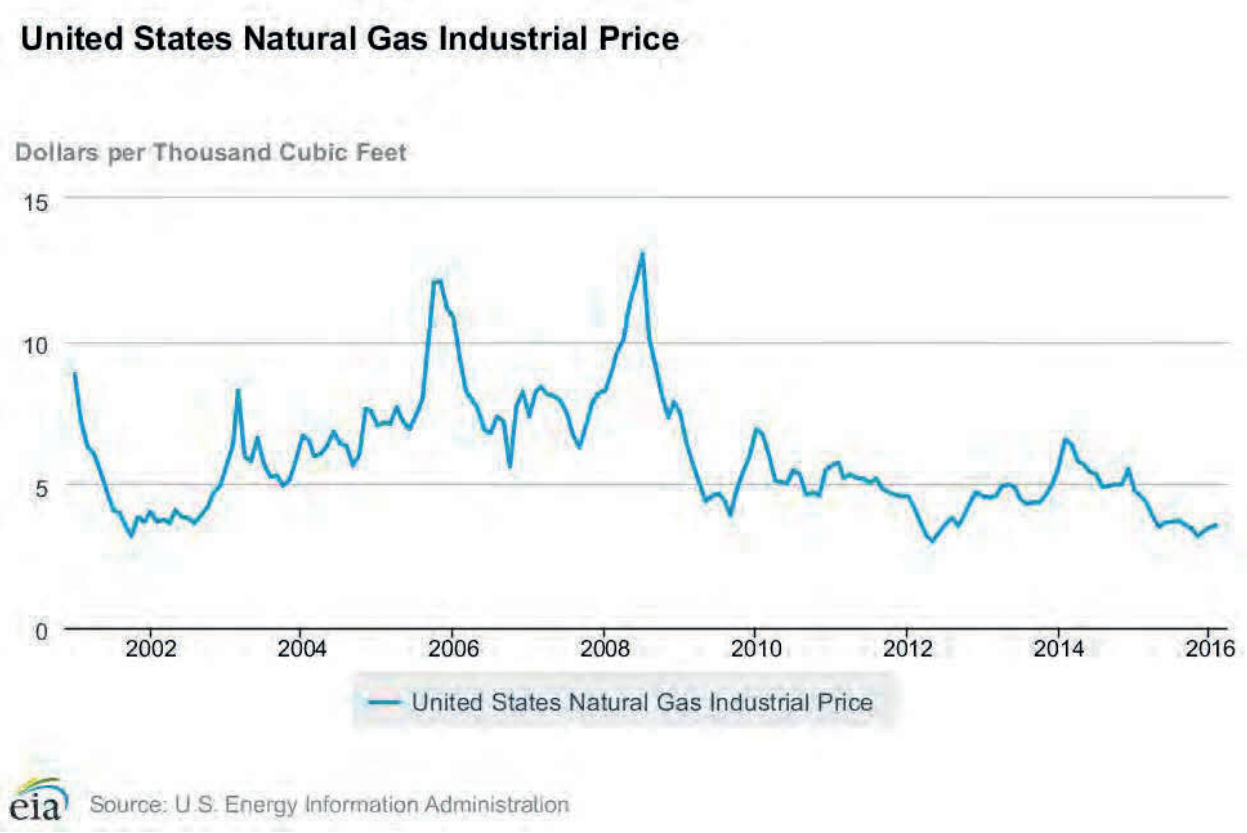
Nevertheless, the low price of natural gas has deterred some corporations from pursuing long-term renewable purchase agreements. While businesses are increasingly using renewable PPAs to meet their renewable energy procurement or carbon reduction goals, PPA contracts typically require a term length of 10-25 years.

While low natural gas prices are attractive in the near term, there are several compelling reasons why renewables are a better choice for C&I buyers, both now and over the long-term.

[14]http://www.awea.org/amr2015
[15]http://www.eia.gov/todayinenergy/detail.cfm?id=24412
[16] http://www.theenergycollective.com/microgrid-media/2321563/why-7-years-low-natural-gas-prices-havent-brought-down-electricity-prices

Price volatility

Energy is the most volatile commodity in the world.[17] The spot price of natural gas, for example, which is based on supply and demand and largely dependent on the weather, can swing widely in a matter of moments. Rapid and unpredictable changes in energy prices can have dramatic consequences for C&I organizations, whose electricity budgets must react accordingly, and which present a considerable source of operational risk exposure. Natural gas is also subject to regional price spikes, which can occur during extreme weather events and upend even the best price predictions.



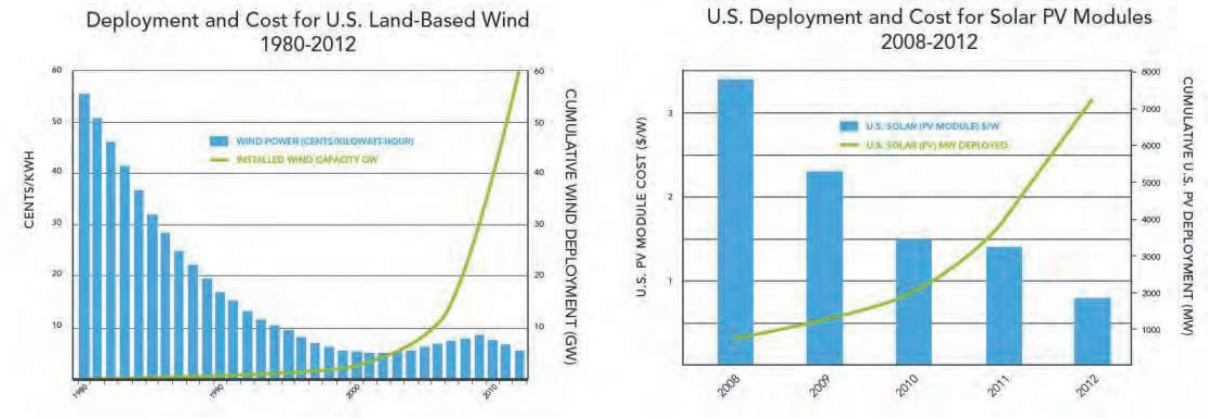
While favorable for consumers, mismatch between supply and demand that leads to low prices is unsustainable, as investors pull out of the market and put fossil fuels squarely in the "insolvency zone,"[18] where energy producers run the risk of stranded natural gas assets over time.

Renewables, on the other hand, incur little to no fuel costs, and display no such price volatility. C&I buyers who enter long-term contracts for wind or solar can expect to see little variability in pricing throughout the duration of the contracts. Corporate CFOs value this predictability, which enables them to shift their budgets from energy risk mitigation to other higher-value projects.

[17] http://www.solomonenergy.com/blog/wp-content/uploads/2015/08/2015-08-13-Why-are-Electricity-Prices-so-Volatile.pdf
[18] http://www.bloomberg.com/news/articles/2016-04-06/wind-and-solar-are-crushing-fossil-fuels?cmpid=yhoo.hosted

Price Parity

Although fossil fuels such as natural gas have historically been cheaper than renewables, the prices of wind and solar power have dropped dramatically over the past decade. When combined with the tax benefits of the PTC and ITC, wind and solar projects in deregulated retail markets are meeting, and in some cases beating, natural gas prices, and can save businesses money in both the near and long term.



Source: Department of Energy

Unlike coal and natural gas, wind and solar benefit from cost reductions spurred by continuing technology improvements. Energy from wind and solar is also infinitely available, limited only by the ability to store and transmit it, whereas all fossil fuel resources are finite.

Even when factoring the current record-low gas prices, independent forecasts show significant savings potential from wind and solar C&I contracts over 10-20 year terms, sometimes totaling millions of dollars.

Policy Support

The gas rush will inevitably come to an end, triggered in part by a shift in the policy landscape. For example, as part of the Paris Agreement, the U.S. has committed to net-zero greenhouse gas emissions by 2100, which will require a significant move away from fossil fuels—including natural gas—between now and mid-century. Some form of carbon pricing at the national level now seems inevitable.

Natural gas may have played a role in stabilizing global emissions[19] to date, but its acknowledged success will be short-lived due to methane leakage. Methane is 28 times more potent[20] to global warming than carbon dioxide over a 100 year period, and reports from the U.S. Environmental Protection Agency indicate that methane leakage during the hydraulic fracturing (fracking) process is far more prevalent than previously believed.

[19]http://www.c2es.org/publications/leveraging-natural-gas-reduce-greenhouse-gas-emissions
[20] http://ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_FINAL_full_wcover.pdf

While cleaner burning, natural gas still emits approximately 50-60% of the greenhouse gases that coal emits,[21] without accounting for methane leakage,[22] which is too high for the commitments set by both the Paris Agreement and the EPA's Clean Power Plan.

There are also legislative challenges to fracking at the state and local municipal levels that vary from state to state.[23] Rising concerns over the safety of fracking—including its role in producing man-made earthquakes[24]—have the potential to result in additional legislative constraints that could affect future natural gas extraction.

The combined effects of local, state, and federal policy changes, both legislative and executive/regulatory, will make natural gas less plentiful and more expensive over time.

Environmental Commitments

Hundreds of institutions, ranging from universities to multinational corporations, have publicly agreed to reduce their carbon emissions or improve their performance on climate change. Renewable energy supports these organizations in meeting their goals cost effectively and on time.

Beyond their environmental commitments, these institutions must also consider the impact of their facilities on the communities in which they have license to operate, and specifically the impact of fossil fuel generation on human health. In 2012, air pollution from fossil fuel combustion played a role in the deaths of 7 million people worldwide, leading the World Health Organization to declare it to be the single largest environmental risk.[25] In Europe alone, the costs of pollution-related illnesses and deaths surpassed $1.6 trillion in 2010.[26] In contrast, the historic U.S. wind installations in 2015 are estimated to have resulted in the savings of $7.3B on public health.[27]

Bottom Line

While attractive in the short-term, low natural gas prices should not derail renewable energy purchasing by C&I buyers. Wind and solar outperform natural gas in price and stability and are essentially carbon free. C&I buyers that want to save money and meet environmental commitments are more likely to achieve their goals using renewable energy PPAs than relying on gas as a long-term energy solution. Buyers who move now, while others hesitate, will have access to the best PPA projects with the most favorable terms.

About the Authors

John Powers is the VP of Strategic Renewables for Renewable Choice Energy where he leads the company's PPA division and oversees all C&I PPA processes. With over 12 years of experience in renewable energy markets, John is recognized as a trusted leader who brings considerable technical and

[21] https://www.eia.gov/tools/faqs/faq.cfm?id=73&t=11
[22] http://pubs.acs.org/doi/pdf/10.1021/es506359c
[23] http://scholarworks.umt.edu/cgi/viewcontent.cgi?article=5605&context=etd
[24] http://www.huffingtonpost.com/entry/human-induced-earthquake-report_us_56f959a0e4b014d3fe239339
[25] http://ecowatch.com/2014/03/26/world-health-organization-air-pollution-killed-7-million/
[26] http://www.euro.who.int/en/media-centre/sections/press-releases/2015/04/air-pollution-costs-european-economies-us$-1.6-trillion-a-year-in-diseases-and-deaths,-new-who-study-says
[27] http://www.awea.org/MediaCenter/pressrelease.aspx?ItemNumber=8634

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HOW C&I PURCHASING IS CHANGING THE U.S. WIND ENERGY LANDSCAPE

Jacob Susman
EDF Renewable Energy

As the cost of renewable energy has dramatically declined, and the U.S. business sector's interest in reducing emissions has markedly increased, corporate procurement of renewable energy is booming. In 2015, over half of all wind Power Purchase Agreements (PPAs) in the U.S. were executed by non-utility customers. This trend is shifting how developers are contracting for renewable projects, as well as the utility industry's role in clean energy deployment. This article will explore some of the changes in geography, contract terms, utilities' roles, and market development for the renewables industry as a result of increased corporate procurement.

In 2015, more than half of all U.S. wind PPAs were executed by corporate, non-utility renewable energy purchasers.[28] The increasing presence of these non-traditional renewable energy buyers is affecting the renewables industry in a big way. For instance, developers are intentionally siting new U.S. wind and solar projects in geographic markets that are particularly attractive to corporate buyers of *virtual PPAs*.[29] Also, regulated utilities are increasingly responding to corporate demand by **procuring renewable energy on behalf of corporate purchasers**, either through long-term contracts or asset ownership.

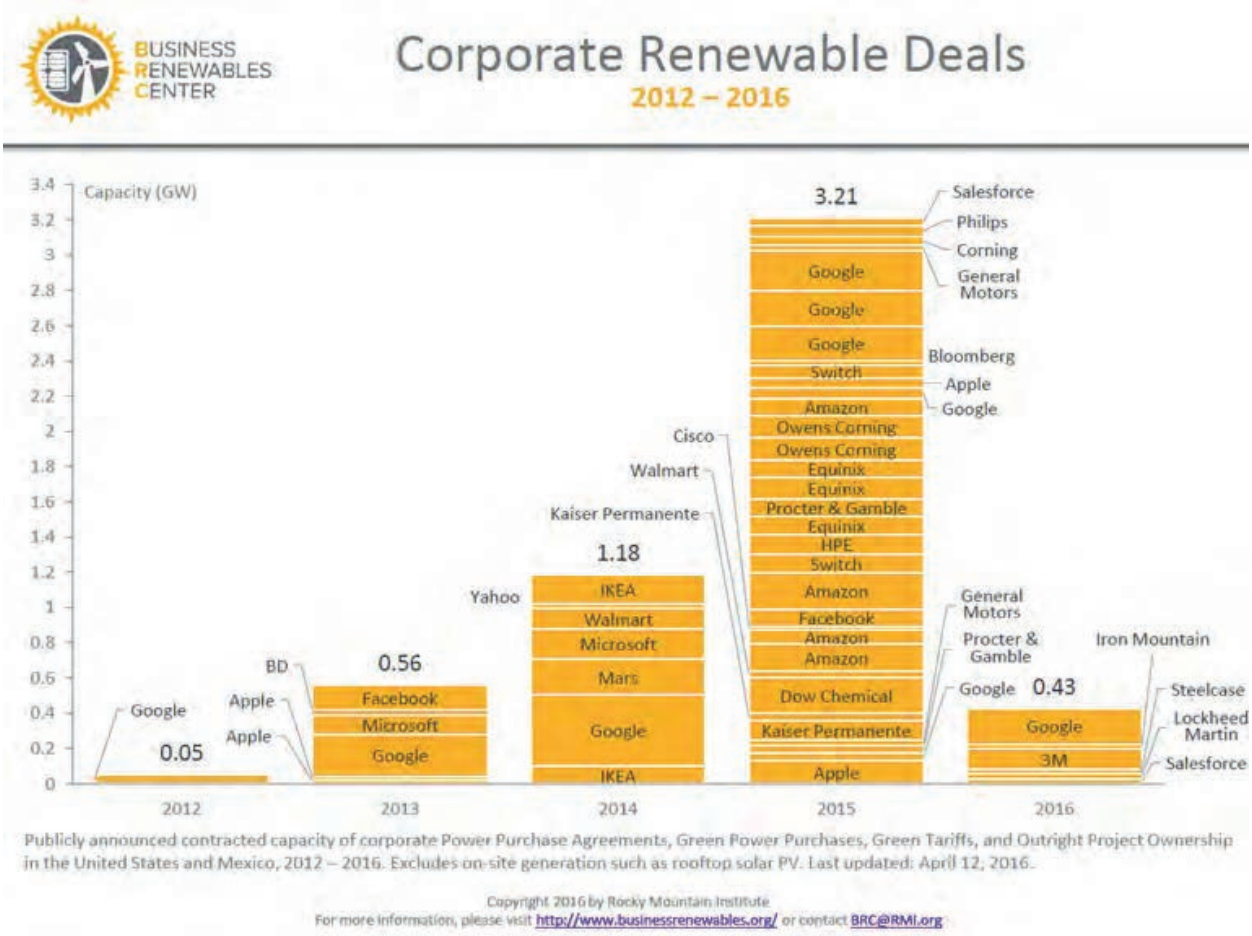
Over the last decade, the world's largest corporations have increasingly set sustainability targets. As outlined in the Power Forward 2.0 report, 43% of the Fortune 500 have goals to reduce their carbon footprint, reduce their energy usage, or power a portion of their operations with renewable energy.[30] Naturally, these for-profit entities have tried to find cost-effective ways to achieve these goals. In particular, EDF Renewable Energy (EDF RE) has successfully partnered with Microsoft, Yahoo, Google, Procter & Gamble, and Salesforce to achieve such corporate customer objectives via offsite wind PPAs. With the decrease in the cost of wind power, which has dropped 60% in the last five years, companies view renewable energy as a viable way to reduce their carbon footprint. As a result, corporate customers invested in or procured over 3 GW of offsite renewables in 2015.[31]

Changing Industry Landscape

In 2015 alone, 52% of the wind power capacity contracted through PPAs was signed by non-utility buyers.[32] EDF RE is helping to drive this trend, and has executed five such wind deals tallying over 540 megawatts (MW) with Fortune 500 companies. The fact that the majority of new wind capacity is being purchased by non-utility customers represents a tectonic shift in the renewable energy market.

In the earlier days of wind generation, the technology, construction, and operating risks were hard to measure. In order to complete financing, developers required wholesale risk transfer to a creditworthy

[28] http://www.awea.org/amr2015
[29] VPPA involves a financial settlement whereby an organization commits to pay the facility owner a fixed price for each unit of electricity produced by the wind farm, while the wind farm takes responsibility for managing the delivery and sale of the electricity produced.
[30] http://www.ceres.org/resources/reports/power-forward-2.0-how-american-companies-are-setting-clean-energy-targets-and-capturing-greater-business-value
[31] http://www.rmi.org/business_renewables_center_newsletter_003_april_2016#market_update
[32] http://www.awea.org/amr2015



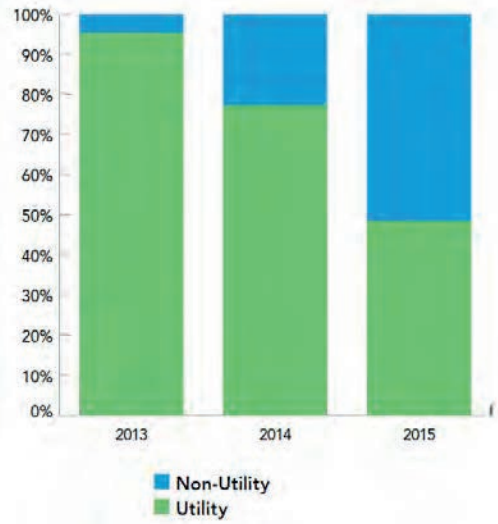
utility via a long-term PPA. Utilities obliged, especially in states that required renewable energy purchasing under a Renewable Portfolio Standard (RPS), but only in exchange for a low price. This created an odd dynamic; developers were given license to be less scientific about evaluating and pricing risk, while utilities benefitted from learning about the aforementioned risks.

Increasingly, traditional utilities are building their own renewable assets rather than just purchasing power from third parties, allowing for both a regulated rate of return and lower cost of energy generation, even without factoring in incentives or pricing in externalities. From the renewable energy developers' perspective, as utilities sign a smaller percentage of overall PPAs, corporate purchasers are becoming increasingly important as PPA customers. The shift to utility ownership of renewable generation assets and voluntary corporate procurement of renewables are both supported by and driving the favorable economics and growing share of renewable energy within our nation's electricity portfolio.

The data tables below illustrate 1) annual U.S. wind capacity additions over the last decade, which reached 74 gigawatts (GW) by the end of 2015, and represented more than 60% of non-hydro renewable generation, and 2) the percentage of wind contracted with utility vs. non-utility buyers:[33]

Year	Annual Capacity Installations (MW)	Annual Capacity Decommissionings (MW)	Cumulative Capacity (MW)
1999	844	2	2,385
2000	71	-	2,456
2001	1,690	-	4,147
2002	411	-	4,557
2003	1,665	-	6,222
2004	396	-	6,619
2005	2,374	-	8,993
2006	2,457	-	11,450
2007	5,253	-	16,702
2008	8,362	-	25,065
2009	10,005	2	35,068
2010	5,216	3	40,283
2011	6,820	171	46,930
2012	13,131	48	60,012
2013	1,087	5	61,110
2014	4,854	90	65,877
2015	8,598	484	73,992

Figure 36
Power Purchase Agreements Signed over Time, by Type of Power Purchaser



Source: AWEA

The chart below shows the recent decline in utility PPAs as a proportion of total U.S. wind offtake (represented in dark blue and light blue on the chart):

Figure 37
Power Offtake Status for New U.S. Wind Power Capacity over Time

[33] http://www.awea.org/amr2015

Further evidence of this transition is found by the number of organizations that are being set up to advise buyers and sellers on the topic. Large tech companies such as Google and Amazon have comprehensive renewable energy departments. A growing number of renewable energy advisors serve corporate purchasers by guiding these buyers through the PPA transaction process. New associations and NGOs have been launched to promote corporate purchasing, and existing organizations are shifting to better serve the corporate purchaser marketplace. The upshot to the U.S. renewable energy market is clear, with substantial brain power and institutional resources being focused to find better, cheaper, and faster ways to promote corporate purchasing of renewables. EDF RE will continue to push this effort via its global CAP 2030 commitment of doubling its renewable energy capacity from 28 GW to 50 GW by 2030.[34]

Market Impacts from Corporate Procurement

Increased corporate purchasing has affected the geography of U.S. renewable energy development. While RPS states have historically been and are still popular destinations for new wind and solar installations, corporate purchasing is driving renewable energy growth in states and regions where wind and solar PPA prices compete economically with traditional brown power sources (ERCOT and Southwest Power Pool (SPP) are good examples). Separately, PJM's renewable energy market has been driven significantly by corporate demand, as data center-dependent companies such as Amazon Web Services, Microsoft, and Salesforce have signed over 240 MW of PJM wind and solar PPAs to serve their regional loads with renewable energy.[35] A recent GTM Research report shows that 19 states currently have over 50 MW of utility-scale solar in development outside of RPS-driven projects.[36]

In addition to changing geography, the renewable energy PPA product itself is evolving due to corporate demand. In the past, utilities generally purchased bundled power and Renewable Energy Credits (RECs) from the same wind or solar energy generation facility. As renewable energy purchasing shifts to different geographies with a greater emphasis on liquid markets, an increasing number of corporate PPAs may unbundle the power and RECs. Furthermore, developers have been responding to corporate demand by offering shorter PPA contract tenors preferred by corporate purchasers, compared with the typical 20-30 year PPA term lengths preferred by utility purchasers.

Other important questions remain about the impacts of corporate procurement on renewable energy markets, including whether there will be a rise in hub-delivered energy contracts with sharing of curtailment and congestion risks between buyer and seller, an increase in PPA prices, and/or changes in credit requirements in offtake agreements, especially with corporate purchasers that have lower credit ratings than traditional utilities.

The Big Picture

To counterbalance the upside potential of growing corporate buyer demand, one must consider its limitations. Many of the corporate purchasers who have entered into offsite renewable energy contracts to date are global Fortune 100 companies with large and growing energy footprints. However, even if

[34] https://www.edf.fr/sites/default/files/contrib/groupe-edf/espaces-dedies/espace-finance-fr/actionnaires/lettres-aux-actionnaires/edf_laa-mars2015_uk_web.pdf
[35] https://www.bnef.com/core/insight/13569
[36] GTM Research, "The Next Wave of U.S. Utility Solar: Procurement Beyond the RPS," Mar 2016.

every Fortune 100 company entered into a 100 MW contract with a wind farm, this 10 GW would only represent about one to two years of average installations in the wind industry. This would certainly have a meaningful impact, but is it enough to change the whole power industry?

The answer is a qualified yes, when taken in the context of developments in the utility industry.

Utilities are facing a rapidly changing market and regulatory environment, driven by lower annual load and revenue growth due to energy efficiency and the increased presence of distributed generation. Combined with a forecast of low natural gas prices in the near-to-medium term, this has served to challenge many utilities and their traditional business models.

For many utilities, renewable energy is an attractive source of new power generation. The rapid reduction in the cost to procure renewable energy has led several utilities to recognize the long-term value of renewables investments and meet or exceed their state RPS requirements. Some utilities are also pursuing renewables to get a jump on the U.S. Environmental Protection Agency's Clean Power Plan (CPP) requirements, and to benefit from the federal Production Tax Credit (PTC) for wind and the Investment Tax Credit (ITC) for solar while still active.

More proactive utilities are working to find innovative ways to better serve their corporate customers with renewables. For example, some have introduced green riders and green tariffs (often encouraged by state governments), while others have explored relationships whereby the utility enters an energy-only PPA with the wind or solar plant, while that plant enters into a separate REC-purchase-only contract with a corporate purchaser. In other instances, utilities have purchased wind or solar developments outright in order to serve the load of a corporate customer.

In conclusion, the recent onslaught of corporate renewable energy purchasing is shifting the overall market's traditional PPA contract terms and, possibly, its overall geography. As developers increasingly cater to the corporate purchaser market to source new wind and solar PPA offtakers, they are reckoning with corporate buyers' needs for shorter contract tenures, shared pricing risk with the seller, and the idiosyncrasies of projects and contracts in liquid trading markets such as ERCOT, SPP, and PJM. Developers such as EDF RE have adapted and moved the U.S. and international corporate buyer marketplaces forward by successfully serving the corporate buyer with creative, flexible, and financially attractive projects and deal structures acceptable to both buyer and seller.

About the Author

Jacob Susman has been building businesses, investing, and developing projects in renewable energy since 1999. He led OwnEnergy from inception to its sale in August of 2015 to EDF Renewable Energy, including recruiting and managing its industry-leading team, raising capital, establishing a nationwide brand, sourcing new business, developing projects, building customer relationships and generating revenue. Today, he serves as VP, Head of Origination where he leads EDF RE's relationships with both utility and corporate customers around the U.S. for the Company's wind and solar portfolio.

Jacob served on the Board of the American Wind Energy Association for five years, where held the positions of Secretary and Treasurer on its Executive Committee. Jacob also serves on the Advisory

Board of the Business Renewables Center. In 2010, Jacob was named to Crain's New York '40 Under 40', and in 2012, he was named an E&Y Entrepreneur Of The Year Finalist. In 2013, Greentech Media named him one of New York's Top 10 Cleantech Leaders.

CONTRACTING INSIGHTS

CREATING THE RIGHT INTERNAL PROCUREMENT TEAM

George Favaloro & Ezequiel Hart
PricewaterhouseCoopers

A company's first major purchase of renewable energy is an exciting endeavor. A renewables purchase can be a very visible corporate point of pride and save companies money, while helping to transform our collective energy system by bringing online important new generating capacity. It also involves introducing new technologies and unfamiliar contracting approaches to an organization that may lack renewables procurement knowledge and expertise. Typically, the renewables purchasing process introduces a series of questions that impact not just the energy, sustainability, and facilities functions, but also the legal, accounting, finance, and potentially even marketing departments. It is no wonder that experienced corporate renewables buyers report that building internal support is the hardest aspect of the procurement process.[37] However, internal renewables champions that successfully create a cross-functional internal team and lead that team through a well-defined evaluation and buying process can greatly reduce procurement friction and generate successful buying outcomes. This paper explains leading practices in assembling a corporate renewables procurement team and driving the procurement process.

Team Formation

As strong cross-functional teams do in other corporate settings, a well-formed renewable energy procurement team can bring together disparate knowledge, provide a vehicle to create shared purpose, and drive cross-functional accountability. Forming the team is the task of the renewables champion and the executive sponsor. Working together, they bring the team to life by giving it a purpose, recruiting members, and defining the process the team will use. The **executive sponsor** makes sure that critical senior executives are supportive of the activity and involved in selecting the right representatives from their functions to the procurement team. The sponsor should clearly explain the purpose and process to these executives, who should explicitly sign off on it so the team has a mandate to work against. It is helpful if this initiative can be carried out with a charter provided by a Sustainability Executive Committee or similar group, therefore forming part of a coherent strategy and program with an existing decision making and accountability structure. However, while this is ideal, it is not required and good executive sponsorship can assure a strong mandate and a successful procurement process. The **renewables champion** will be the team leader, and typically is a sustainability or energy leader, although it can be someone from the facilities or procurement organizations. The champion needs to engage and coordinate the team, systematically driving the process forward as well as tracking action items, open issues, and next steps.

[37] PwC Corporate Renewables Procurement Survey: http://www.acore.org/images/documents/CorporateRenewableEnergySurvey.pdf

The Team Members and Their Roles

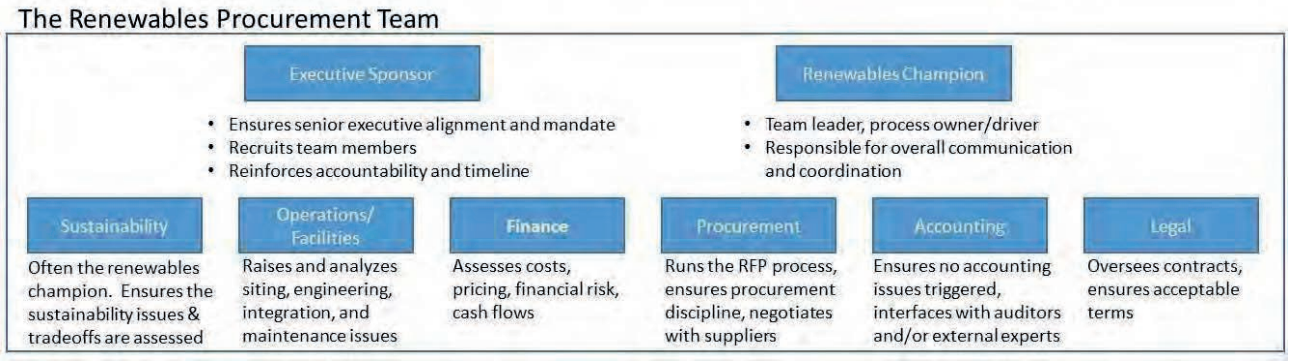
The functions that need to be represented are typically Operations and/or Facilities, Sustainability, Finance, Accounting, Legal, and Procurement:

- If the company has a **sustainability** function, a representative should be involved in, if not lead, the process. Even if sustainability (e.g., carbon reduction) is not a primary driver of the renewable energy purchase, the sustainability representative can ensure the company is considering the sustainability issues and fully assessing any potential tradeoffs.
- The role of the **operations/facilities** team member is particularly acute when seeking on-site renewables or when the company will be a direct offtaker of the power. They need to raise and analyze siting, engineering, integration, and maintenance issues.
- The **finance** team member will assess the cost, pricing, financial risk, and discounted cash flow aspects of the deal. Importantly, they need to translate the various financial projections for bids from different vendors into *apples-to-apples* comparisons, test the projections using alternative (including worst-case) scenarios (e.g., forward price curves for energy), and assess organizational requirements for evaluating and securing approval for operating and capital expenditures.
- The **accounting** team member's role is to anticipate and avoid negative accounting triggers that can be especially problematic for certain Power Purchase Agreement (PPA) deal structures. They may need to interface with the firm's auditors or external accountants familiar with renewable energy accounting issues.
- The representative from **legal** will need to oversee the contracts with vendors to ensure that the terms are favorable and acceptable from a corporate perspective and do not create legal risks. In cases where the deal involves more complex contracting structures such as virtual PPAs, the legal specialist may need to bring in external counsel with the right expertise to represent the company in the negotiation.
- The **procurement** team member will run the request for proposals (RFP) process, interface with vendors, and ensure the team follows procurement guidelines, as well as bringing a cost focus. It is helpful if the procurement team member has knowledge of energy markets and general energy contracting issues.

Guiding the Team through the Procurement Process

We recommend a four-phase renewables procurement process that involves:

- Creating a shared mandate
- Evaluating the options and developing a recommendation
- Driving a go/no go decision
- Closing the transaction



Ideally, the procurement team should be formed upfront so all its members are engaged in the full process, including helping to refine the mandate.

Phase 1. Creating a shared mandate

In the first phase, the focus is to develop organizational buy-in and a shared understanding of the reasons for procuring renewables. It will vary by organization, but the business case for procuring renewables usually involves a mix of benefits including cost savings, carbon reductions, energy price certainty or hedging, increased resilience, and reputation enhancement, which extends to consumers and employees.

In some cases, the renewables champion may begin the process without having yet won the support from senior leaders to bring together a team and initiate the procurement process. In this scenario, the first priority is to put together a compelling business case for the organization and make the case for it internally, until the champion has secured the green light to proceed, and (ideally) confirmed that an executive sponsor is in place. In other cases, the process will have been initiated from the top, by the CEO, COO or another senior leader who believes the organization should procure renewable energy, or at least explore the options in-depth.

Once the renewables champion has the go-ahead from senior leadership, we advise taking the time necessary to socialize the business case for renewables and align the organization around a shared understanding of the rationale for the purchase. Without that shared understanding, the project can stall when difficult questions are asked and obstacles emerge as they often do. The executive sponsor can play a critical role in Phase 1 by helping the renewables champion to build support across the organization.

Once the renewables procurement team is in place, the executive sponsor and renewables champion should engage members in an open discussion and seek to build a strong alignment around the purpose with the team. The renewables champion will guide the team to agree on a timeline and the key steps in the process, and establish coordination and communication mechanisms, while the executive sponsor should stress the need to adhere to the timeline and process, and reinforce the importance of each team member's role. During Phase 1, each team member should be thoughtful and vocal in anticipating potential issues, raising concerns, and noting requirements that will need to be addressed. Team members should also actively build and maintain support for the project within their respective functions.

Phase 2. Evaluating options and developing a recommendation

Companies are faced with many different options as they begin to consider their renewables procurement approach, including for example technology alternatives, project ownership or leasing, renewable energy credit ownership, and siting options. The team will need to consider the various options through a systematic process that evaluates potential approaches and eliminates those that do not fit, and focuses on the most attractive alternatives given the organization's energy requirements, desired amount of renewables, site considerations, return on investment (ROI) requirements, and relative priority of other potential benefits. It is often beneficial to work with an external expert that can bring a robust set of alternatives to the table for consideration.

Once the team has settled on the one or two approaches, the next step is to develop a Request for Proposals (RFP). There are a number of available guides to developing a renewables RFP.[38] The procurement team member should take the lead in publishing the RFP and collecting proposals. Submitted proposals will be compared by finance on an "apples-to-apples" basis, and by operations/facilities in terms of siting, engineering, and integration considerations. Assuming the bid analysis identifies attractive options, the team should develop a consensus recommendation, with a supporting business case.

Phase 3. Driving a go/no go decision

While it may be tempting to skip or minimize this step, we recommend treating it with some formality. The renewables champion and executive sponsor should seek organizational approval in a high-visibility internal forum if possible, especially if this is the first significant renewables purchase.

We recommend a two-stage approval process. First, all the team members should review the recommendations and business case with their functional leaders. This will surface any additional issues and help to refine the recommendations before seeking approval from senior executives. Final approval may come from the investment committee, the company's sustainability steering committee, or (if it is of significant enough magnitude) the full executive committee.

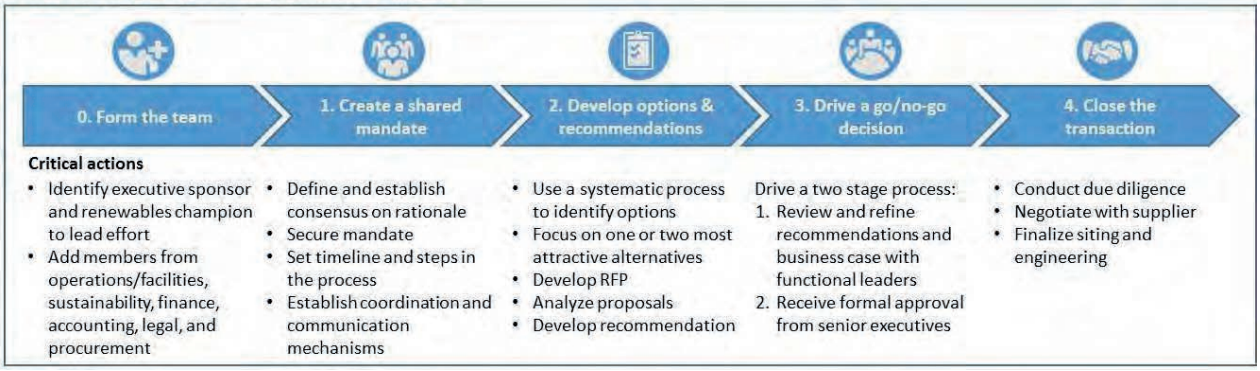
Phase 4. Closing the transaction

The final phase involves negotiations with the supplier, due diligence, siting and engineering plans (for onsite projects) and agreement on acceptable contract terms. These tasks will fall primarily on procurement, legal, accounting, and operations/facilities, who often have to coordinate a broader set of internal and external resources to get the deal done.

Some organizations disband the team once a recommendation is approved. While it is true that the team needs to shift into execution mode, issues will almost inevitably arise that will be best

[38] For example, see The Solar Foundation's "Steps to a Successful Solar Request for Proposal Fact Sheet"

The Renewables Procurement Process



dealt with via a team effort. Keeping the team intact will also preserve cross-functional accountability and provide a mechanism to address issues in a timely manner.

Conclusion

While procuring renewable energy for the first time is a complex endeavor that can feel daunting for many organizations, it is worth the effort. Our research shows that among the corporate renewables leaders who have made the leap and successfully completed a major renewables purchase, over 70% are planning to make another in the next 18 months.[39] It is in a company's interest to explore the options, fully assess the business benefits, and determine if now is the time to join the group of energy innovators who are purchasing renewables. By taking the time to put the right team together, create a shared mandate, and follow the other steps outlined above, companies can drive a renewables procurement process that will successfully launch the company down the path to transforming their energy footprint.

About the Authors

George Favaloro is a Managing Director in the Sustainable Business Solutions (SBS) practice at PwC where his clients include leaders in manufacturing, consumer products, communication and information technology, as well as in the airline, chemicals, and utilities industries. He is the Energy Transformation leader within SBS. George holds an MBA from Amos Tuck School at Dartmouth College and a BA from Princeton University.

Ezequiel Hart is a director in PwC's Sustainable Business Solutions practice. Zeke helps corporate clients develop and implement sustainability and energy management strategies. He has worked with leading global companies in diverse industries, including retail & consumer, industrial products, and hospitality. Zeke specializes in sustainability strategy and goal-setting; carbon and energy management strategies; and sustainability communications and reporting.

Zeke holds an MBA from the Amos Tuck School at Dartmouth, a Master's degree from Tufts' Fletcher School and a BA from Haverford College.

[39] PwC Corporate Renewables Procurement Survey: http://www.acore.org/images/documents/CorporateRenewableEnergySurvey.pdf

MAINTAINING CORPORATE RENEWABLE ENERGY CLAIMS

Robert Maddox
Sterling Planet

Corporate America is playing a major role in driving clean, renewable energy deployment. There are several reasons why businesses are leading the way, which include a desire to hedge future energy prices, enhance their brands, differentiate products or services, respond to stakeholder engagement, or in many cases, a combination of all these reasons.

There are many paths businesses can take. The choices include signing Power Purchase Agreements (PPAs), developing onsite renewable energy, working with competitive electricity providers, engaging in a utility Green Power program, participating in community solar projects, or purchasing unbundled Renewable Energy Certificates (RECs). While these actions each offer different opportunities, a key element for success is how businesses should communicate their renewable energy strategies and purchases.

This paper discusses best practices for making renewable energy claims based on current accepted industry standards as well as what the law allows. It provides a brief history and discusses the Federal Trade Commission's (FTC) Green Guidelines, the Environmental Power Agency's (EPA) Green Power standards, Green-e requirements, the World Resources Institute's Scope 2, and the legal aspects involved in making renewable energy claims.

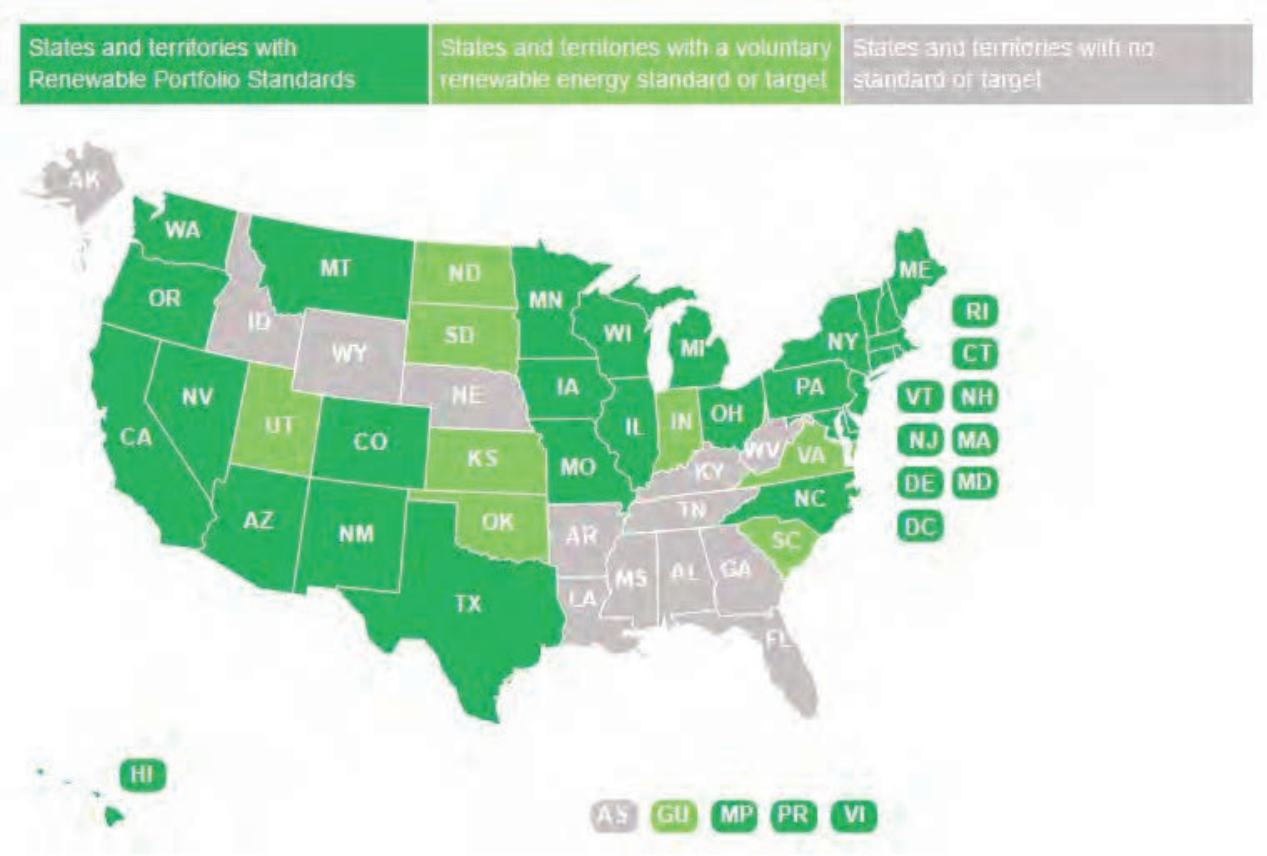
The Birth of Green Electricity

In the early 1990s, significant regulatory hurdles and perceived financial risks limited renewable energy development in the U.S. Also, voluntary consumers had little influence on electricity supply, as the only choice was to accept the mix the utility offered or do without electricity.[40]

However, in the late 1990s, with the advent of electricity choice in California, Texas and the Northeast, a door opened that allowed consumers to pick which sources of electrical generation they wished to support.[41] This new choice allowed consumers and businesses to mitigate the environmental impact of their electric power use, matching their wallets with their environmental ethics.

At the same time, many states began to require that a certain percentage of electricity generation come from renewable sources, and established mandates that continued to raise the percentage over the next several years. Referred to as Renewable Portfolio Standards (RPS), these requirements have grown to include 29 states, the District of Columbia, Guam, N. Mariana Islands, Puerto Rico and the U.S. Virgin Islands, as well as eight states with renewable portfolio goals (RPG), which in total represent more than half of all electricity generation in the United States.[42,43]

[40] https://www.purdue.edu/discoverypark/energy/assets/pdfs/History.pdf
[41] https://www.purdue.edu/discoverypark/energy/assets/pdfs/History.pdf
[42] https://emp.lbl.gov/sites/all/files/lbnl-1005057.pdf
[43] http://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx



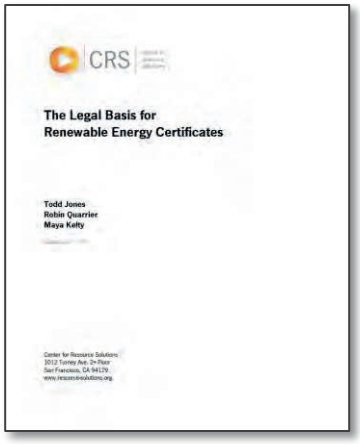
A REC is Born

Because state requirements needed to be verified, a transparent, auditable system was developed that insured renewable energy sales were not being double sold, counted, or traded for compliance purposes. This system created a certificate for each megawatt-hour (MWh) of renewable energy produced and deposited these certificates into a tracking system. Just like a certificate of deposit is proof of money in a bank, RECs are proof that renewable energy was produced and placed onto the electricity grid.

Understanding the difference between the definition of a REC and the legal aspects of a REC is very important for companies looking to procure renewable power. While each state has a slightly different definition, they all accord to the guidelines used by the U.S. EPA:

> ***A REC (pronounced: rĕk) represents the property rights to the environmental, social, and other non-power qualities of renewable electricity generation. A REC, and its associated attributes and benefits, can be sold separately from the underlying physical electricity associated with a renewable-based generation source.[44]***

[44] https://www.epa.gov/greenpower/renewable-energy-certificates-recs



The legal basis for RECs is best outlined in this report done by the Center for Resource Solutions that administers the Green-e energy certification program.

This study can be downloaded at: http://resource-solutions.org/site/wp-ontent/uploads/2015/07/The-Legal-Basis-for-RECs.pdf

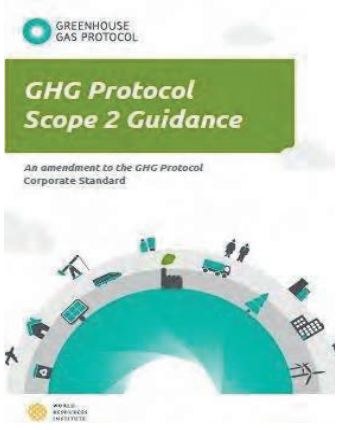
The Federal Trade Commission's guidance is very specific:

§ 260.15 Renewable Energy Claims.

(a) It is deceptive to misrepresent, directly or by implication, that a product or package is made with renewable energy or that a service uses renewable energy.

A marketer should not make unqualified renewable energy claims, directly or by implication, if fossil fuel, or electricity derived from fossil fuel, is used to manufacture any part of the advertised item or is used to power any part of the advertised service, unless the marketer has matched such non-renewable energy use with renewable energy certificates.

The U.S. EPA requirements for the Green Power partnership mirrors the Center for Resource Solutions (CRS) Green-e energy standard. This standard defines the eligible technologies (such as wind, solar, small hydro, and bioenergy), the online date and discourse required.[45]



Last year, The World Resources Institute (WRI) released its latest Guidance on how to account for renewable energy. WRI refers to power use as Scope 2. The bottom line is that their standard requires ownership of the REC in order to make a renewable energy claim. Full report: http://www.ghgprotocol.org/scope_2_guidance

[45] http://www.green-e.org/getcert_re.shtml

Be a Savvy Buyer

Up until 2010, most businesses purchased green power through a competitive electricity supplier, a Utility Green Power program, or unbundled RECs. In these cases, the REC is included and retired by the company in order to make their renewable energy claims. Recently, as the market has developed, more choices are available for corporations wishing to purchase renewable energy. Many organizations are engaging in Power Purchase Agreements (PPAs), community solar, lease options and other financial instruments such as debt or equity investment. While these options all have benefits, in order to make any claim, companies must answer whether they own the RECs.

If the answer is no, then a company cannot make any claim about using or supporting renewable energy.

- Unbundled RECs → Company owns the RECs
- Purchase power agreements → Depending on the agreement, company may or may not own RECs
- Competitive electricity supplier (In states where allowed) → Company should own the RECs
- Utility green power program → Company always owns the RECs
- Community solar (In states where allowed) → Depending on the program, company may or may not own the RECs
- Onsite renewable energy → Company may or may not own the RECs
- Leased renewable energy → Company usually does not own the RECs

Easy steps to successful claims

- **Be transparent**. Successful organizations are upfront about their intentions and also transparent. If a company sets a goal for a certain percentage of renewable energy, then it must openly disclose its aggregate energy use and provide independent verification on the progress made. Most large corporations do this through their Carbon Disclosure Project reports.[46]
- **Understand what backs up a claim**. If a company has a commitment to become 100% renewable, it should have enough RECs secured to match its load and know from which projects they are sourced.
- **Only make claims that can be verified**. As the market has evolved, many organizations are considering PPAs. While PPAs are a good instrument to hedge against raising electricity prices, a company must understand REC ownership within the agreement. If the company does not own the RECs from the PPA project, it cannot make claims about the energy generated from the project. If it wants to sell the RECs from a PPA project and buy less expensive replacement RECs, it is important to be transparent and explain why.
- **Do not overstate purchases**. Buying renewable energy has many benefits. However, most organizations should not translate this action into a claim of being completely carbon neutral.

The bottom line to claiming renewable energy is possession of RECs that match a company's claim. Companies should ensure the legal rights to the RECs they claim, have sufficient quantities to match their claims, and be transparent about their actions.

[46] https://www.cdp.net/en-US/Respond/Pages/companies.aspx#whyreport

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Robert A. Maddox, Jr. has significant energy experience through his work as a former 7-term State Representative and former member of Connecticut's Clean Energy Board. As Chief Sustainability Officer for Sterling Planet, he frequently provides expert testimony to regulatory commissions and his insights on sustainable energy and carbon regulation are sought out by many policy makers, Fortune 500 companies, universities and the press. Mr. Maddox owns Sun One Organic farm. A LEED™ AP, he founded the CT Green Building Council, and is actively involved with USGBC. He recently built a net zero energy high performance Permaculture based solar & wind powered home. He holds an MBA degree from UCONN. In 2014, Mr. Maddox was named Green Power Leader of the Year by The Center for Resources Solutions.

PROCUREMENT OPTIONS: RECS VS PPAS

Shalini Ramanathan
RES Americas

Brokers of Renewable Energy Certificates (RECs) maintain that their products are an easier way to get corporate buyers comfortable with green energy and can later lead to direct purchase of electricity via power purchase agreements (PPAs). Yet, some companies only buy RECs despite having laudable and highly publicized corporate sustainability goals around green energy. Flexibility in corporate procurement is important; however, it is equally important to understand that REC purchases do not bring new renewable assets into the market.

Additionality – the concept that a wind or solar project would not have happened under business as usual, and that a specific action (such as a credit-worthy corporation signing a PPA) made a critical difference – is not a phrase that many people outside the energy industry understand. Currently, most customers are unlikely to investigate whether green energy claims tied to consumer products are derived from REC purchases or additionality from signed PPAs. Shareholders of large companies may not understand the difference, since green energy is not a core issue when juxtaposed with earnings and governance.

How can renewable energy suppliers help corporate purchases explain the value of PPAs, and the concept of additionality, to stakeholders? Should Corporate Social Responsibility (CSR) claims about green energy come with more detailed explanations? What is the role of ACORE and other industry associations in pushing for PPAs so that more green megawatts (MW) are installed?

The Fine Print

Major companies, especially those with strong consumer brands, understand that their customers care about sustainability. Every month brings new announcements about corporations buying green energy. Greentech Media reported earlier this year that corporate buyers signed 75% of the 1,800 MW of PPAs in the fourth quarter of 2015.[47]

Fifty-one companies in the U.S., most of them household names, have signed on to the Corporate Renewable Energy Buyers Principles, set forth by two NGOs, the World Resource Institute and the World Wildlife Fund.[48] As of 2013, 60% of the Fortune 100 had set targets to reduce greenhouse gas emissions and buy clean energy. ACORE regularly brings together corporate buyers and is tackling the issue of how to engage companies beyond the Fortune 100 with significant energy load and buying power.

However, while some companies are entering into PPAs, more are just purchasing RECs. The U.S. Department of Energy (DOE) says that RECs "represent the environmental attributes of the power produced from renewable energy projects and are sold separate from commodity electricity. Customers can buy green certificates whether or not they have access to green power through their local utility or a

[47] http://www.awea.org/Resources/Content.aspx?ItemNumber=7525&RDtoken=29653&userID=
[48] http://buyersprinciples.org/

competitive electricity marketer and they can purchase RECs without having to switch electricity suppliers."[49]

The National Renewable Energy Laboratory (NREL), in its *Status and Trends in the U.S. Voluntary Green Power Market* assessment of 2014 data, calculated that 36,000,000 MWh of unbundled RECs were bought that year, while only 6,700,000 MWh were contracted in PPAs in the same period.[50] RECs are a major force in the green energy market.

The "sold separately" aspect of RECs as described by the DOE is what makes them a concern for companies interested in new wind and solar being installed. The U.S. Environmental Protection Agency's Green Power Partnership requires only that partners "use green power from renewable energy facilities put into service within the last 15 years."[51]

This 15-year standard allows corporate buyers to buy RECs from green energy projects that are already operational – the REC purchase has not made anything new happen. It is not additional.

RECs In and Out of PPAs

There are ways REC sales can add value. RECs produced in certain markets (e.g., New England) are worth substantially more than those produced in others (e.g., Texas). Because some green energy buyers, such as the commodity desks that sign hedges, do not need to retire RECs to meet sustainability goals, they sell them separately from the power. Right now, a buyer can secure a five-year supply of RECs produced in ERCOT for less than $1.00/MWh. The PPA price for bundled wind power/RECs in the same market would cost $24-29/MWh, which is a good price relative to historic and forecasted power prices, but still much more than a REC.

The ability to strip out valuable RECs (mostly in the Eastern U.S.) and substitute less-valuable RECs has helped some PPAs go forward. Most corporate buyers want green power at or only slightly above the price of brown power, and swapping out RECs can make a difference to project economics. Developers and corporate buyers involved in such deals would argue that they have met the additionality test, since such deals would not have happened without signed PPAs. However, there is little discussion around the issue of RECs being stripped out to lower the PPA price.

The average customer does not understand the complexities of the power market. Even savvy shareholders on large corporate boards are more likely to focus on earnings, governance, and other core issues than they are with green energy commitments. A deal announcing a simple REC purchase sounds just as rosy as a deal announcing the significant commitment to a PPA, while the nuance of whether the original RECs were kept or sold is only rarely publicly announced. There is no clear standard for discussing green energy commitments, unlike corporate claims made about the fuel efficiency of cars or the nutritional content of food.

[49] http://apps3.eere.energy.gov/greenpower/markets/certificates
[50] http://www.nrel.gov/docs/fy16osti/65252.pdf
[51] https://www.epa.gov/greenpower/green-power-partnership-requirements

REC brokers argue that their products are the stepping stones to PPAs. But REC-only deals and PPAs have very different risks and very different price tags. Why step up the risk exposure curve if the market treats all deals the same?

Finding Solutions

Those who work for a low-carbon future understand the importance of getting additional green energy megawatts in the ground. So what can be done to encourage a greater focus on additionality?

- **Be more precise with language**. Instead of announcing that a company is "buying green energy," we should talk and write about PPAs and REC purchases. And greater transparency around the treatment of RECs in PPAs (whether a bundled product or if valuable RECs have been sold and replaced with less-valuable RECs) would lead to a broader understanding of deal options. Just seeing these distinctions may begin conversations about the differences between them.
- **Corporate leadership**. Many corporations have now done both REC deals as well as bundled power/REC PPAs. They are in a unique position to raise the bar in the community of corporations who have CSR goals. Having individuals at leading companies explain how they built support for bundled power/REC PPAs would encourage others to do the same. Corporates who have signed PPAs have a unique interest in speaking out; they worked hard to make a complex deal happen and should get credit for it.
- **Different tiers**. Having different levels of recognition within programs for corporate buyers would be a way to honor all actions taken while recognizing that some have a bigger positive impact than others. The U.S. Green Building Council's Leadership and Environmental Design (LEED) certification program, which specifies how buildings must be designed and constructed to qualify for various certification levels, is a useful model. Greenpeace's Clicking Clean report on tech companies also offers a starting point.[52]

Corporations with public environmental commitments, strong credit ratings, and robust demand for power are an important new class of buyer. We need to encourage corporate green energy goals to focus on additionality to maximize the environmental benefits of corporate action.

About the Author

Shalini Ramanathan is the VP of Origination for Renewable Energy Systems (RES), a leading developer and constructor of wind, solar, transmission, and energy storage projects. Ms. Ramanathan has closed 1,400 MW worth of deals with more than $2.5B in total transaction value. She has negotiated PPAs with Google and Microsoft, as well as with numerous utilities including Xcel Energy and Wolverine Electric Coop. She holds a Master's degree in Environmental Management from Yale University and a BA from the University of Texas at Austin. She lives in Austin, TX and serves on the Board of CleanTX, which promotes the clean energy economy in Central Texas.

[52] http://www.greenpeace.org/usa/wp-content/uploads/legacy/Global/usa/planet3/PDFs/clickingclean.pdf

GETTING TO A SIGNED STRUCTURED POWER PURCHASE AGREEMENT

Ellen Gilman
Apex Clean Energy

This case study walks through the process that has been used to successfully contract for an off-site, renewable energy Structured Power Purchase Agreement (SPPA). This case study is based on Apex's experience working with several corporate buyers who opted to use an SPPA for renewable energy procurement.

The example buyer in this case study is referred to as *GreenCo*. This case study presents GreenCo's path from concept to SPPA execution, describing GreenCo's drivers to pursue renewable energy purchases, the various options it considered, how it chose the SPPA approach, its process to select a project, and how it finalized the contract.

The Corporate Buyer

GreenCo represents a buyer profile Apex has encountered repeatedly. GreenCo has its headquarters located in the Midwest and a number of facilities throughout the United States, including light manufacturing/assembly, data centers, office space, and retail space. GreenCo is publicly listed but not large enough to be included in the Fortune 500. The company has an investment-grade credit rating, but just barely. And most importantly, GreenCo's CEO recently announced aggressive sustainability targets for the company that need to be met with renewable energy.

On an annual basis, GreenCo purchases 735,000 megawatt-hours (MWh) of electricity. Its purchases are spread across five different states within four different Independent System Operators (ISOs). GreenCo's electricity purchases are fairly evenly split between competitive and regulated markets.

To achieve the CEO's targets, GreenCo's Energy Manager must offset 20% of GreenCo's electricity purchases with renewable energy. This is approximately 150,000 MWh per year. In addition, the Energy Manager's mandate is to meet this goal without increasing the overall energy budget.

The Options

Based on GreenCo's goal to purchase 150,000 MWh of renewable energy, or 150,000 Renewable Energy Certificates (RECs) per year, the Energy Manager considers four approaches: (1) installation of solar panels at GreenCo facilities (either by purchasing the equipment or having the equipment financed by a third party that would offer GreenCo a long-term power purchase agreement), (2) purchasing RECs, (3) working with GreenCo's incumbent electricity providers (a combination of utilities and retailers in different locations) to purchase a green energy product from them, and (4) contracting for the purchase of offsite renewable energy directly from a project under a Virtual or Structured Power Purchase Agreement.

There are benefits to each of these approaches. For GreenCo, the decision is driven by three factors: convenience, financial benefits, and additionality (i.e., adding additional renewable energy to the grid). In his/her assessment of the options, the Energy Manager determines that GreenCo does not have suitable rooftop space or land to install enough solar to meet the GreenCo green energy target. He/she

plans to install a solar project at GreenCo's flagship store, but this project will only satisfy 3% of GreenCo's total renewable energy target. REC purchases represent convenience, allowing GreenCo the most flexibility on quantity and timing of renewable energy purchases. But RECs alone do not provide the additionality and economic benefits that are desired as part of GreenCo's renewable power purchasing initiative. The Energy Manager contacts GreenCo's existing energy suppliers for pricing on a green product to replace GreenCo's current purchases. For each supplier, green power is offered at a premium to GreenCo's current energy purchases, and it is not possible to meet the budget parameters of the initiative. Furthermore, it is unclear to the Energy Manager where this green power is being sourced and whether there is any additionality associated with the purchase.

Upon considering the options, the Energy Manager considers an off-site renewable energy purchase. He/she is somewhat daunted by the contract that will be required and the long-term (12-15 year) purchasing commitment. In addition, the Energy Manager is concerned that the structure of the SPPA approach, and its risks and benefits, will take more education internally and will require approval from a wide array of internal stakeholders. The Energy Manager foresees reviews by not only the legal, procurement and energy groups within GreenCo, but also review from sustainability, accounting, finance, and the senior executive committee. Despite these concerns, the SPPA for an off-site renewable energy purchase is elected as the optimal approach for GreenCo because it is efficient, economical, provides additionality, and provides electricity hedging benefits.

	On-site Solar	REC Purchase	Utility/Retailer Purchase	Off-site Wind/Solar
Pros	Visible renewable energy purchase Ability to use the electricity directly	Convenient, simple transaction Easy to increase/decrease amount as electricity usage changes	Adjustment of existing utility/retailer terms	Lowest cost for renewable energy Large contracts available
Cons	Siting restricted to company facilities Can be difficult to achieve an attractive return on investment Requires multiple installations and contracts to fulfill target MWh quantity	No return on capital, expense only No additionality associated with purchase	Premium pricing for green power Not offered by all suppliers	Not necessarily local to corporate facilities Requires long-term contract

The SPPA is a fixed-for-floating swap contract. Under the agreement, GreenCo agrees to pay a fixed fee per MWh produced by a project. In exchange, GreenCo will receive the RECs associated with each MWh produced, and as the energy is sold into the market, GreenCo will receive the market price.

The SPPA offers the ability to hedge electricity purchases, the potential to provide positive cash flow from contract year one, and provides RECs and additionality associated with the construction of a new wind energy project.

Selecting a Partner and a Project

GreenCo next identifies what it wants in an SPPA contract, particularly a contract with a new wind or solar project that could supply approximately 150,000 MWh per year starting in 2017. Provided that pricing remains competitive, the Energy Manager wants the shortest contract term available for this first SPPA. So he/she requests bids for 12-year terms and any shorter terms that the developers are willing to offer. While the Energy Manager prefers a project location aligned with GreenCo's load, he/she would consider multiple locations if the economic profile is attractive.

Once the basic parameters are set, the Energy Manager generates a list of developers that offer SPPA contracts, and GreenCo contacts each to determine if they have projects that fit GreenCo's requirements. After speaking with six developers, the Energy Manager has 27 different projects to consider. To narrow down the list, the Energy Manager requests that each developer provides indicative pricing, an hourly market price forecast, and a 12x24 production profile for each of their projects. With this data, GreenCo estimates the revenue generated by each of the projects over the term of the contract and narrows down the list of projects to a handful that are the most economically advantageous.

As a second approach to evaluating the projects, the Energy Manager determines if there is a clear preference of one market over another based on the market price correlation with GreenCo's load. He/she reviews the historical pricing at the project node with historical pricing of GreenCo's load. This analysis slightly disadvantages projects located in one of the ISOs compared to the others.

Third, GreenCo reviews the completion risk associated with each of the projects. This assessment is based on a number of factors. GreenCo compares the status of project development at each of the sites and the potential for delays in reaching commercial operation. For example, whether the projects have

all the required permits, land leases, and interconnection rights; whether turbines are on order; and if the construction contractor has been selected. Second, GreenCo evaluates the developers and their ability to bring a project to completion, including their track records for completing projects once a PPA is signed, whether they require additional PPAs prior to moving forward on project construction, and if they need third-party financing to close before the project is built.

Finally, GreenCo compares the major commercial terms offered by each developer. GreenCo requests that each provide their standard form of SPPA contract and then performs a preliminary analysis of the proposed terms.

Based on all of the factors outlined above, the Energy Manger is able to zero in on a lead project for the GreenCo SPPA.

Finalizing the Deal

With a project selected, GreenCo proceeds with contracting and obtaining internal approvals for the SPPA. The developer updates the form of SPPA contract to incorporate some of the project specifics, and GreenCo begins its thorough legal review of the contract. The Energy Manager schedules meetings with senior management to present the selected project and the high-level deal terms. The developer helps the Energy Manager prepare materials for senior management explaining how the SPPA works and the risks and benefits associated with this type of contract. In addition, at the Energy Manager's request, the developer prepares an overview of renewable energy project development and finance so that senior management has a better idea of how this SPPA contract fits into the project as a whole and of the various participants involved in the project going forward. Following this meeting, the GreenCo team has the green light to finalize contract negotiations.

Once the contract is in a form that it is close to execution, GreenCo circulates it among a number of groups within the company to obtain sign off. The controller sends the contract for review by GreenCo's third-party auditing firm. The accounting team reviews the payment provisions. The sustainability group reviews the requirements related to REC delivery and certification. The legal group ensures that GreenCo's standard supplier requirements are incorporated into the contracts. Additionally, the Energy Manager engages GreenCo's energy consulting firm to perform an independent, third-party review of the economic model for the contract and assessment of market risks.

The feedback from all the GreenCo stakeholders is incorporated into the contract and each group signs off on the deal as proposed. With this review complete, the Energy Manager schedules the final review meeting with the executive committee and receives approval to enter into GreenCo's first purchase contract for off-site renewable energy, thereby satisfying one of the CEO's targets for corporate sustainability.

About the Author

Ellen Gilman is the Senior Director of Business Development at Apex Clean Energy. Ellen works with corporations, universities and other non-utility entities seeking power procurement directly from large-scale renewable energy projects. Ellen has worked in renewable energy for over 10 years, primarily in business development roles with Clipper Windpower and more recently in distributed solar finance for commercial and industrial customers. Ellen graduated from Yale University with a B.A. in Philosophy.

INNOVATIVE STRUCTURES TO MAXIMIZE OFF-SITE SOLAR ADOPTION

Richard Walsh
WGL Energy

The growth in offsite renewable energy is a result of both macroeconomic and microeconomic factors. Increasing demand from stakeholders coupled with an evolving marketplace and improving technology have allowed the renewable energy industry to flourish. Federal and state incentives have provided developers and investors with the certainty needed to grow the renewable energy sector.

Large users like Google and Facebook are incorporating renewable energy into their portfolios through direct purchase of electricity from utility-scale wind and solar projects and in some cases bypassing the utility altogether. In certain markets, including New York, Maryland, and Massachusetts, residential customers and small commercial customers are enjoying the benefits of solar through the use of community solar arrangements and virtual net metering programs.

The industry has enjoyed tremendous success, yet there are still barriers preventing organizations of all types, sizes and locations from enjoying the benefits of renewable energy. The rise in offsite solar procurement demonstrates that hurdles are being overcome with and without policy assistance and that, if structured properly, any organization can enjoy the benefits of cost savings, increased sustainability and budget certainty provided by renewable energy.

Introduction

The energy industry is, in many ways, a microcosm of the economy as a whole. Many of the same factors that drive innovation, growth and change in the economy have similar effects in the energy industry. Well-known author Chris Laszlo provides three factors that influence business today: declining resources, radical transparency and increasing stakeholder expectations. Nancy Pfund, Managing Partner at DBL Partners, adds a fourth factor: personalization of everything.

There is no doubt that energy companies and their customers are facing challenges associated with unprecedented industry change, including the decline in coal-fired power, an abundant supply of clean, affordable natural gas and the growing economic viability of renewable energy. Corporations are becoming radically transparent about their energy use as part of their social responsibility reporting, and stakeholders continue to push utilities to meet their expectations of cleaner and more sustainable energy as well as more customized, personalized options.

Offsite solar is experiencing significant growth as a result of these trends. There are a number of offsite solar options, ranging from projects that serve residential and small commercial entities, most commonly known as community solar or shared solar arrangements, to large utility-scale projects serving major renewable energy purchasers, such as Google and Amazon.

For this sector to continue to flourish, we need all types of renewable generation, including onsite solar, community solar, utility-scale solar and perhaps the most important and overlooked segment, *everything in between*.

Growth in Off-Site Solar

The growth of solar – both onsite and offsite – is difficult to overlook. According to the Solar Energy Industries Association's (SEIA) 2015 Market Insight Report, "cumulative solar photovoltaic (PV) installations surpassed 25 gigawtts (GW) dc by the end of the year, up from just 2 GWdc at the end of 2010. Cumulative concentrating solar power (CSP) capacity now stands at 1.8 GWac."[53]

This growth is driven by a combination of economic and sustainability factors. The competing cost of electricity is a key driver, as are installation costs, which have decreased significantly as a result of both technological advancements and soft cost reductions. The federal investment tax credit (ITC) and state incentives and programs also provide motivation for consumers and businesses to incorporate solar power into their energy portfolios. Even with strong incentives and an economically attractive value proposition, obstacles remain which must be overcome in order for the solar industry to keep up with demand.

The National Renewable Energy Laboratory (NREL) produced a study that found 23 percent of rooftops in the U.S. are available for solar installations.[54] Beyond the obvious infrastructure and sunlight availability issues, there are several other hurdles that may prevent onsite solar from being a viable option. Many businesses and residences are leasing their facilities and are often unable or unmotivated to make upgrades to their properties. Locating a project offsite also allows for those users with substantial energy use to enjoy the benefits of solar without occupying a large portion of their property.

The proliferation of offsite solar is a function of overcoming these hurdles.

"CUMULATIVE SOLAR PV INSTALLATIONS SURPASSED 25 GWDC BY THE END OF THE YEAR, UP FROM JUST 2 GWDC AT THE END OF 2010. CUMULATIVE CSP CAPACITY NOW STANDS AT 1.8 GWAC."[1]

Issue	Onsite Solar	Offsite Solar	Neutral
Capacity Factor (sunlight)		x	
Installation Costs		x	
Offsetting Costs	x		
Avoidance of Infrastructure Issues		x	
Utility Interconnection Challenges			x
Wholesale Market Integration	x		
Termination Costs		x	
Flexibility of location		x	
Soft costs (legal, tax, etc)		x	
Contracting Challenges (Leasing vs. Owning)		x	
Contract itself		x	

[53] http://www.seia.org/research-resources/solar-market-insight-2015-q4
[54] http://www.nrel.gov/docs/fy16osti/65298.pdf

Corporate Off-site Renewable Energy

Corporate offsite renewable energy has more than doubled every year since 2012 and is projected to grow to more than 60 GW by 2030.[55]

The off-takers of large, utility-scale projects have traditionally been utilities. However, large corporations are increasingly working directly with developers to serve as project off-takers. In 2014, corporations were responsible for 19 percent of large wind Power Purchase Agreements (PPAs) and that number increased to 56 percent in 2015.[56]

In addition to the shift of off-takers, adoption of solar projects is building in momentum. From 2008 to 2014 solar only accounted for 40 megawatts (MW) of corporate offsite renewable energy versus 2,238 MW of wind. In 2015 and 2016, year-to-date solar has accounted for 815 MW versus 2,778 MW of wind.[57]

While economic drivers and budget certainty are the key drivers, credit must be given to those within the industry advocating for adoption of renewable energy and increased sustainability measures. The American Council on Renewable Energy (ACORE) is a leader in renewable energy advocacy along with other specialized industry organizations driving this change.

Business Renewables Center (BRC) is engaging developers and businesses to expedite renewable energy adoption by "unlocking market-based solutions that can be replicated and implemented now." The RE100 plays a key role and describes itself as "a collaborative, global initiative of influential businesses committed to 100 percent renewable electricity, working to massively increase corporate demand for renewable energy."

The importance of renewable energy extends beyond sustainability and economic benefits and includes brand engagement. The brands that have committed to renewable energy are some of the most recognized in the world. Coca Cola, Nike, Facebook and Disney have all made commitments to renewable energy. Google is the unquestionable leader with over 2.2 GW of installed renewable energy.[58] These visible commitments help spur other companies and individuals to incorporate renewable energy into their own operations.

Community Solar

Community solar, also known as shared solar or solar gardens, is defined as a grid-connected solar array that provides electricity to multiple customers (referred to as "subscribers). The subscribers may purchase or lease some of the solar panels in the array. Just as if the panels were on their own rooftops, subscribers receive a credit on their electric bill for the power the panels produce. Utility customers within the solar garden's service area, including residences, businesses, local governments, non-profits and faith-based organizations, can all subscribe to them.

[55] http://www.rmi.org/business_renewables_center
[56] http://www.awea.org/amr2015
[57] https://www.bnef.com/core/insight/13569
[58] https://www.google.com/green/energy/

According to SEIA, the total community solar market size at the beginning of 2016 was just over 100 MW, spread across 91 different projects.[59] Just like the solar market as a whole, the success of community solar depends on favorable state programs and incentives. Community solar projects exist in 25 states and are the most highly concentrated in California, Colorado, Minnesota and Massachusetts, with New York and Maryland poised for growth. WGL Energy Systems is active or reviewing investment opportunities in Minnesota, Colorado, New York and Massachusetts and has played an active role in developing the framework for Maryland's community solar program.

As seen in the below chart, community solar is forecasted to continue to grow at a rapid rate in the near term. [60]

Cumulative installed capacity of community solar is projected to increase nearly sixfold from about 80 MW in 2014 to 465 MW in 2016 (Honeyman et al. 2015). Community solar could represent up to 49% of the annual distributed PV market by 2020 (Feldman et al. 2015) (see Figure 11).

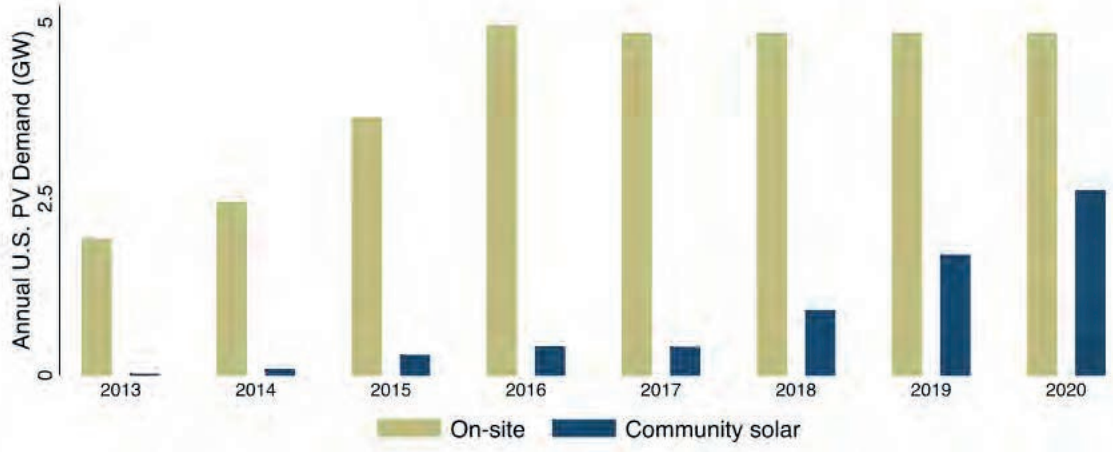


Figure 11. Projected U.S. PV demand from on-site and community solar through 2020

Source: Feldman et al. 2015

Everything In Between

For the renewable energy industry to reach its full potential, it is important that businesses not interested in signing PPAs with utility-scale projects have more options for capitalizing on community solar projects.

Certain states have programs in place for organizations seeking these types of *in between* options. As evident from the WGL Energy asset map below, New York, Massachusetts and Maryland have favorable

[59] http://www.seia.org/research-resources/us-solar-market-insight
[60] http://www.nrel.gov/docs/fy15osti/63892.pdf

programs for the in-between sector. These programs by way of various, virtual net-metering structures, allow commercial customers to enjoy the benefits of onsite solar.

The framework of each program varies in terms of project size, project location, customer type, overall program size/allowance and incentives. In Maryland, only agricultural customers, non-profit organizations and municipal governments or their affiliates are eligible to take advantage of the aggregate net metering program.

WGL Energy is in a unique position as it can provide both services through WGL Energy Services, a supplier of retail electricity and WGL Energy Systems, and a key player in the solar market. Because of this position, WGL Energy has been able to take full advantage of programs available in attractive solar states, while also formulating solutions in states, markets or sectors where these programs are not available. WGL Energy's position is that organizations of all types should benefit from solar power within their existing budget and purchasing parameters.

Available Structures

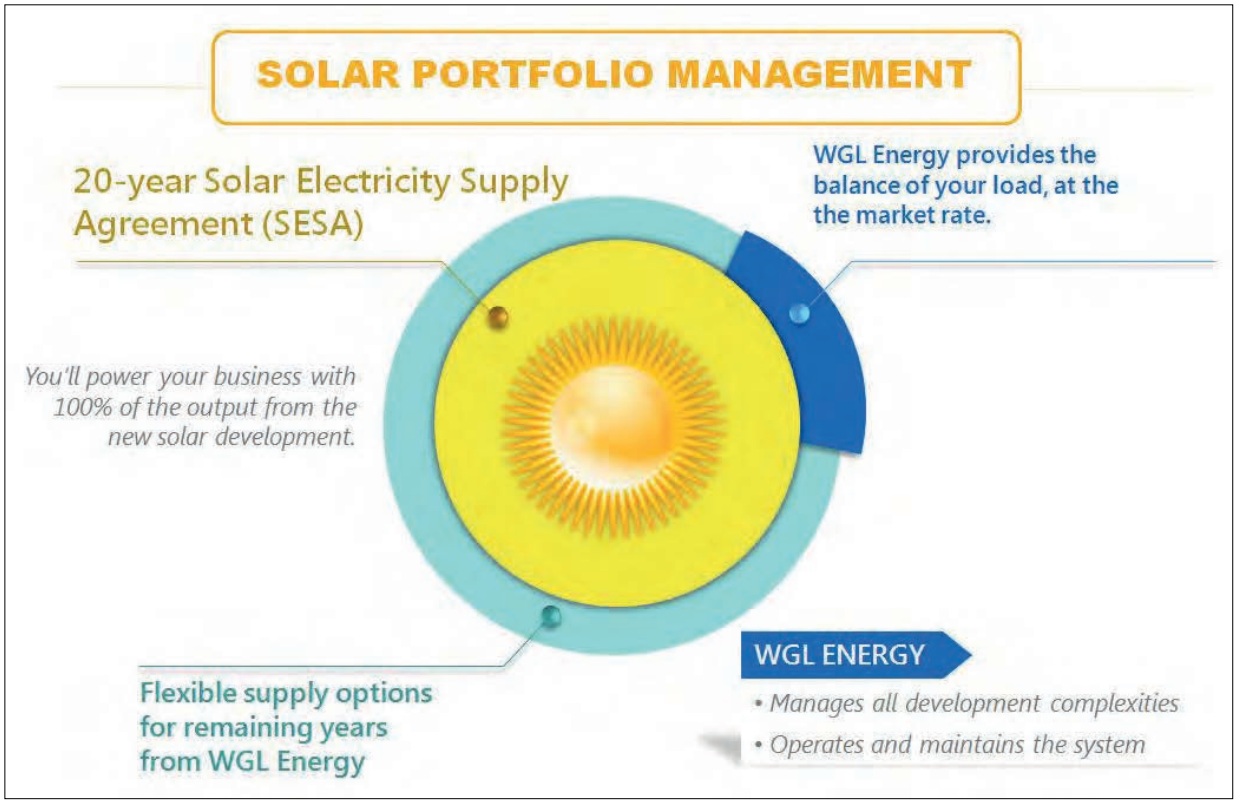
Solar Portfolio Management

Energy users located in restructured markets that allow competition, which represent more than 50 percent of electricity load in the United States. These users are able to bundle a longer term solar supply contract with shorter term retail electricity contracts.[61] WGL Energy calls this structure *Solar Portfolio Management* and, in theory, it can be made available by any retail supplier in such a market. This structure is ideal for those companies that do not have the resources of a Google or an Amazon, but still

[61] http://www.nrel.gov/docs/fy14osti/61765.pdf

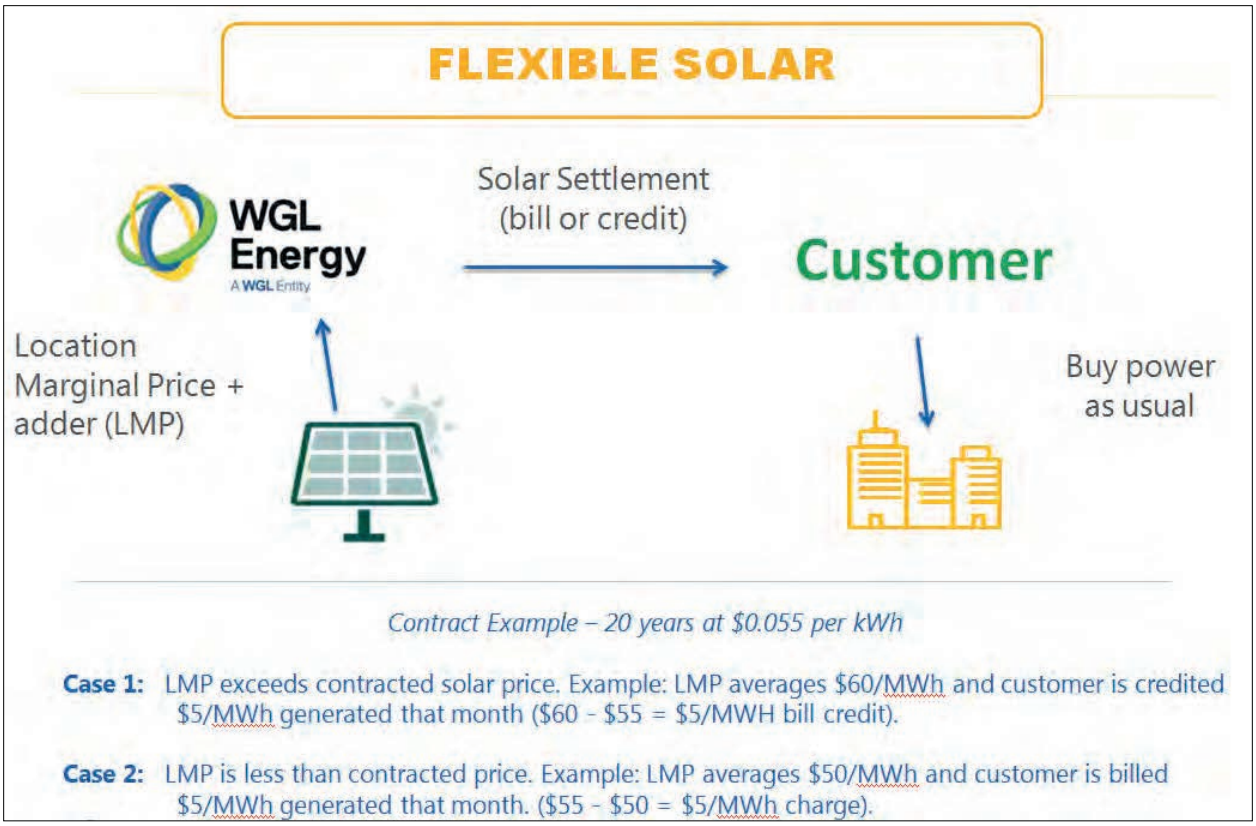
want to enjoy the long-term benefits of solar. Solar Portfolio Management can likely fit within current procurement practices and is dependent on retail contract timing.

Flexible Solar



Energy users that are fortunate to have dedicated energy procurement resources may find the f*lexible solar* option more attractive. This structure is commonly known as a *virtual PPA*, *contract for differences* or a *swap*. There are no location requirements, load-size requirements, or retail contract limitations. Larger projects are typically executed through this manner.

Depending on the market, there are ways to limit risk and exposure. Although not a requirement, close proximity to the project is to the customer's load location is ideal, the better. Additionally, the size of the project versus the customer's load is an important component. Finally, there are certain ways to structure the retail electricity purchases to limit risk by buying off-peak blocks and purchasing energy on an index. The chart below provides an example of this structure.



Case Study: Flexible Solar

WGL Energy's recently completed project for MOM's Organic Market, a leader in sustainability and community engagement, provides an excellent example of a flexible solar structure. With nearly 1,000 employees and stores in three states and the District of Columbia, MOM's Organic Market has been in business for nearly three decades and has created a culture centered on their purpose to protect and restore the environment. MOM's implements environmentally responsible and forward-thinking practices into every aspect of their work. It is a leading member of the Green Power Partnership, recognized since 2005 as a 100 percent Green Power User and a member of the EPA's Top 30 Retailers. MOM's mitigates their environmental footprint through an on-site solar panel installation and the purchase of American Wind Credits (RECs) covering 129 percent of the company's electrical use in 2015. MOM's offsets the CO_2 produced by their customer transportation to and from their store by purchasing carbon offsets that support local methane capture projects. Partnering with WGL Energy allows MOM's to further their Purpose by supporting local green energy projects in the community.

WGL Energy is dedicated to delivering renewable energy solutions that meet the unique requirements of each customer while allowing them to focus on their core business. The solution developed for MOM's is complex and requires expertise in solar development, engineering, financing and retail energy. WGL Energy was able to provide this expertise while allowing MOM's to focus its resources on its mission.

A 1.5MW-DC / 1MW-AC fixed tilt ground mounted solar array located in Kingsville, MD is part of the MOM's solution. The WGL Energy-owned solar system interconnects to the PJM Interconnection via a

local utility distribution feeder and sits on 6.6 acres of land in a highly visible location that allows WGL Energy and MOM's to further promote the use of renewable energy. The system is expected to generate 2,124 MWh of power in its first year. WGL Energy resells this power from the system to MOM's bundled with national solar renewable energy certificates (SRECs) that allow the company to maintain its high environmental standards.

About the Author

Rich Walsh manages the clean energy program at WGL Energy Services and WGL Energy Systems (WGL Energy). (These companies trade under their holding company, NYSE: WGL.) WGL Energy's portfolio includes distributed generation projects in 18 states totaling over 170 MW and its retail groups has contracts in place with the General Services Administration, the State of Maryland and dozens of Fortune 500 Companies. Outside of his work with WGL Energy, Rich was selected as a member of the World Energy Council's Global Future Energy Leaders 100 Programme, he is on the board of Young Professionals in Energy NYC Chapter, he is a member of the steering committee for the American Council on Renewable Energy's Partnership for Renewable Energy Finance (ACORE PREF); and he is active with the Solar Energy Industries Association (SEIA) serving on the SEIA project finance and real estate subcommittees. Rich is a graduate of Samford University where he studied Finance and Spanish and was captain of the Men's Tennis team. You can contact Rich at Richard.Walsh@wglenergy.com

POLICY & LEGAL CONSIDERATIONS

NAVIGATING THE RAPIDLY EVOLVING ENERGY MARKETPLACE

Roger Ballentine & Patrick Falwell
Green Strategies

This is a time of unprecedented change in the energy sector with many new options available for corporations interested in procuring or generating clean energy. States are at the forefront of these changing dynamics, and state policy decisions over the next three to five years will have long-lasting impacts. A number of states are reexamining policies that have driven considerable renewable deployment to date – net metering programs, renewable portfolio standards, and incentives – and are considering constraints or extensions. States are also examining new policy models and frameworks that could set the stage for renewable market growth for decades. These policies include electricity market restructuring, Clean Power Plan (CPP) compliance strategies, and economy-wide carbon pricing. Corporations have an opportunity to influence the direction of these state-level developments by working with stakeholders and sharing best practices and lessons learned.

Overview

Energy procurement and use once presented few decisions for a corporation. One electricity provider (an integrated utility) generally sold one product (electrons from whatever sources of generation were available). The only concerns for the customer were price and reliability – and the customer had little control over either.

Today, corporate buyers can choose different products (renewable energy or traditional "brown" power), different sellers (competitive retailers of grid power or third-party providers of on-site generation), and a growing array of technologies that enable participation in managing the grid (selling excess power or participating in grid service markets). Corporate energy users have the opportunity to maximize value from their energy expenditures. However, energy markets and the opportunities available to corporate buyers vary widely across states and utility territories and can complicate corporate procurement.

Legislatures, public service commissions, and state agencies are making decisions today that could have immediate and long-term implications for corporate strategies and investments. In some states, policies are being challenged by traditional energy interests and others seeking to thwart fundamental changes in energy markets. In other states, extensions and expansions, as well as new frameworks and models, are being considered. These new policies often reflect higher levels of environmental ambition and/or a desire to create market designs that attract greater levels and speeds of innovation.

Evolving Market Framework

The energy sector is experiencing a rate of change not seen in the last three decades. Managing this landscape requires expertise and close attention. State battles over clean energy policy are playing out in different ways. A prime example is the debate over whether to extend initial net metering programs or adopt alternative approaches for compensating distributed assets. Some states have frozen or curtailed net metering programs, while others have approved short-term extensions of existing programs. Most of these states have launched value of solar and distributed assets studies to guide their policy decisions. In the meantime, the renewables industry is left with significant uncertainty, a problem that could potentially be avoided if there was more uniformity to state-level proceedings and greater sharing of corporate best practices.

To date, there has been no standard approach for completing value of solar and distributed asset studies and proceedings. In certain states, legislatures or public service commissions are actively directing these efforts. At the same time, individual utilities and companies are offering their own reports, data, and experiences into the process. As a result, these studies have included or omitted a variety of different variables in drawing their conclusions about potential remuneration for distributed assets. In some cases, only a narrow range of benefits, such as a utility's avoided costs, have been addressed. In others, a much broader range of grid and environmental benefits have been considered and reflected.

Near-Term State Policy Decisions

Even after current issues are resolved, states will explore several new policy fronts – complying with the Clean Power Plan, restructuring electricity markets, and adopting economy-wide carbon prices. State decisions on these issues will have enduring and long-term implications on clean energy market development. Despite the recent Supreme Court stay, around 20 states are still drafting CPP compliance plans, which cover the years 2022 to 2030, and some may submit final plans by EPA's original deadline of September 2016. CPP compliance is very likely to lead to the establishment of regional or national trading programs of emissions allowances or emission rate credits (ERCs) depending on whether states opt for mass-based or rate-based compliance plans.

Greater electricity market reforms, already underway in states like New York and Minnesota, could also shift the focus of utilities to grid management and broaden the opportunities available to distributed assets and other clean energy options and services.

Finally, several states, including Washington, Oregon, Massachusetts, and Vermont, are actively studying economy-wide carbon pricing. These policies will establish powerful price signals for businesses and consumers and accelerate investment in renewables. At the same time, carbon pricing will generate substantial revenue streams for states. Given the political reality, many states will likely seek offsetting revenue neutrality measures. Depending on the interpretation of revenue neutrality, this could mean decreases in personal or corporate taxes or programs that protect consumers against higher energy costs or help them access low-carbon energy.

Corporate Engagement in State Energy Policy

States are moving quickly to make decisions, and corporate renewable buyers, clean energy developers, and providers of clean energy services need to lend their voices to the policy debates. Companies have important experience and vital insights to share, yet state officials and other stakeholders may be relatively unaware of company goals and investments regarding renewables. Companies with corporate renewable energy goals need to educate state policymakers that there is large and sustained demand for renewables. They need to identify the policy barriers that remain in place and highlight solutions that provide access to affordable renewable energy options. For example, in many states, power purchase agreements (PPAs) and buy-through contracts that allow for the direct procurement of off-site renewables are not authorized or face legal ambiguity under state law. Increasing the number of available options for obtaining renewables access beyond what is offered by traditional utilities will likely be essential for companies to meet their increasing renewable goals over time.

Companies should consider participating in the various stakeholder processes that are underway in many states. Already, diverse groups of stakeholders, ranging from utilities, environmental groups, labor organizations, and renewable energy trade associations, are actively involved in efforts to find a consensus approaches to CPP compliance and other policy questions. Most states are inviting input from their stakeholders so they can learn about innovative policy ideas and ultimately maximize opportunities for their constituents. Many of these efforts involve intensive discussions with stakeholders, as well as modeling and data collection. Large corporate energy users often appear to be absent from these efforts.

While companies have limited resources to work in all 50 states, a smaller group of states are likely to be leaders in setting frameworks for the rest to follow. Going forward, increased company participation and better coordination and cooperation with various stakeholders can go a long way in avoiding the range of outcomes so far witnessed on leading energy issues. The diversity of results from current state battles calls for companies and other stakeholders to work together on more consistent basis. Arriving at more common and more beneficial outcomes is essential for creating stable and predictable conditions for renewable energy market growth across the country.

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IMPLICATIONS OF THE CLEAN POWER PLAN FOR CORPORATE RENEWABLES PROCUREMENT: STRATEGIES TO ACHIEVE ADDITIONALITY

Mark L. Perlis & Gary S. Guzy
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Many companies have voluntarily adopted renewable energy procurement goals with the objective of accelerating development of new renewable generating facilities and reducing their carbon footprints. These companies typically structure electricity procurement so that their energy supplies come from new renewable resources that are *additional* to renewable generation procured by load-serving utilities under a state's renewable portfolio standard (RPS). Many companies assure additionality by entering into long-term power purchase agreements with new renewable facilities and requiring that any renewable energy credits (RECs) accruing to their renewable suppliers be retired so that they are not available to load-serving utilities for satisfying their compliance obligations under RPS mandates. These companies often decline to purchase *unbundled* RECs on the ground that shifting ownership of paper credits representing renewable energy delivered to the electricity grid insufficiently assures that their electricity consumption comes from newly developed renewables facilities.

The Administration's Clean Power Plan (CPP) will alter the regulatory context and economic outlook for renewables. At its core, one of the CPP's main aims is to substantially reduce carbon emissions from the electricity sector by displacing fossil-fueled generation (both capacity and energy) with generation from new renewables facilities and through consumer-side energy efficiency load reductions. The CPP will accomplish this sector-wide displacement through a complex federal-state regulatory scheme that will likely feature carbon emissions trading, expanded RPS requirements, incentives for deployment of new renewables capacity, increased dispatch and capacity utilization of renewables (and, to some extent, existing natural gas) facilities, and consumer-side energy efficiency programs.

In this paper, we consider how the CPP will enable monetization of the zero-carbon attributes of renewables and consumer-side energy efficiency savings, and whether corporate purchasers can realize that value consistent with voluntary procurement strategies premised on achieving additionality.

Core Elements of the CPP

The CPP establishes stringent carbon emissions limits for existing coal- and gas-fired power plants. These plant-specific emissions standards generally cannot be achieved through installation of emission control technology or heat rate improvements. Rather, the CPP contemplates that carbon emissions limits will be met on a sector-wide basis through generation displacement. Because the U.S. electric grid is an integrated system in which fungible electrons are dispatched from interconnected generating resources to meet load, EPA has adopted carbon emission standards chiefly based on achievable displacement of generation from existing fossil plants by generation from cleaner resources. Thus, the CPP contemplates that existing, efficient natural gas resources will run at higher than their historic capacity utilization levels, displacing coal-fired and older, less efficient natural gas units.

Importantly, the CPP also contemplates substantial increases in generation from new renewable resources, displacing generation from all types of fossil plants. In addition, EPA has structured the CPP to

enable system-wide carbon emissions reductions to be achieved, in part, through consumer-side energy efficiency measures that reduce the overall electricity load and consumers' energy bills.

While EPA has established uniform, nationwide carbon emissions performance standards for existing coal and natural gas units, based on achievable system-wide emissions reductions, administration of the CPP devolves to the states. Each state must develop its own *implementation plan* (or EPA will do it for states that fail to do so), to assure that affected generating units within the state collectively attain compliance. States are afforded considerable flexibility in developing these plans. They may choose to enforce *rate-based* emissions limits (tons CO_2/kWh) or *mass-based* emissions limits (total tons CO_2). States may also adopt complementary regulatory programs tailored to the profile of the state-wide fleet of existing resources and the potential for growth in renewables generation and consumer-side energy efficiency.

Even though states will design their implementation plans, EPA is encouraging all states to consider adopting carbon emissions trading programs. Indeed, since fossil generating plants cannot achieve mandated emissions limits through *inside-the-fence* measures, emissions trading becomes the most efficient means for driving least-cost displacement of fossil-fuel generation. Emissions trading programs will provide direct and indirect benefits to renewables generation and to consumer-side energy efficiency programs. These benefits may be monetized through corporate renewables procurement and energy efficiency savings.

Directly, carbon emissions trading programs will create valuable, tradeable compliance certificates known as emission reduction credits (in rate-based states) or emission allowances (in mass-based states). Existing fossil-fuel generators will be able to purchase emission reduction credits (ERCs) or allowances to meet their compliance obligations. Under complex, proposed EPA rules, new renewable generation and energy efficiency programs would be eligible to create and sell ERCs or to receive and sell allocated allowances to existing fossil-fuel generators who will be required to obtain sufficient certificates to cover their carbon emissions. Corporate energy consumers should be able to capture part of the ERC/allowance value through renewables procurement and reductions in their energy consumption. The extent to which this direct value of ERCs/allowances will flow to corporate consumers depends upon the details of the trading programs allowed by EPA and adopted by each State (which are yet to be written) and upon terms in procurement contracts and energy efficiency protocols for verifying energy savings (which are also still to be developed).

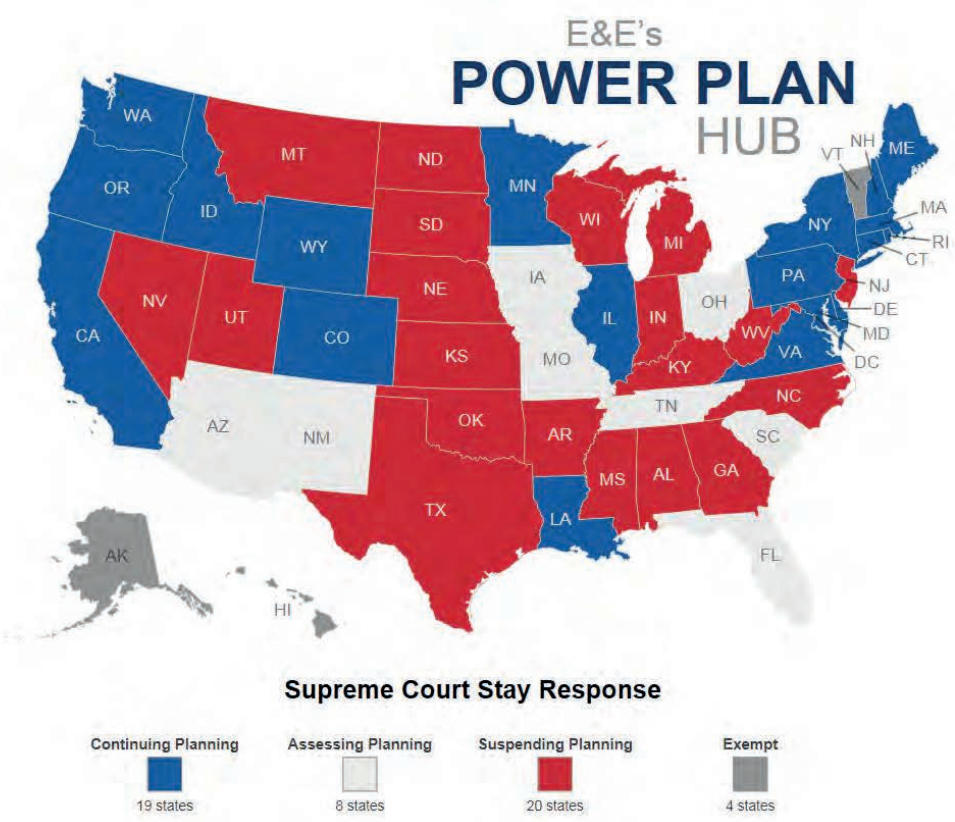
Indirectly, carbon emissions trading will benefit corporate energy consumers through the salutary emergence of a market price for carbon emissions. Regional or national carbon prices will be factored into energy prices through economic dispatch models prevalent in wholesale electricity markets (both organized markets and within single-utility dispatch systems). Even though not required under EPA's model trading rules, states or Independent System Operators (ISOs)/ Regional Transmission Operators (RTOs) may adopt carbon-based dispatch that will create a competitive advantage for renewables and energy efficiency programs with their zero (or even negative) carbon costs. The extent of the competitive advantage and the degree to which it can be monetized by corporate consumers will again depend upon the details of the trading programs allowed by EPA and policies adopted by each state and ISO/RTO and upon terms in procurement contracts and energy efficiency protocols.

Emissions trading will not be the sole mechanism for implementation of the CPP. States are likely to craft a suite of policy measures to drive generation displacement, including strengthened RPS requirements, incentives for utility-scale and/or distributed renewables resources, and deployment of consumer-side energy efficiency programs. These policy measures should enable corporate procurement strategies to realize, directly or indirectly, value associated with zero-carbon renewables and reductions in energy consumption.

Both complexities and enhanced revenue opportunities will arise from the details of how each state implements the CPP. Just as one example, the rules are not yet written on how renewables generation and consumer-side energy efficiency programs will qualify for receipt of ERCs and free allocations of carbon emission allowances. The rules are also not written on how widely ERCs/allowances can be traded across multiple states and how carbon values will be incorporated into ISO/RTO tariffs for a multiplicity of purposes. Consequently, corporate energy consumers have substantial realizable value at stake, justifying their proactive involvement in the process by which each state develops its implementation plan.

The Future of the CPP

The CPP is now subject to judicial review, following the U.S. Supreme Court's stay, pending completion of proceedings in the U.S. Court of Appeals and ultimately in the Supreme Court. Notwithstanding the Supreme Court's stay, as many states are continuing as are suspending development of CPP implementation plans



The upcoming presidential and congressional elections and international commitments, such as the Paris Agreement, may affect future implementation of the CPP. Likewise, technology advances and distributed generation options may provide compelling cost-effective alternatives to centralized fossil-fuel generation. Separate from the CPP, it seems highly likely that renewables and consumer-side energy efficiency will feature prominently in the future, intersecting federal and state climate and electricity policies.

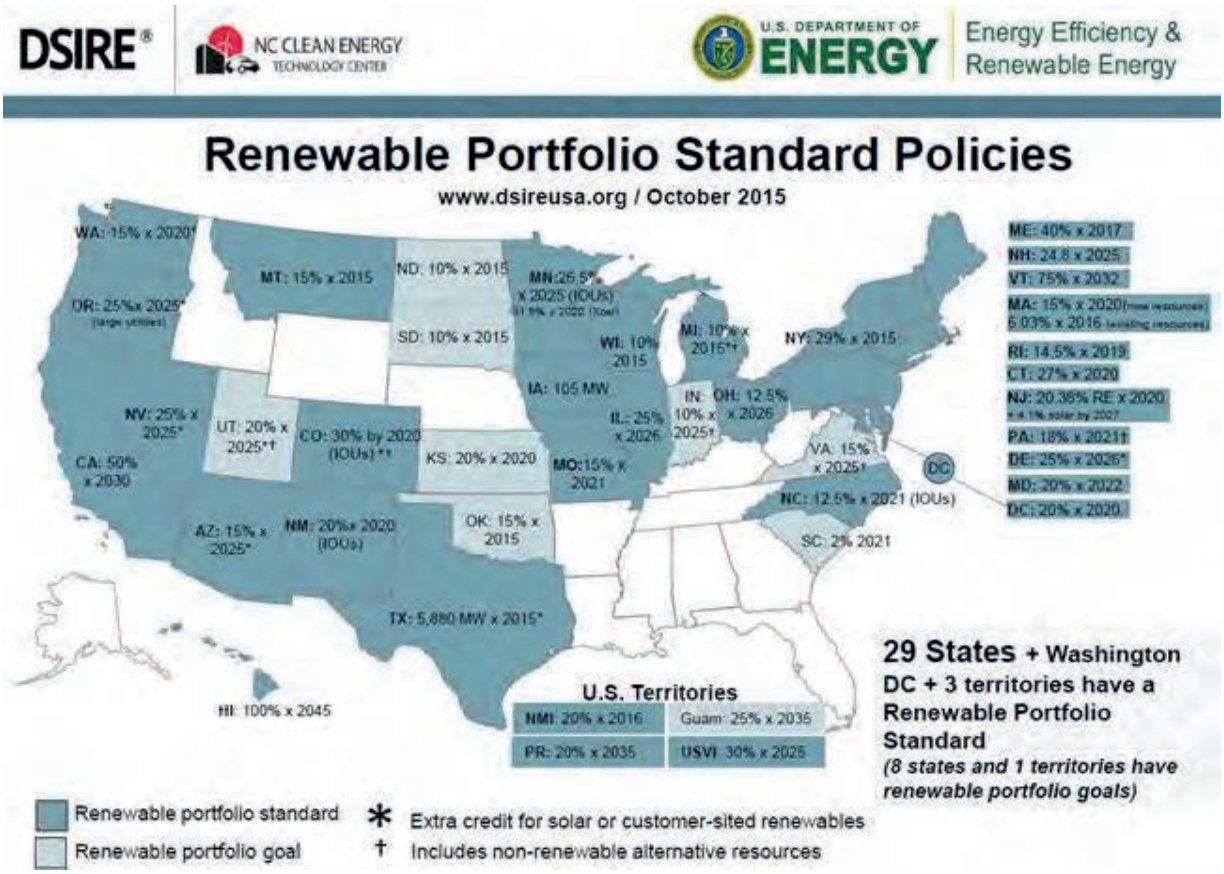
Realization of Carbon Value in Voluntary Procurement Strategies Premised on Additionality

The additionality feature of many voluntary, renewables procurement strategies merits reexamination in the context of the CPP. Conceptually, voluntary procurement programs strive to develop new renewables generation that is *surplus* to government mandates. For that reason, voluntary programs generally require that RECs that accrue to procured renewables generation be retired so that they cannot be used by load-serving utilities to satisfy their RPS compliance obligations. The CPP will drive a build-out of new renewables facilities, which may accrue ERCs/allowances that can be monetized by sale to fossil-fuel generators that need ERCs/allowances for compliance with the Plan. This raises the question of whether, to be consistent with additionality and the treatment of RECs, voluntary renewables procurement should require retirement of ERCs/allowances (foregoing their monetization in emissions trading markets) to preclude their use in meeting CPP-mandated compliance obligations.

There may be competing considerations in addressing additionality. On the one hand, if a company's energy procurement objective is to develop new renewables generation supported by a long-term Power Purchase Agreement (PPA), that goal may be served by solely requiring retirement of the RECs accruing to the new facility. The facility should still be considered as surplus to the amount of renewables capacity mandated by a state's RPS, even if the facility qualifies to receive ERCs/allowances under the CPP. Also, the market value of ERCs/allowances could be realized by the generator and shared under the PPA with the corporate purchaser without diminishing the facility's status as surplus to a state's RPS mandate. Such realization and sharing of carbon value also would not constitute double counting of carbon emissions reductions for purposes of the CPP.

On the other hand, if a company's renewables procurement objective is also to achieve carbon emissions reductions that are additional to the CPP, requiring retirement of the ERCs/allowances and foregoing their monetization in emissions trading markets would be consistent with the concept of additionality as applied today to RECs. These companies may want to reassess their objectives in the fundamentally altered regulatory context that allows system-wide carbon trading to achieve unprecedented carbon emission reductions. These companies might consider whether and how to allow, as part of their procurement strategies, ERCs/allowances associated with renewable generation or energy efficiency savings to be traded or to be available for CPP compliance.

Similar considerations should also inform a company's treatment of the carbon savings associated with verified, consumer-side energy efficiency improvements. In particular, a company making a robust voluntary commitment to reducing its carbon footprint should consider whether to monetize or to forego ERC/allowance value associated with verified, internal energy efficiency savings.



Whichever way a company decides about additionality for carbon reductions, its PPAs should be drafted consistently with the company's voluntary strategies, while preserving optionality should the company's strategies change in the future.

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THE RENEWABLE JUMBLE: BASIC LEGAL CONSIDERATIONS FOR CORPORATE END-USERS OF RENEWABLE ENERGY

Frank Shaw & Ethan Schultz
Skadden, Arps, Slate, Meagher & Flom LLP

In addition to helping meet corporate sustainability goals, renewable energy benefits from multiple direct and indirect subsidies, including tax credits, renewable energy credits, and other benefits that can make renewable energy an attractive financial proposition. As a result, many companies are considering buying renewable energy directly, through a standard power purchase agreement (PPA) where electrical output is physically delivered and the buyer takes title to the renewable energy. Others are procuring renewable energy through *virtual* or *synthetic* PPAs, which are essentially derivatives or swaps. However, corporate customers entering the market for off-site renewable energy face a jumble of legal, regulatory, tax, and accounting constraints, as well as potential benefits. Energy production and distribution is a highly regulated industry, at federal, state and local levels, and tax benefits entail complex rules and financing structures, which must be reconciled with accounting and financial reporting considerations.

Such considerations are likely to be unfamiliar to most corporate procurement officers, who may be accustomed to purchasing all their electrical needs from the local utility. Balancing all of the competing considerations can be a challenge. In evaluating a green energy procurement strategy, corporate end-users should first consider some basic legal and practical considerations, which are outlined below.

Does applicable state law allow direct retail access?

The most direct way to procure renewable energy would be through a standard PPA for physical delivery of energy from a renewable power project, either on-site, or off-site with transmission arranged by the seller. In many states, however, only traditional public utilities may sell directly to end-users, at regulated rates, within their service territory.

Other states, such as those in deregulated markets, may allow competitive sales by qualified retail service providers. In these states, a corporate customer seeking to procure renewable energy may be able to buy its electricity requirements from a state-qualified retail supplier of renewable energy, with the local utility continuing to provide transmission and distribution services scheduled by the seller.[62]

Can the corporate customer establish its own renewable energy marketer?

Companies with large enough operations may even find it worthwhile to establish their own retail supply arms, which could procure renewable energy at wholesale, buying directly from large, utility-scale renewable energy projects, to capture the price savings from economies of scale. However, establishing and operating a captive retail supplier is also not simple. The retail supplier must qualify under state law, and likely will be subject to regulation at the state level. If the retail supplier becomes a power marketer, buying and selling in wholesale markets, it would be need to obtain market-based rate

[62] Virtual PPAs are typically financial instruments not implicated by state laws restricting retail sales to regulated utilities or approved retail service providers.

authority and have a rate on file with the Federal Energy Regulatory Commission (FERC). Such marketers are subject to reporting requirements and other regulation by FERC under the Federal Power Act.

How will procuring green power from a third party affect demand charges under the corporate customer's existing utility tariffs, including any *exit fees*?

Under traditional rate regulation, local utilities are permitted to recover capital and operating costs from their customers plus a regulated profit margin. The loss of customers can leave fewer ratepayers to pay the utility's fixed charges for building and maintaining its power plants and its transmission and distribution system. Thus, even states that permit retail customers to switch suppliers or self-generate may allow the local utility to charge an exit fee or a non-bypassable wires charge to compensate it for the loss of revenue. Utility tariffs also may include provisions for *demand charges*, which are set according to the customer's peak load, or for backup or maintenance power. A customer replacing much of its energy requirements with renewable energy thus may face higher-than-expected costs for obtaining the remaining power from the local utility. Corporate consumers seeking renewable energy alternatives should consider the costs the utility will charge to serve their remaining electrical needs.

Who owns the renewable energy credits, and who can claim them?

As an alternative to direct purchases of renewable energy, corporations may purchase unbundled renewable energy credits (RECs) from a renewable energy project or a broker. Such unbundled purchases are falling out of favor with some corporations seeking additionality in their investment in renewable energy, i.e., that seek to promote development of new renewable energy sources to displace non-renewable energy in the energy marketplace. Such corporations tend to favor purchases of renewable energy through PPAs or virtual PPAs.

In a standard PPA, the RECs can be bundled with the purchased power, or sold separately. Care should be taken not to double count, however. RECs are legally enforceable rights to claim the environmental attributes of renewable energy, and while they can be traded, they are tracked (though systems such as Green-e Energy) so the same REC is not claimed twice or by multiple parties. If the RECs are retained by the seller and sold separately, or if the purchaser of bundled renewable energy promptly resells the RECs, the renewable energy has lost its environmental attributes and become mere fungible electrons. Under the Federal Trade Commission's Green Guides, the right to claim environmental benefits of green energy belongs to the owner of the RECs.[63] Thus it would be potentially deceptive for a company to announce it were utilizing renewable energy purchased directly from a renewable energy project, unless the company also purchased (and retired) the RECs. The FTC's guidance is paralleled in the requirements for certification by Green-e Energy, which would similarly consider such an announcement as double counting, likely making the RECs ineligible for certification.

Some PPAs permit *REC arbitrage*, where cheaper, unbundled RECs purchased in other markets may be substituted for the RECs produced by the particular project under the PPA, which may be more valuable if sold separately in a local market. Again, however, corporations should consider carefully how such substitutions could affect marketing materials or other claims regarding use of renewable energy.

[63] 16 CFR §260.15.

Is the PPA subject to regulation as a swap under Dodd-Frank?

Some PPAs may be subject to regulation as a derivative or *swap* by the Commodity Futures Trading Commission (CFTC), whose regulatory authority was expanded under the Dodd-Frank reforms. A standard PPA in which the commercial entities intend the transaction to be settled through physical delivery of power most likely will be excluded from CFTC regulation as a *forward contract*. A virtual PPA that is settled financially rather than physically is likely to be subject to CFTC regulation as a swap, principally certain detailed reporting and recordkeeping requirements. Even a physical PPA, if it provides for "embedded volumetric optionality" (for example, one that allows the corporate purchaser to vary or curtail the quantity of electricity purchased) may be a "swap" unless it meets certain CFTC tests or qualifies as a *trade option*.

Corporate PPAs that are or may be regulated as swaps typically require the seller of electricity to handle these reporting and recordkeeping obligations, as a renewable energy provider is more likely to have the requisite experience (and staffing) to manage these obligations than a corporate off-taker new to the business.

What is the customer's potential exposure to damages, and concomitant excuses or mitigants, under the PPA?

Most independent power projects, including renewable energy projects, are financed on a *project finance* basis, where the revenue from power sales from the project, rather than the corporate credit of the project's sponsors, is the principal source of repayment of the debt or tax equity used to finance construction of the project. Project financiers generally require long-term PPAs for fixed quantities of power (or for some minimum portion of the project's output), and clear damages and remedies provisions in the case of purchaser breach. While most PPAs contain customary excuses for failure to purchase required quantities, such as *force majeure* or transmission outages, such excuses may be limited or even overruled by *take-or-pay* provisions requiring minimum monthly or annual purchases. Corporations entering into long-term PPAs for renewable energy should review carefully their purchase obligations, including minimum quantities or take-or-pay provisions, provisions excusing performance, damages calculations, and limitations of liability. Damages are often determined by the difference between the contract price and forward price curves, for the required quantity of power, integrated over the remaining term of the agreement. Markets can be volatile, and under a long-term contract, potential damages in the event of a breach can grow very large.

Can the customer issue parent guarantees under its bond or debt covenants?

To secure this potential exposure under a PPA, a customer that does not have adequate corporate credit may be required to post financial security, typically in the form of letters of credit or corporate guaranties from a credit-worthy parent. Corporate customers should consider whether requirements to post such security are consistent with their bond or debt covenants. Of course, customers should confirm the creditworthiness of their counterparties as well. Renewable energy projects are typically special-purpose vehicles established solely to own a specific project, and renewable energy marketers may be thinly capitalized considering their potential liabilities.

How will the PPA be treated for tax and accounting purposes?

Under the tax code, a standard PPA may be recharacterized as a lease of the underlying property for tax purposes, depending on the particular facts.[64] There is a safe harbor for alternative energy facilities, unless the service recipient (i.e., the purchaser of power) or a related entity (i) operates the facility, (ii) bears any significant financial burden if there is nonperformance under the contract (not for reasons beyond the control of the service provider, i.e., the seller under the PPA), (iii) receives any significant financial benefit if the operating costs of such facility are less than the standards of performance or operation under the contract, or (iv) has an option or obligation to purchase all or part of the facility at a fixed and determinable price (other than at then-fair market value). Since classification as a lease can change the tax ownership of a project (if not respected as a true lease for tax purposes), upsetting the parties' expectations about allocation of depreciation and other tax benefits, a corporate PPA should be analyzed carefully to assess the risk of recharacterization. The tax treatment of a virtual PPA raises additional questions, depending on the specific characteristics of the PPA, and should be considered with the corporate purchaser's tax advisors.

Care also should be taken to structure the PPA to achieve the desired accounting treatment. In certain circumstances, a PPA may be treated as a lease for accounting purposes. If lease treatment is desired, the purchaser should further consider whether the lease is to be treated as a capital lease or an operating lease. Virtual PPAs, where no physical delivery of electric energy to the purchaser is contemplated, may be treated as derivatives for accounting purposes. Output guarantees, for example, may trigger mark-to-market accounting treatment, creating liabilities on the corporate purchaser's balance sheet, which many industrial or commercial customers may wish to avoid. Parties considering a corporate PPA should consult with their accounting and legal advisors to structure the PPA in a way that achieves the desired accounting treatment.

If direct ownership is desired, does the corporate customer have the *tax capacity* to utilize the ITCs, PTCs, or accelerated depreciation from the project efficiently, or the institutional capacity to master complex tax structuring vehicles?

Owners of renewable energy projects may claim various federal tax benefits, including a 30 percent investment tax credit (ITC) for solar or wind projects, a production tax credit (PTC) for wind and certain other renewable energy projects, and accelerated depreciation (MACRS).[65] Certain states, such as Hawaii and New Mexico (and until recently, North Carolina) may have state income tax credits as well. Corporate customers with the capacity to utilize such tax benefits could consider expanding their support of renewable energy to include a direct ownership investment in renewable energy projects.

Tax benefits together can constitute as much as 60% of the cost of constructing a renewable energy project in the United States, on a present value basis. Since most project developers do not have the federal tax base to efficiently absorb the tax benefits, they need to monetize the value of the tax benefits to finance the cost of constructing the project. In fact, renewable energy finance in the United

[64] Internal Revenue Code § 7701(e).

[65] The deadline for qualifying for such tax credits was recently extended by Congress under the Consolidated Appropriations Act, 2016. For example, solar projects can qualify for the full ITC if construction starts on or before December 31, 2019, and wind projects can qualify for the full PTC if construction starts on or before December 31, 2016. Each deadline ratchets down over periods of several years thereafter.

States is highly dependent on such tax equity investments, which is mostly provided by large banks and other financial institutions with large and relatively predictable tax appetites. If a corporate customer expects to have taxable income sufficient to utilize the ITC, PTC, and/or accelerated depreciation, it may be able to achieve an attractive after-tax return as a tax equity investor, while directly supporting construction of a renewable project. While the partnership or lease arrangements used to structure investments in such projects can be quite complex, more and more large corporations are becoming comfortable with such tax equity investments. In doing so, they can go beyond being a mere customer to being an active participant in renewable energy production.

Conclusion

A power purchase agreement for renewable energy can help corporate purchasers meet sustainability goals and, ideally, hedge against long-term price volatility in energy markets. Care should be taken to address basic legal questions first, however, and then to see that the PPA is properly structured in a way that meets tax, regulatory, and other legal objectives. Only by properly structuring the PPA can the corporate customer be comfortable that the transaction will be truly sustainable, not just for the environment, but for the corporate balance sheet too.

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GUIDANCE ON FINANCING

STRUCTURING AND FINANCING CONSIDERATIONS FOR CORPORATE RENEWABLE PPAS

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Corporates and industrial customers are becoming a driving force in the development of renewable energy projects. Sixty percent of the largest U.S. businesses have established goals to increase their use of renewable energy.[66] Renewable power purchase agreements (PPAs) are one way that corporates are meeting their renewable energy goals. These PPAs can benefit corporates by allowing them to meet their sustainability and energy management goals while at the same time supporting the development and construction of additional renewable energy generation projects.

In order for corporates to satisfy their goals of using renewable energy from new projects, those projects must first be financed and constructed in traditional project finance and tax equity markets. When financing parties evaluate whether to fund a renewable energy project, they carefully scrutinize the PPA by analyzing a number of factors, including the availability of the renewable resource, the type of energy products being purchased and sold, the price (and any factors contributing to price uncertainty), the expected energy production levels, the creditworthiness of the counterparties, and the contract duration. Financing parties use these and other factors to evaluate the PPA to determine whether its revenues from the project can support the project's operating costs as well as repayment of the loan and the desired return on investment in the project.

This article describes different types of PPAs that corporates are using to acquire renewable energy, and discusses key considerations for structuring corporate PPAs in order to meet the requirements of financing parties.

Types of Corporate Renewable PPAs

Physical PPA

Physical PPAs are a traditional form of renewable energy purchasing transaction where the project owner and corporate purchaser enter into a long-term contract for the energy generated from the project for a typical length of between 12 and 25 years. In a physical PPA, the corporate purchaser takes physical delivery of the energy. Because a corporate purchaser is receiving physical delivery of the energy generated, the corporate purchaser generally must have an electrical demand no smaller than

[66] Source: Letha Tawney, Bryn Baker, Martin A. Spitzer, *Corporate Renewable Energy Buyers' Principles: Increasing Access to Renewable Energy*, World Resources Institute, available at http://www.wri.org/publication/corporate-renewable-energy-buyers-principles and http://www.wri.org/sites/default/files/Corporate_Renewable_Energy_Buyers_Principles.pdf (last visited June 6, 2016).

the project's capacity or must find an alternative arrangement to deliver or use the power, such as a back-to-back purchase and sale arrangement with a utility or an independent power producer.

There are a number of regulatory considerations unique to physical PPAs that corporate purchasers must consider. While corporate purchases of energy from on-site *behind-the-meter* renewable energy projects are permitted in most states, only a limited number of states permit direct retail sales by non-utility project owners utilizing the electric grid. Thus, selling power from utility-scale, off-site generation projects to serve a corporate's specific energy demand will be challenging or impossible in most states. By contrast, a *virtual* or *synthetic* PPA can provide an alternative solution to the physical PPA in states where regulations prevent direct retail sales, or where behind-the-meter generation is not an optimal solution.

Virtual PPAs

Virtual PPAs are a type of transaction structure that project developers use to secure a financeable level of pricing for the energy generated by the project while not actually delivering the physical power to the customer. This price certainty can serve as a foundation to enable the project developer to secure financing to construct the renewable project. A virtual PPA, unlike a physical PPA, also enables a corporate purchaser to buy renewable energy that is generated from a project in a different geographic area to serve multiple offices, stores, factories, or data centers, instead of limiting the purchase of renewable energy to the corresponding demand of a single facility.

Virtual PPAs can take several forms. The most common form is a *contract for differences* under which the buyer agrees to purchase renewable energy and renewable energy credits (RECs) from a project for a fixed price, the seller sells the "brown" power (without the associated RECs) into the market, the buyer keeps the RECs and purchases the power it actually uses from its local utility, and the buyer and seller settle the difference between the contract (fixed) price and the applicable market (floating) price on a periodic basis. Virtual PPAs can also take the form of a hedging agreement, such as a fixed-for-floating swap, in which the buyer pays a fixed rate and receives a floating (market) rate for the energy produced by the project, as well as receiving title to the RECs associated with that energy. The swap can apply to all or a portion of the energy produced by the project or to a notional amount that is not tied to actual generation. As a variation of a straight fixed-for-floating swap, a virtual PPA can also be structured as a *collared transaction*, where the buyer guarantees a floor price for the power, and the seller provides a ceiling on the power price, so the price to the buyer and the revenue to the seller are assured of being within a defined range. In many of these variations, the corporate purchaser will purchase the environmental attributes or RECs associated with the energy produced by the project or the project owner will arrange for replacement RECs from another renewable resource or region to be transferred to the corporate purchaser. In all cases, financing parties will scrutinize the particular structure of the virtual PPA, including any risks related to the certainty of the price performance.

Financing and Transactional Considerations

Financing parties evaluate a number of factors when evaluating a long-term PPA for renewable energy and determining whether to provide funding for a project. A selected few of these factors are briefly discussed below.

Energy Products, Pricing and Basis Risk

Renewable energy project developers use physical and virtual PPAs to generate revenue from a project by selling the energy generated as well as RECs and other environmental attributes. In some transactions and jurisdictions, capacity attributes are also part of the products being sold. When structuring a PPA, the parties must develop a plan to address how and whether capacity, RECs and other environmental attributes generated from the project will be marketed. The corporate purchaser may either buy the RECs or allow the project to sell the RECs into the energy market. Another common arrangement is a REC swap by which a project owner sells into the market RECs from the project that are generated in a more expensive regional REC market and then supplies replacement RECs to the corporate purchaser. A key consideration for financing parties when analyzing a PPA is determining how the counterparties intend to address RECs generated from the project and whether the PPA exposes the project or a counterparty to risk associated with RECs, such as financial penalties or PPA defaults associated with the project's failure to deliver a fixed quantity of RECs.

Fluctuations in future market pricing for energy as compared to the price of the PPA, whether physical or virtual, and allocation of costs associated with delivering energy, are important considerations for the corporate purchaser and the project owner. When negotiating the PPA, the corporate purchaser must evaluate the risk that the market price for energy may decrease over the term of the PPA and, conversely, the project owner must consider the risk that the market price for energy will rise above the fixed price in the PPA. Further, parties must determine how they will allocate any differential in the energy price at the point that the project puts the energy onto the grid and the price at the point where the corporate purchaser either takes delivery (for physical PPAs), or where the counterparty prices the energy generated by the project. This differential in price at the points that energy is placed onto the grid and the ultimate market-price reference point is commonly referred to as *basis risk*. Depending on the price of energy at each point on the grid and the terms of the PPA, the corporate purchaser or the project owner can be exposed to basis risk. Counterparties to PPAs can mitigate basis risk by entering into hedging arrangements outside the terms of the PPA, or by negotiating terms of the PPA that set the project's interconnection point and the point of delivery or pricing at the same location, adjust pricing based on basis differential, or cap basis risk payment amounts. The corporate purchaser, project owner and the project owner's financing parties will need to examine how the PPA counterparties structure these arrangements and ensure that basis risk has been appropriately mitigated to avoid materially impacting the project's revenue projections.

Creditworthiness of the Parties and Performance Security

Financing parties evaluate the credit risk associated with both the project owner and the corporate purchaser. The corporate purchaser's credit rating and projected demand for energy are important factors in determining whether to provide funding to a project with a corporate PPA. If a corporate purchaser is using a special purpose entity to enter into the PPA, or a subsidiary without a large balance sheet or strong credit rating, the project owner may request, and financing parties may require, that the corporate purchaser provide some form of credit support as performance security for the PPA. This credit support is typically a corporate guaranty from a creditworthy parent or a letter of credit. The corporate purchaser will often require the project company to provide some form of credit support to maintain its obligations pursuant to the PPA as well. Financing parties will consider any credit support

provided by the PPA counterparties when determining whether to provide funding for the development of a renewable energy project.

Contract Term

Regardless of whether the corporate PPA is physical or virtual, the length of the contract term is an important consideration for the financing parties. Physical and virtual PPAs typically have a term of 12-25 years, although some virtual PPAs are shorter and some corporates seek shorter terms. A financing party will analyze the PPA in order to evaluate the level of certainty with respect to the projected revenue stream for a particular renewable energy project. The longer the term of the PPA, the easier access the project will have to longer term debt and tax equity financing. Although securing price certainty with respect to the cost of energy over the long term can provide value to a corporate, the corporate purchaser must weigh the risk of entering into a long-term contract at a fixed price against changing market dynamics that could reduce the cost of energy over the term of the PPA.

Curtailment and Negative Pricing

Another important consideration is how the PPA will address curtailments of the energy production from the project due to external factors such as temporary unavailability of the electric grid. One scenario for curtailment occurs when renewable energy is available to be delivered from a project but a transmission system operator prohibits the project from sending its energy onto the grid because of *congestion*, which means that power on the transmission grid exceeds the grid's transfer capacity. In order to avoid overloading the grid, which threatens reliability, utilities or regional transmission operators require some users to reduce or shut down generation. Corporate purchasers and project owners must consider the transmission operator's policies and procedures with respect to curtailment in the geographic area where the project is located and the parties must negotiate terms of the PPA specifying if and how the parties will address the loss of project revenue during periods of curtailment.

In instances where there is an overabundance of energy being delivered into a regional market system, the transmission operator may use locational marginal pricing (LMP) to determine which generation source will use the limited transmission capacity. The LMP in a transmission-constrained area will turn negative – meaning the project must pay to have its power accepted onto the grid. Generators that are willing to temporarily accept the negative LMPs will continue generating and delivering power during the negative LMP period. Parties must negotiate terms of the PPA to specify whether the project will continue to operate during periods of negative pricing and how to allocate risks related to the negative market prices, as well as procedures in the event that the project must economically curtail operations.

Corporate purchasers may also negotiate terms of the PPA granting them the right to curtail purchases of energy from the project based on economic, rather than reliability, circumstances. Curtailment by a corporate purchaser may occur if it can obtain energy at significantly lower cost from a different source. PPA parties should consider how to define transmission-related curtailments and economic curtailments and how to allocate risks associated with curtailment and negative pricing. When analyzing a PPA, financing parties will be particularly interested in how the project will be compensated during periods of curtailment or negative pricing, and how various curtailment scenarios impact the financial model which is critical to sizing their investment.

Energy Management Arrangements

If the corporate purchaser enters into a physical PPA for its renewable energy purchases, the corporate purchaser will typically be responsible for balancing its energy supply, scheduling the energy, and marketing the energy into the relevant regional power system. In some instances the project owner may offer to perform these roles (or engage an energy manager to perform these roles) as an additional service to the corporate purchaser. If the corporate purchaser is fulfilling these functions it will either need energy-trading expertise or contracts with qualified third-party energy managers. For a virtual PPA, the project owner generally retains responsibility for energy supply, scheduling, and power marketing. In either case, it is very important to engage a qualified energy manager for performing energy scheduling services.

Dodd-Frank Considerations

Virtual PPAs described above are often considered swap contracts and are subject to Dodd-Frank reporting and related regulatory requirements. Depending on its terms, it is also possible that a physical PPA could be subject to Dodd-Frank requirements if, among other things, the corporate purchaser has the ability to curtail the project or the price for renewable energy generated by the project is not fixed. The counterparties and the financing parties will need to ensure that appropriate Dodd-Frank compliance requirements are in place.

Conclusion

Corporate PPAs can be an excellent way for corporate energy users to satisfy renewable energy goals and support the development of new renewable energy generation projects. In order for corporate PPAs to support new renewable energy projects, they must contain terms that are financeable. Corporate purchasers should consider the topics presented in this article when evaluating and negotiating a PPA with a project developer in order to structure a transaction that both fulfills the corporate purchaser's objective and increases the potential sources of capital available to the developer for the renewable energy project.

About the Authors

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CORPORATE VS. PROJECT FINANCING OF RENEWABLE ENERGY PROJECTS, AND ASSOCIATED VALUATION ISSUES

Kenneth Kramer
Rushton Atlantic

While many developers have relied on project financing techniques to support renewable energy projects, operating businesses may also rely on structurally simpler corporate financing for generation projects supporting their internal power requirements. The financing requirements and appraisal approaches for both alternatives are discussed below.

With the extensions of the federal investment and production tax credits for solar and wind, and the increasing market share of commercial and industrial renewable power, now is a logical time to consider financing alternatives appropriate for projects in the growing sub-utility scale generation sector.

The developer-focused project finance model has provided a mechanism by which even small developers could bring a project to market, albeit within well-established parameters, the most important being a firm, long-term off-take agreement.

However, many of the same economic and tax incentives for renewable energy also apply to operating businesses with commercial or industrial facilities that could benefit from internally generating at least a portion of their electricity requirements. In the case of on-site or behind-the-meter projects, tax-intensive structured project financings may be neither necessary nor desirable.

Both project and corporate financing models have advantages and disadvantages. The project approach may generate 100% financing and be structured with tax-oriented investors to utilize tax benefits more efficiently than the developer can. Corporate debt financing, however, is structurally simpler, and allows the project owner to retain its tax benefits, but may not provide 100% financing. Corporate credit-based lease financing would be most attractive to non-current taxpayers, and provide 100% financing without a project finance structure.

The valuation approaches appropriate to project and corporate financing, including secured lending and leasing, differ given project financiers' emphasis on project credit and cash flow, whereas corporate lenders and lessors can focus on the corporate obligor's credit and asset value. In order to appropriately assess which approach companies should employ, several considerations should be taken into account to examine whether a power purchase agreement (PPA) via project finance or corporate finance will be most beneficial for a given project.

Project Finance Considerations

The requirements to arrange project and corporate financings differ dramatically. To credibly approach a project financier, a renewable energy developer must be able to demonstrate:

- Control of the project site
- All necessary permits
- An interconnection agreement
- A power purchase agreement

- Contracts for additional revenue streams, such as solar renewable energy credits (SRECs)
- Project costs and specifications including commercially viable technologies, and
- Credible project contractors

With these issues resolved, a financier can evaluate whether it will be feasible to build the project, and whether the cash flows expected to be generated will be sufficient to provide a return of, and an adequate return on, the funds provided.

Funding for a project financing may take the form of senior debt, tax equity, lease financing, project equity, and/or mezzanine debt. The project financial analysis takes into account power sales revenue, tax benefits, and potentially RECs, which collectively service different tranches of the project's capital structure with differing returns, maturities, levels of seniority, tax sensitivity, etc.

Corporate Finance Considerations

A profitable operating business, however, may undertake a renewable energy project, such as a solar photovoltaic (PV) installation, maintain ownership, and treat it like any other capital project intended to reduce net operating costs. Assuming the company can utilize all the power generated and absorb the project's tax benefits, it does not need to negotiate an off-take agreement or find a buyer (at a discount) for the tax benefits. In this case, senior secured debt financing, such as a conventional term loan, may be the most attractive of the available options. Although 100% financing may not be available, senior debt is generally the least expensive capital, after tax, on the balance sheet, and a secured loan should have fewer covenants than unsecured financing. As noted above, a lease would provide 100% financing, with fewer restrictive covenants, but would be most attractive to taxpayers unable to utilize depreciation or the Investment Tax Credit (ITC) on a current basis.

Valuation Issues

An appraisal of the project to support a project financing would include an analysis of the project's after-tax cash flows, as well as consideration of the project's total construction costs, including soft costs. The project financiers would focus qualitatively on the risk mitigants in a structure with no corporate obligor, and quantitatively on the cash flow coverage ratios appropriate to each tranche of the financing structure.

A secured corporate credit however, would focus on the creditworthiness of the operating company, and on the project's collateral coverage, rather than project-specific cash flow coverage. A lessor would also focus on creditworthiness, as well as the fair market value of the asset at closing, and at lease termination.

For the purposes of a secured lender, the collateral would be appraised on the basis of fair market value (FMV) in exchange. In this case, FMV would be that of the system's physical components not including installation or soft costs, on the theory that for collateral purposes, the components would be removed to be reinstalled at another location. A lessor's appraisal would include installation and soft costs to the extent such costs were financed as part of lessor's cost, and the end-of-term purchase option was on an *in-place* basis.

To construct a residual value projection, the appraiser would rely on current secondary market transactions of comparably used components, determine the percentages of original cost as a function of age, reconcile them against projected rates of physical depreciation as well as functional and external obsolescence, and project the resulting percentages forward to construct a residual value curve. This forward curve could be used by the lender to determine the schedule of principal payments required to maintain the desired loan-to-value ratio against the collateral, or by the lessor to determine residual value at lease termination.

If a potential corporate user wishes to realize the operating cost benefits of a solar generation system, but is not a current taxpayer, it may choose to lease the installation, based in its corporate credit rather than on a project finance basis. Leases offer 100% financing, the ability to utilize tax benefits on a current basis to reduce the effective financing rate, and rentals generally lower than principal and interest payments on a 100% debt financing (if one were available). At the end of the lease, the lessee may have the option to extend the lease or purchase the system at its then fair market value.

The system's initial fair market value would include not only equipment costs, but any soft costs or installation costs financed by the lessor. Without a PPA in place, the assets would be valued primarily on the cost and market approaches, as described above, for the purposes of both fair market value at lease inception and end of term residual value.

However, the economic value to the lessee at lease termination, for the purpose of deciding whether to exercise a purchase option, may differ from the cost- and market-based residual value projection described above. An economic value to the existing lessee would reflect the present value of the savings available to the lessee by not having to purchase grid power. This analysis would require a projection of future electricity prices, the generation capability of the solar plant after considering degradation during the lease term, required maintenance and capital costs (such as periodic inverter replacement), and an appropriate discount rate.

Lease vs. Buy Analysis

The "apples to apples" lease vs. buy analysis, for a potential lessee who intends to operate a solar facility for its entire economic life, is therefore a comparison between the after-tax costs of (a) conventional debt service payments and (b) the combined total of lease rental payments and the purchase option, in both cases on a present value basis. These analyses must also consider the timing in which applicable credits and deductions, including ITC as well as depreciation, interest, and rent deductions, may be realized.

Conclusion

The project finance model developed for utility-scale solar projects involves complexity and high transaction costs. The model makes sense for large scale projects where the transaction costs are a small percentage of the financing amount, and the developer cannot utilize available tax incentives on a timely basis.

For smaller inside-the-fence commercial and industrial projects, corporate debt or lease financing may be an attractive, tax-efficient alternative with a simpler structure and lower transaction costs.

The Rushton Atlantic team has extensive experience in both collateral and cash flow analysis of energy projects, and stands ready to assist its clients in evaluating alternatives and supporting transactions.

About the Author

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INTEGRATION & STORAGE

ENERGY STORAGE IN THE C&I INDUSTRY

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The U.S. energy sector is rapidly pivoting away from fossil based sources, and towards clean, renewable energy sources. Between the years 2002 and 2015 alone, the renewable energy portion of the total U.S. electric generation capacity grew from 8.9%[67] to about 17% today[68] (an additional 150 GW). Renewable energy accounted for over half of all new electric generation capacity added in the U.S. during 2015,[69] with wind and solar generation comprising over two thirds of this added capacity, totaling over 90 gigawatts (GW) AC.[70]

These 90 GW bring with them the blessings inherent to renewable sources, but also carry the challenges characteristic of intermittent generation (i.e., generation of which the increase or decrease cannot be controlled). Inability to dispatch this type of load when irradiation or wind are not in abundance, coupled with inability to control energy output when demand so requires, challenges system managers' and utility companies' abilities to plan and utilize sources in a cost-effective, reliable and clean manner. Front-of-the-meter energy storage systems are increasingly integrated to counter these drawbacks, while providing a suite of other important benefits and services.

Commercial and industry (C&I) sector players (data centers, hospitals, corporations, etc.) are too facing energy challenges, including costly consumption and demand charges, lack of reliable clean back-up, and a diminished ability to harness the full potential of distributed energy resources. As with grid-scale challenges of incorporating intermittent resources, energy storage has proven effective to combat C&I end-user-level challenges when placed behind-the-meter (BTM).

When so positioned, BTM storage systems are uniquely capable of providing solutions both at the end-user level and the grid level, which cannot be said for front-of-the-meter storage systems. If well designed and located in an accommodating jurisdiction, BTM storage systems can more than just problem solve and abate costs; they can generate substantial revenue streams to the end-user by performing vital functions thereto, as well as to the utility company and system operator. These include time-of-use bill management, frequency regulation and spin-reserve services, increased utilization of distributed sources, and more.

[67] http://breakingenergy.com/2015/02/05/6-new-charts-that-show-us-renewable-energy-progress/
[68] http://www.renewableenergyworld.com/articles/2015/05/wind-and-solar-account-for-100-percent-of-new-us-generating-capacity-in-april.html
[69] https://www.snl.com/InteractiveX/Article.aspx?cdid=A-34950800-13103
[70] http://www.eia.gov/electricity/monthly//

Despite the great potential of BTM storage systems, several factors currently impede the deployment of these systems. This article will focus on the financing challenges associated with BTM energy storage and will offer possible solutions to overcome these hurdles.

High Capital Costs and Technology Risks

Leading among the obstacles facing the BTM energy storage market are high up-front capital costs and a relatively high degree of technology risks.

In recent years, capital costs of all energy storage technologies, whether the underlying batteries are flow, compressed air, lead-acid, sodium-sulphur, zinc, or the most prevalent – lithium ion – are trending downwards. Studies show that over the course of the last decade, $100 of energy storage secured about 11 times more storage capacity in 2005 compared to the same investment in 1991.[71] Reports predict battery storage costs to fall by 30% to 50% within the next five years.[72] The World Energy Council expects this trend to continue and expand, predicting energy storage costs to drop 70% over the next 15 years.[73]

In addition, many battery technologies have experienced substantial improvements over recent years extending their discharge depth, life cycle, efficiency and reliability levels. These improvements have also helped drive energy storage system costs downwards by a factor of 10.[74]

Notwithstanding the promising progression, capital costs of BTM energy storage systems remain high compared to other available distributed energy sources such as rooftop photovoltaic panels. Computing the cost of energy storage systems is highly complex, as it greatly depends on variables such as the exact BTM location (e.g., *use cases* such as microgrid integrated, island grid integrated, commercial and industrial, domestic, etc.), the exact services performed beyond those provided directly to the end-user (e.g., frequency regulation, spin reserve, voltage support, etc.), the system quality, and other factors. A recent study has found that on average, the levelized cost of energy (LCOE) attributed to BTM lithium-ion-based energy storage systems installed at C&I sites ranges between $350 and $1100/MWh.[75] This price point is considered to be too high to grow the industry, especially considering cheaper available alternatives such as solar panels, the LCOE of which currently ranges between $100 and $200/MWh.[76]

Securing commercial debt to finance energy storage systems is not easy. Commercial lenders are usually reluctant to lend in face of the technology risks associated with energy storage, even if performance is guaranteed by the contractor. Lithium-ion and lead-acid may be established technologies, but other battery technologies have not been deployed long enough to afford sound performance and financial models commercial lenders seek. In addition, attendant circumstances, unpredictable by nature, can significantly impact how the storage system will perform, such as temperature, elevation, humidity, nature of use, etc., adding a further degree of uncertainty.

[71] https://www.bnef.com/est
[72] http://analysis.energystorageupdate.com/lithium-ion-costs-fall-50-within-five-years
[73] https://www.worldenergy.org/publications/2016/e-storage-shifting-from-cost-to-value-2016/
[74] http://www.forbes.com/sites/gregsatell/2016/04/01/why-energy-storage-may-be-the-most-important-technology-in-the-world-right-now/#7c8de7474869
[75] https://www.lazard.com/media/2391/lazards-levelized-cost-of-storage-analysis-10.pdf
[76] http://sunmetrix.com/what-is-the-levelized-cost-of-solar-energy/

One solution for both foregoing challenges is utilizing public-sector (federal, state and local) financing. Currently, a wide range of federal and state/local government programs offer various financial products to BTM storage providers and users, such as low-interest loans, loan guarantees, grants and tax credits. These programs mitigate some of the risks, thereby reducing financial costs.

Notable among such programs are the:

- Improved Energy Technology Loans program run by the United States Department of Energy, which offers loan guarantees to eligible projects that reduce air-pollution and greenhouse gases, and support innovative and first commercial use of advanced technologies[77]
- Internal Revenue Service ruling, which qualifies batteries used to store solar energy for 30% investment tax credit, subject to certain restrictions[78]
- Energy Storage Technology Advancement Partnership program, managed by the Clean Energy States Alliance, designed to provide funding and information sharing to accelerate the deployment of energy storage technologies across the U.S.[79]
- New Jersey Energy Resilience Bank, which offers grants and loans focusing on existing commercially available and cost-effective distributed generation technologies, including battery storage[80]
- California Public Utilities Commission Energy Storage Decision D.13-10-040, which set a mandate for utility companies to procure 1.325 gigawatts (GW) of energy storage by 2020[81]
- Oregon mandate for non-consumer-owned utilities to procure at least 5 megawatts (MW) of storage by 2020[82]
- New York Commercial Existing Facilities Program and Demand Management Incentive Program, which provides incentives (the latter program, mostly for C&I customers), who install batteries to reduce peak load[83]

These programs are vital to help attract private-sector financing to the energy storage sector. However, to date, the overall number of such programs still remains low. Hopefully, as the importance of deploying BTM storage systems grows, so will the public sector's involvement in the much-needed financial assistance.

Another way of alleviating the high capital costs strain is adopting innovative contractual structures that shift the initial capital cost weight from the C&I end-user to third-parties. This could be done by arrangements whereby the energy storage supplier or a third-party financial institution owns the storage system (thereby benefiting from any federal or state incentives, such as tax credits) while the end-user leases the energy storage systems from such owner. Rent payments over the life of the agreement may count as installments towards purchasing the systems should they total the full value of

[77] authorized by Section 1703 of the Energy Policy Act of 2005; 42 U.S.C.A. § 16513
[78] The tax credit was extended until 2020 in the Omnibus Appropriations Act 2016; see also http://www.renewableenergyworld.com/articles/2016/02/when-is-energy-storage-eligible-for-the-30-percent-itc.html
[79] http://www.cesa.org/projects/energy-storage-technology-advancement-partnership/
[80] http://www.state.nj.us/bpu/commercial/erb/
[81] California Assembly Bill 2514
[82] H.B 2193-B
[83] http://www.nyserda.ny.gov/All-Programs/Programs/Commercial-Implementation-Assistance-Program; http://www.nyserda.ny.gov/All-Programs/Programs/Demand-Management-Program

the installed system plus a premium. This model, which initially was used to galvanize the photovoltaic market, could be adopted in the energy storage space as well and assist in avoiding high up-front costs.[84]

Monetizing Energy Storage Services

As mentioned above, BTM energy storage systems not only provide valuable benefits to the C&I end-user, but also an array of services to both the utility company and the Independent System Operator or Regional Transmission Organization (or any relevant system operator). A study performed in 2015 by the Rocky Mountain Institute (RMI) identified 13 fundamental services or benefits created by BTM energy storage systems. RMI concluded that only when several of these fundamental services are stacked do the economics shift in favor of energy storage.[85]

BTM energy storage services directly benefiting the end-user include: time-of-use bill management, demand-charge reduction, increased distributed energy sources utilization and back-up power. Services directly benefiting the utility companies and system operators include: infrastructure investment deferrals, transmission congestion relief (peak shaving), resource adequacy, energy arbitrage, spin reserve, frequency regulation, voltage support and black starts.

Despite this wide range of services, current regulatory structures in the U.S. have not yet caught up with the speed at which energy storage systems have evolved and the functions they are capable of performing. These regulatory schemes still assume all energy sector players are either consumers, producers, or distributors. As a result, current regulations do not allow end-users to effectively monetize the services BTM energy storage provides to utility companies and system operators. For example, under current Federal Energy Regulatory Commission (FERC) rules, energy storage systems are not permitted to participate in the wholesale market; rate schedules and compensation rules still remain uncertain in most regions with respect to frequency regulation and spin reserve; and there are no formal market structures for black start and voltage control, services particularly well suited to battery-based energy storage.[86]

The good news is that federal and state legislatures and regulators are slowly but surely establishing new laws and rules to reflect the reality of energy storage. FERC has initiated formal potential rulemaking changes to allow for energy storage to be integrated in the wholesale market;[87] PJM continues to develop its October 2012 decision to revamp its wholesale market to meet FERC Order 755 (which mandates that fast-responding frequency sources, such as batteries, be paid for their services);[88] FERC order 745, recently upheld by the Supreme Court,[89] assures demand-response providers receive equal remuneration to that granted to power producers, thereby incentivizing deployment of sources supportive of demand-response services, such as energy storage; a bill was recently introduced in the

[84] http://www.nacleanenergy.com/articles/20654/challenges-of-energy-storage
[85] http://www.rmi.org/Content/Files/RMI-TheEconomicsOfBatteryEnergyStorage-FullReport-FINAL.pdf
[86] *Ibid*, page 37.
[87] http://www.mondaq.com/unitedstates/x/486834/Oil+Gas+Electricity/FERC+Staff+Seeks+Information+from+RTOsISOs+on+Energy+Storage+Participation+in+Wholesale+Markets
[88] http://analysis.energystorageupdate.com/market-outlook/pjm-leads-us-fast-frequency-regulation-market
[89] *Federal Energy Regulatory Commission v. Electric Power Supply Association (EPSA)*, 136 S. Ct. 760 (2016); http://www.kilpatricktownsend.com/en/Knowledge_Center/Alerts_and_Podcasts/Legal_Alerts/2016/02/Supreme_Court_Ruling_Spurs_Energy_Storage_Possibilities.aspx

U.S. Congress that would amend the Internal Revenue Code of 1986 to provide for an energy investment credit for energy storage property connected to the grid;[90] and states continue to adopt and expand distributed sources incentives such as net-metering and virtual net-metering policies, which stimulate storage system deployment in light of their ability to enhance the efficacy of such sources.

Further regulatory changes must take place if the U.S. electric sector is to become smarter, more efficient, secure and environmentally friendly.

Conclusion

Despite the barriers discussed above, many believe that the record breaking growth of energy storage during 2015 is just the beginning, and that this sector's best days are ahead.[91] SEC filings by the electric-vehicle giant Tesla in April 2016 reflect a growing trust in the BTM energy storage market. According to these filings, Tesla plans to sell more such energy storage systems during 2016 than the entire market of such systems in 2015.[92]

With well-planned stacking of battery services, supportive regulatory structures, innovative financing arrangements, evolvement of battery technology, and growing public-financing involvement, energy storage proliferation can be expedited for the good of the entire electric sector.

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[90] H.R. 5350

[91] https://www.greentechmedia.com/research/subscription/u.s.-energy-storage-monitor

[92] http://www.pv-magazine.com/news/details/beitrag/tesla-prepares-major-growth-in-us-behind-the-meter-energy-storage-in-2016_100024291/#axzz47Q7cvw3s

How Smart Grid Deployment Can Facilitate Renewables Procurement by Commercial and Industrial Customers

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Current renewable electricity purchases by commercial and industrial (C&I) customers are largely initiated under a contract for differences (CfD) power purchase agreement (PPA). The C&I entity agrees to buy renewable electricity at a fixed price from a generator and immediately sell it into the spot market within the generation region. Then, a payment is received if the average spot market price for a given time period is above the purchase price, or a payment made if it is below. These PPAs typically are 12 to 20 years in length, with longer terms preferred, and typically require a minimum capacity commitment from 20-40 megawatts (MW). While a PPA based on a CfD model is successful for the subset of companies with large demands in a given grid region and risk appetites for long-term contracts in what has been a highly volatile market for the past decade, many companies do not fit this profile.

A substantial percentage of the C&I companies with an interest in procuring renewable electricity have dispersed loads and are interested in shorter contract time horizons of five to 10 years. This group of customers stands to benefit from a new contract model which would utilize grid management tools and advanced analytics to integrate renewable and conventional generation capacity to deliver firm, reliable power to a company's facilities. This approach would offer several benefits to C&I customers, renewables generation facilities, and utilities and/or energy services companies (ESCOs) providing the contract, because it:

- Distributes the risk in average grid electricity price variations across all parties in the transaction
- Enables companies to purchase firm electricity on workable contract terms that fit their business models
- Offers the opportunity to integrate demand response and other innovative programs to better integrate intermittent renewable sources into the grid

Introduction

In today's global electricity market, there are an assortment of regulated and unregulated utility markets and attendant rate classes, contracts, and requirements for procuring electricity. In the current market environment, where increasing numbers of C&I companies desire to procure renewable electricity to fulfill climate protection objectives, stabilize electricity costs, and send signals to electricity providers and transmission companies regarding the importance of providing increased access to economically competitive renewable generation options, finding a workable means to procure renewable electricity remains difficult. The large, publicized renewable purchases made by C&I companies over the last several years have typically involved the use of PPAs based on the CfD contract type, in which companies buy the renewable electricity from the generator and then immediately sell it into the spot market while retaining the renewable energy certificates (RECs). Under the CfD, the company receives a payment where the average spot market price exceeds the PPA rate and makes a payment where the average spot price is less. For many companies, the minimum capacity requirements, the long contract terms, and the struggles to convince internal treasury and accounting

groups, as well as the business, to enter into a long-term, financial hedge type contract can make the CfD approach difficult.

Some companies have interest in finding a procurement method that will enable the purchase of renewable electricity capacity at or near the electricity demand location or group of locations owned or operated by the company within a grid region. The renewable capacity would be matched with a conventional power component to provide reliable power to the facility or facilities being supplied. Such an approach should be possible where the utility has invested in smart grid technologies, such as system management software which ingests and analyzes sensor and system data from the generation and distribution/transmission systems, as well as end-user demand information, augmented with weather forecasting data. The availability of real-time monitoring, forecasting and dispatch management capabilities can power new PPA and rate-class types that enable the bundling of renewable and conventional capacity and generation to provide reliable electricity supply.

Greater Integration of Renewables through the use of Grid Management Software

Effective integration of renewables into the energy supply grid represents a challenge due to the intermittent and distributed nature of solar and wind generation assets. Getting capacity onto the grid is one challenge, but it is equally important to ensure that the transmission/distribution system has sufficient capacity to move renewable electricity, which is often generated in remote locations, to points of demand and to manage the grid with analytic and cognitive-based systems to accurately forecast generation levels and optimize the integration of renewable and conventional generation assets.[93,94,95] The nature of the grid is also changing, from a one-way to a multi-directional distribution system due to the growth of Distributed Energy Resources (DER), which originate from within the distribution system and substantially complicate the power flow within the grid as the capacity of intermittent renewables exceeds 20-30%. Managing the multi-directional network requires greater visibility to and control of the transmission, generation, and DER assets, as well as higher resolution visibility to demand requirements.

Self-learning grid management software, with analytics and forecasting capabilities for both supply and demand components of the grid system, is a critical component of broadening the availability of renewables on the grid both in the near and long term. Curtailments of 20% to 50% of renewable generation sources have been reported for some grid systems where a lack of forecasting and integration capability precluded higher dispatch levels.[96] Grid management software can provide near term and long term forecasts of renewables generation, improving the dispatch of renewables into the grid, and providing better management of conventional generation and demand response assets to enable more reliable operation of the grid with higher utilization of renewables.

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[94] "Communications in the Energy Cloud, Navigant, https://www.navigantresearch.com/research/communications-in-the-energy-cloud, 1Q2016
[95] Western Wind and Solar Integration Study, National Renewable Energy Laboratory, http://www.nrel.gov/electricity/transmission/western_wind.html, December 2014
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Procurement of Renewables Based on Grid Management Software

Analytics and cognitive based grid management software provides the functionality need to offer C&I customers supply based contracts with a renewables component. The visibility into the grid operation provided by the grid management software can enable utilities or ESCOs to create a PPA with a defined quantity of renewables, set at a capacity equal to or less than demand at a facility or group of facilities, and which is filled in with conventional generation assets to provide reliable power to the facility. The weather forecasting capability improves both the demand and renewable supply estimates to provide near and long-term outlooks which will enable a more proactive ability to buy ahead and economically fill in the contracted renewable energy capacity. The analytics and forecasting will also facilitate the ability of the company location(s) to engage in demand response programs, providing another management and financial dimension for the contract. Building a supply contract based on the capabilities of the grid management software offers a range of benefits:

- Using the grid management software to develop a contract that combines renewable and conventional generation capacity to economically supply a specific location or group of locations develops the technologies needed to diversify the grid and increase the renewable generation capacity deployed on the grid. Ideally, these types of contracts should be established to cover a large quantity of demand to improve the ability to match renewable and conventional generation assets to ensure reliable supply.
- Incorporating demand response capabilities into the contract offers a third dimension to the supply management equation and enables the electricity purchaser to reduce its costs by committing specific assets for specific periods of time to the demand management program.
- A supply based contract with an intermediate term spreads the rate risk among the renewable generation facility, the utility or the ESCO, and the purchaser over a more realistic time period where the contracting parties have the ability to properly project and weigh the risk and reward of the contract.
- This type of contract enables companies to directly supply the consuming locations with renewables augmented by conventional power. In turn, this directly matches the billing to the location. For many companies, this will simplify the financial aspects of the purchase and directly align the purchase and consumption of the renewables with the consuming locations.
- As the technology advances, PPA buyers will increasingly be able to supply additional capabilities back to the grid, such as ancillary services (frequency, VAR control, etc.) that can benefit the buyer financially, and the ability of the utility systems to absorb more renewable energy.

Conclusion

Deploying, integrating, and optimizing renewable generation assets on the grid presents a significant physical and technical challenge as the grid becomes a multi-directional network of physical and virtual generation assets and demand. Deploying renewable generation assets on the grid is just one component of a successful system; transmission system upgrades and advanced analytic and cognitive based grid management systems are also critical components of converting to a low-carbon grid. The availability of grid management software can expand the renewable procurement options for C&I customers, offering the means to combine renewable and conventional generation assets with a

demand response component that enables C&I customers to procure larger quantities of renewables in their electricity supplies, while also reducing the contract terms required for CfD-based PPAs and capturing the cost reduction benefits of a demand response component in their electricity supply contracts. While the details remain to be worked out, developing a shorter-term, direct delivery contracting option addresses the system-level challenges inherent in providing firm, delivered power to mission-critical facilities on a grid with high percentages of intermittent renewable generation assets.

About the Author

Jay Dietrich is an IBM Distinguished Engineer in the Corporate Environmental Affairs and Product Safety organization with responsibility for energy and climate stewardship programs. He has been involved with the World Resources Institute (WRI) efforts to expand the availability of renewables for C&I customers and the Corporate Buyer-Utility Renewable Energy Workshops sponsored by Edison Electric Institute, WRI, and World Wildlife Fund to investigate and develop options for C&I procurement of renewables from regulated utilities in the United States, among other efforts in this subject area. Jay works with the IBM energy management team to procure renewable electricity for IBM's operations.