

EMERGING SOLAR STRATEGIES

How Innovative Companies are
Using Solar to Reduce Energy Costs

WHITE PAPER

EXPANDING SOLAR OPTIONS

Photovoltaics and distributed solar generation have redefined expectations, reduced costs, and rocked the century-old utility business model. Solar costs have dropped nearly 50%¹ in just the past few years and customer options are no longer limited to only a few types of onsite systems. Today, customers can access a broad range of solar solutions, including:

- Onsite solar systems
- Large, frequently off-site, solar systems that can achieve better economies of scale
- Wholesale, long-term renewable energy contracts

In a business environment focused relentlessly on reducing operating costs, these new opportunities allow businesses to develop renewable energy portfolios with a unique ability to address volatile energy costs. Solar power can be a central asset in these portfolios. While these are sophisticated solutions, the right solar partner can help organizations to evaluate the different options and effectively build a solar energy portfolio that achieves sustainability goals and lowers overall energy costs.

THE DAWN OF A NEW ENERGY MANAGEMENT ERA

The incredible pace of change in solar has paralleled an enormous shift in facility energy management. With growing connectivity, low-cost metering, and software that provides sophisticated data interpretation, facility managers have more tools than ever before to optimize the efficiency of their buildings. Savvy, forward-thinking energy managers are also exploring demand response strategies to optimize the timing of electric loads and get the most benefit from the way electric rates are designed. But many of the same pain points remain, including:

- Increasing electricity costs
- Increasing volatility in electric costs caused by fluctuations in fuel prices
- Growing pressure to reduce energy operating expenses
- Limited capital budgets for energy efficiency and other energy management investments

To address these concerns, energy managers are helping to usher in a new era of energy management that includes energy risk management and diversified energy portfolios. Solar power is a cornerstone in that portfolio because:

- Solar energy rates are certain from the day a system is commissioned or a power purchase agreement is signed.
- Solar provides economies of scale—the more you do, the cheaper it gets.
- Solar financing options can eliminate capital requirements and even free up capital for other projects.

Whether it is offsetting the carbon footprint of energy-intensive data centers or reducing a building's electric bill through self-consumption and tariff optimization, solar power can help to meet that objective.

ON AND BEYOND THE ROOF: EXPANDING SOLAR OPTIONS

Customers have an increasing array of solar options because of innovations in technology and solar policy. And this isn't a situation of selecting one and not the others. Each option can be a critical piece in a company's total, global energy portfolio to most effectively address rate volatility and attain superior economics. Companies can purchase solar in a variety of ways, including:

- Small or medium systems deployed onsite
- Large systems built offsite on company property
- Wholesale solar energy contracts

Onsite Solar Power

Onsite solar power can provide compelling customer benefits because the highest value kWh is the one a customer doesn't have to purchase from the utility. Depending on the local utility tariffs and how the utility treats net metered systems, an onsite solar system may be the best value for a customer.

An emerging strategy for onsite solar is to aggregate many sites in a specific geographic area into a larger bundle. The aggregation strategy, rather than an

¹GTM Research, U.S. Solar Market Insight Report: 2013 Year-in-Review, Solar Energy Industries Association, released March 5, 2014, <http://www.seia.org/research-resources/us-solar-market-insight>.

offsite project or wholesale contract, is often dictated by state regulation since the wholesale power contract alternative is available only in a limited number of states. Several large U.S. retailers have already adopted this strategy of aggregating multiple stores to get lower cost solar installations. The public sector has caught on to this idea as well. Alameda County in Northern California recently coordinated a large-scale solicitation that included several county governments and school districts within the region. Any one of the counties or school districts could have conducted their own solicitation, but as a member of the larger pool, they were able to achieve more attractive pricing.

However, onsite solar isn't always the best economic solar choice, and that has deterred some customers in the past. Some of the top stumbling blocks include:

- Net metering policies with unfavorable credit values
- Restrictive interconnection requirements
- Structural limitations with the building itself

Regulators in many of the net metered states have allowed their utilities to develop unique--and less attractive--net metering tariffs. California allows full retail net metering where 100% of energy, transmission and distribution costs can generally be avoided with onsite solar.² At the other end of the spectrum, New Mexico offers a buy/sell arrangement where the customer purchases 100% of their energy needs from the utility and sells the solar energy produced back to the utility at a rate that is substantially lower than the cost of the delivered electricity.

While net metering is extremely important for onsite solar economics, other factors can also affect the value. States such as Hawaii and North Carolina limit the size of net metered systems through interconnection requirements and the use of standby charges, respectively. Unfortunately, these size limitations erode the value a customer might realize from a rooftop system. While onsite generation can produce the highest avoided cost benefit, smaller systems are also the most expensive to install on a dollar-per-watt basis.

The physical or engineering restrictions of a roof can also limit the viability of onsite generation. Some roof structures are engineered very efficiently to support the roof, but lack the extra strength to support a solar system. Shading caused by other buildings, parapets, and rooftop equipment can also limit the usefulness of a roof for solar. Finally, many customers look at the remaining life of the roof and eliminate sites based on the likelihood of incurring re-roofing expenses.³

In the past, such limitations restricted or halted solar initiatives. Now, new offsite solar options allow companies to still go solar and achieve competitive or potentially superior economics.

Moving Off the Roof: "Virtual" and other Net Metering Innovations

Solar policy innovation and pioneering companies have made it possible for other organizations to move off the roof to benefit from solar energy. Thanks to programs such as "virtual" net metering, companies can acquire offsite ground-based systems. Several states have "virtual"⁴ net metering options for large systems that serve more than one meter, including California, New York, and Massachusetts. These programs allow a customer with many small sites to deploy a solar system at a location that has room for a large system and then credit the production from that system to other locations. Customers who could benefit include:

- Businesses with multiple campuses
- School districts and their many school sites
- Retailers with multiple stores

Each state with virtual or remote net metering has implemented the option somewhat differently, but the basic idea is that a single large system serves multiple meters. This option also allows a company to capture the economies of scale that come with building a large system.

² California residential customers are billed on a volumetric basis, and net metering rules allow residential customers to avoid all of their electric charges. A modest administrative charge is applied monthly. Applicable laws and regulations will vary by state and are subject to change.

³ While this discourages some would-be solar customers, others have actually targeted bad roofs and rolled the cost of new roofing into the cost of a power purchase agreement. In these innovative solutions, they get a new roof and reduce their utility bill while conserving their capital budget for other projects.

⁴ "Virtual" or "remote" net metering programs vary by state and there are regulatory, tariff, and grid issues that affect the viability of virtual net metering options for a specific customer.

Trends Toward Large-Scale Solar Deployment and Solar Purchases

Going offsite allows companies to realize significantly better economies of scale compared to deploying solar on a single rooftop. The greatest economies of scale for solar power are realized with very large systems. According to regulatory filings by Public Service of Colorado, a subsidiary of Xcel Energy, large-scale solar projects now can match-up head-to-head with natural gas-fired generation.^{5,6}

*“This is the first time that we’ve seen, purely on a price basis, that the solar projects made the cut—without considering carbon costs or the need to comply with a renewable energy standard—strictly on an economic basis,” David Eves, CEO of an Xcel subsidiary, told the *Denver Business Journal*.*

A large commercial rooftop system can range from 500 kW up to 1 MW depending on net metering, interconnection rules, and the size of the building. Ground-mounted systems participating in virtual net metering programs can range from 2 MW up to 5 MW in size. Although those are very large systems, the maximum sizes are limited by regulation, not engineering or economics. Solar developers regularly build utility-scale power plants that range from 20 MW to over 500 MW.

Thanks to the opportunity provided by these policies and offsite solar, a single solar power plant can replace dozens of smaller solar systems scattered on leased roofs. This single system can be optimally sited and sized to meet a customer’s load without worrying about utility net metering rules, roof quality, or the term of a site lease agreement. Ultimately, the exact scale and location of the solar power plant should be decided upon by weighing customer needs, appropriate site development, solar policy, solar technology, and financing. Since this scenario can often offer better total economics to a customer, large-scale offsite solar power should be considered an important option in a solar energy portfolio.

Wholesale Energy Contracts for the Long-Term

Wholesale contracts for renewable generation provide green energy credits and contribute to energy risk management strategies, and commercial and industrial customers have realized the value of making these large-scale solar energy purchases. In states that allow a choice of electric suppliers, many forward-thinking companies have turned to these contracts and other renewable energy financing tools as a means to control their energy costs. Google recently announced a power purchase agreement (PPA) to buy more than 400 MW of wind to power its data center in Iowa.⁷ Google has contracted for more than 1,000 MW of renewable energy in an effort to offset the carbon footprint of its massive data centers. Likewise, Facebook announced a deal to purchase 138 MW of renewable energy.⁸ Microsoft announced an agreement to purchase 110 MW of renewable energy in Texas,⁹ and Apple is building solar power plants to fulfill its corporate promise to power its data centers with 100% renewable energy.¹⁰ Having pioneered these renewable energy options, they’ve paved the way for other organizations to get it done in the private sector.

To make these large-scale solar purchases, the customer will find that an experienced solar partner is particularly helpful in negotiating with a utility.

Emerging Energy Contract Opportunities and “Green” Tariffs

Fortunately, some utilities have realized that offering customers the ability to contract for large-scale solar and wind energy is a good way to both attract and retain large customers. Many utilities are seeking tariff options that offer consumers more choices to match their needs and preferences. Some of the utilities that have already embraced this opportunity for long-term renewable energy contracts include:

- NV Energy in Nevada
- Dominion in Virginia
- Duke Energy in North Carolina

⁵ LaMonica, Martin, “Xcel Energy Buying Utility-Scale Solar at Prices Competitive with Natural Gas,” *Green Tech Media*, October 2, 2013, <http://www.greentechmedia.com/articles/read/xcel-energy-buys-utility-scale-solar-for-less-than-natural-gas>.

⁶ Proctor, Kathy, “Xcel Energy hopes to triple Colorado solar, add wind power,” *Denver Business Journal*, September 9, 2013, http://www.bizjournals.com/denver/blog/earth_to_power/2013/09/xcel-energy-proposes-to-triple-solar.html.

Solar Power and Energy Risk Mitigation

NV Energy is the first utility out of the gate with a successful project in development. Located near Reno, Nevada, an Apple data center will be served by a nearby solar project. Nevada is not a retail choice market,¹¹ but Apple and NV Energy were able to jointly develop a tariff that gave them a win-win situation. That Green Rider tariff is currently available for other large electric customers in Northern Nevada, and soon it will be available statewide. Dominion and Duke are also “bundled” markets with a significant number of data center customers but without retail choice. They too have developed tariffs somewhat similar to NV Energy. However, they have yet to announce any projects under their Green Rider-equivalents.

Customers in states with retail choice don’t have to wait for a utility tariff to procure their own renewable energy contracts, and large commercial and industrial customers are realizing that the lowest cost energy isn’t always the best. Customers are looking more closely at the source of the energy as well as the financial standing of suppliers. Quite simply, an unstable supplier with cheap energy may be the first to capitulate in a bad economy or energy crisis when customers need energy and cost certainty the most.

Customers in the Northeast, the Midwest, Texas, and, in limited cases, California, can contract directly for renewable energy. Access to competitive supply via open access transmission grids provides new opportunities for customers to structure energy portfolios that both control costs and meet sustainability goals. In particular, the energy markets in Texas served by the Electric Reliability Council of Texas (ERCOT) and MidAtlantic states served by PJM Interconnection are liquid and robust, offering companies many energy supply options. In these markets, it’s possible to use a variety of innovative contract structures to secure a stable, long-term supply of renewable energy.

The effectiveness and urgency of using long-term energy contracts to mitigate rate volatility was aptly illustrated by the “Polar Vortex” that hit many parts of the U.S. in January 2014. This weather phenomenon brought a wave of extraordinarily high prices for natural gas and financial distress for customers and suppliers. Furthermore, many customers were hit after the fact with surcharges to cover the extraordinarily high cost of natural gas that is used for both heating and fuel for electric generation. Customers with long-term contracts generally were protected from supply shortfalls and against fuel price volatility.

Clearly, recent history has shown that long-term energy contracts can help to protect customers against fluctuations in wholesale markets, and given the growing uncertainty in the weather from climate change, this type of forward-thinking risk mitigation is more important than ever before. Overall, incorporating solar energy contracts into the overall renewable energy portfolio can substantially mitigate on-peak electricity price exposure.

⁷ MidAmerican Energy, “Google and MidAmerican Energy Company Announce Renewable Energy Agreement in Iowa,” *MidAmerican Energy.com*, April 22, 2014, http://www.midamericanenergy.com/wind_news.aspx.

⁸ Finley, Klint, “Facebook Says Its New Data Center Will Run Entirely on Wind,” *Wired*, November, 13 2013, <http://www.wired.com/2013/11/facebook-iowa-wind/>.

⁹ Fehrenbacher, Karen, “Microsoft to buy Texas wind energy to power its San Antonio data center,” *GigaOm.com*, November 4, 2013, <http://gigaom.com/2013/11/04/microsoft-to-buy-texas-wind-energy-to-power-its-san-antonio-data-center/>.

¹⁰ Apple, “Environmental Responsibility,” accessed May 2, 2014, <http://www.apple.com/environment/>.

¹¹ Traditional service provided by a monopoly utility is frequently called “bundled service.” The monopoly utility provides energy and charges customers for transmission and distribution through a single bill. Many states have “unbundled” traditional monopoly utility service to varying degrees. In general, unbundled, or “retail choice” markets allow retail customers to choose their energy supplier while the incumbent utility continues to provide distribution and billing services.

Building Solar into an Integrated Energy Management Strategy

As recent history has shown, forward-thinking businesses have moved towards cohesive, large-scale solar energy acquisitions to address their ongoing energy needs. In building a renewable energy portfolio, companies can achieve greater cost certainty and better total economics. However, this is a sophisticated undertaking, and an experienced solar partner is critical to take full advantage of specific regional policies and other opportunities while correctly selecting the best solar option whether it is onsite solar, large-scale offsite solar, wholesale energy contracts, or a combination.

Generally, onsite solar generation continues to be the most powerful solar solution for addressing cost volatility and rising energy prices. It offers facility-specific options to manage energy usage. Onsite solar directly offsets the energy flowing through a utility meter, and it may be the best way to manage energy usage at key locations.

However, onsite solar may not always offer the best economics depending on the location, site, local policy, and other factors. Fortunately, the expansion and maturation of the solar industry has created new opportunities for companies to include solar in an energy portfolio. From virtual net metering options in select states to large-scale offsite solar systems to wholesale solar contracts in regions such as ERCOT and PJM, the opportunities for offsite solar generation are plentiful.

As companies enter a new period of energy management and undertake these sophisticated energy strategies, an experienced solar partner is central to understanding solar policy, selecting superior technology, and deciding upon financing to unlock the greatest value. A solar partner also helps companies properly understand and manage the multiple available solar options and choose a strategy that makes sense based on local regulations, tariffs, sustainability goals, and the portfolio of building sites. With such a partnership alongside, companies can effectively develop a solar portfolio that includes onsite, offsite, and energy purchases and achieves superior economics that also meet sustainability goals.

References

Apple. "Environmental Responsibility." Accessed May 2, 2014.

<http://www.apple.com/environment/>.

Fehrenbacher, Karen. "Microsoft to buy Texas wind energy to power its San Antonio data center."

GigaOm.com, November 4, 2013.

<http://gigaom.com/2013/11/04/microsoft-to-buy-texas-wind-energy-to-power-its-san-antonio-data-center/>.

Finley, Klint. "Facebook Says Its New Data Center Will Run Entirely on Wind." *Wired*, November, 13 2013.

<http://www.wired.com/2013/11/facebook-iowa-wind/>.

GTM Research. *U.S. Solar Market Insight Report: 2013 Year-in-Review*. Solar Energy Industries Association, released March 5, 2014.

<http://www.seia.org/research-resources/us-solar-market-insight>.

LaMonica, Martin. "Xcel Energy Buying Utility-Scale Solar at Prices Competitive With Natural Gas."

Green Tech Media, October 2, 2013.

<http://www.greentechmedia.com/articles/read/xcel-energy-buys-utility-scale-solar-for-less-than-natural-gas>.

MidAmerican Energy. "Google and MidAmerican Energy Company Announce Renewable

Energy Agreement in Iowa." *MidAmerican Energy.com*, April 22, 2014.

http://www.midamericanenergy.com/wind_news.aspx.

Proctor, Kathy. "Xcel Energy hopes to triple Colorado solar, add wind power."

Denver Business Journal, September 9, 2013.

http://www.bizjournals.com/denver/blog/earth_to_power/2013/09/xcel-energy-proposes-to-triple-solar.html.

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