Drones
Check out an update on the promising marriage between drones and solar.
page 20

Energy Storage
A Vermont utility embraces grid-scale storage and off-grid solutions.
page 22

Installers discuss some of their most unique rooftop projects.
page 14
Say Yes To Tile

Tile Replacement Mount
Fast & Simple | Versatile | 100% Watertight

No messy tile grinding or cutting, so you can install solar faster.

W Tile Mount  S Tile Mount  Flat Tile Mount

Works with W-shaped curved tile, S-shaped curved tile and flat tile roofs.

quickmountpv.com | 925.478.8269
PV Racking & Mounting

14 Five Unique Rooftop Solar Projects
Installers discuss how existing racking and mounting solutions helped them complete some of their most intriguing and challenging projects.

Drones

20 Drones In Solar: Opportunity Awaits
If you’re looking to see what drones can bring to your solar business, there are already plenty of options available.

Energy Storage

22 Why Green Mountain Power Is Embracing Energy Storage
The Vermont utility discusses the potential benefits of grid-scale storage and explains why it is offering customers an option to go off-grid.

Utility-Scale Solar

24 Utility-Scale Solar Pricing: Trending Down And Opening New Markets
Several factors have made solar less expensive, and there are market opportunities and hurdles for utility-scale developers to consider going forward.

Departments

4 Sun Dial
6 New & Noteworthy
27 Projects & Contracts
30 Products & Technology
32 Policy Watch
34 Sundown

On the cover: Beaumont Solar recently completed an installation on a saw-tooth roof at the New Bedford, Mass., plant of men’s suit maker Joseph Abboud Mfg Corp. Photo courtesy of Beaumont Solar
Whether played at a casino, at a buddy’s house or online, poker has become increasingly popular throughout the past several years. A host of TV shows and related merchandise are even dedicated to it. Granted, some versions of the card game are more complicated than others, but there’s perhaps no more exciting version than no-limit poker, during which there isn’t a cap on the amount a player can bet. The player can put it all on the line and, as the saying goes, “go all-in.”

Outside the poker world and in the energy space, local governments and major corporations have also decided to go all-in by committing themselves to 100% renewable energy. For these leading municipalities and companies, though, there is no gambling involved: Clean energy is a sure bet.

In April, Chicago Mayor Rahm Emanuel pledged to transition the city’s hundreds of public buildings to 100% renewable energy by 2025. “As the Trump administration pulls back on building a clean energy economy, Chicago is doubling down,” claimed Emanuel. “By committing the energy used to power our public buildings to wind and solar energy, we are sending a clear signal that we remain committed to building a 21st-century economy here in Chicago.”

According to the announcement, the 900+ public buildings accounted for 8% of all electricity used in the Windy City last year, or 1.8 billion kWh, “the equivalent to powering approximately 295,000 Chicago homes.” In order to meet its 100% goal, the city government will rely on a mix of renewable energy credits and on-site solar, among other resources.

Notably, Emanuel also revealed the commitment while standing at a podium surrounded by rooftop solar panels at Shedd Aquarium - a great photo op that highlighted the growing presence of solar in major cities.

Chicago’s pledge is nothing less than astounding, yet some ambitious cities have even gone beyond plans to green their municipal buildings and established community-wide 100% renewable energy goals. According to the Sierra Club, Madison, Wis., and Abita Springs, La., recently became the latest of about two dozen U.S. cities that have ratified such community-wide commitments. And, frankly, I wouldn’t be surprised if a new city decided to join the list by the time you read this.

As mentioned, large corporations are also going all-in with renewables. Anheuser-Busch (AB) InBev, the world’s largest beer maker, recently committed to get 100% of the electricity it buys from renewable sources by 2025. The brewer plans to meet most of its goal through power purchase agreements, with the remaining 15% to 25% coming from on-site generation such as solar installations.

According to AB InBev CEO Carlos Brito, “Cutting back on fossil fuels is good for the environment and good for business, and we are committed to helping drive positive change. We have the opportunity to play a leading role in the battle against climate change by purchasing energy in a more sustainable way.”

In concert with its decision, AB InBev also has become a member of the global RE100 initiative, under which approximately 90 major companies, including IKEA, Apple, Google and General Motors, have all made 100% renewable energy commitments.

When speaking about AB InBev’s pledge, the head of the RE100 initiative recently pointed out, “Before long, we will see every Budweiser, Corona and Stella Artois made with 100 percent renewable power.”

Yup, wind- and solar-powered beer is on its way to the mainstream - cheers to sustainability and a clean energy future!

Send your news items to jbebon@solarindustrymag.com

---

Solar Industry (USPS: 025-268 ISSN: 1942-213X) is published monthly by Zackin Publications, Inc. Advertising, Editorial, Production and Circulation offices are at 100 Willenbrock Road, Oxford, CT 06478; (203) 262-4670. Periodical postage paid at Shelton, CT and additional mailing offices. Canada Post: Publications Mail Agreement #40612608. Return undeliverable Canadian addresses to IMEX Global Solutions, P.O. Box 23542, London, ON N6E 6B2. Subscription: $48 per year. POSTMASTER: Send address changes to: Solar Industry, 100 Willenbrock Road, Oxford, CT 06478. Copyright © 2017 by Zackin Publications, Inc. All rights reserved; no reproduction without written permission from the publisher.
The QuickBOLT is the most innovative solar mounting system for Asphalt Shingle Roofs.

- Can be installed in less than a minute
- 100% leak-proof MicroFlashing
- Low Profile QuickBOLT creates a level array with no adjustments

Spec Sheets & Test Results available on product page

www.solarroofhook.com

NEW WEBSITE
COMING SUMMER 2017
First Solar Looks To Shed 8point3 Energy Yieldco

First Solar Inc., a U.S.-based vertically integrated solar company, has announced it is exploring options to sell its interests in 8point3 Energy Partners, a yieldco joint venture with SunPower Corp.

The announcement comes after First Solar revealed a restructuring initiative in November, including plans to fast-forward to producing its Series 6 platform and cut over 25% of its workforce, in an effort to remain competitive among global market challenges.

Raj Prabhu, CEO and co-founder of research firm Mercom Capital Group, explains First Solar’s strategic shuffle: “The company is moving back to being primarily a component supplier and is betting it all on the next-generation Series 6 panels. This is a bold move considering the module price crash over the last year, but it remains to be seen how things will play out, as this shift is still in the preliminary stages.”

As a continuation of its restructuring, First Solar says in a press release, the company is exploring options for the sale of its interests in 8point3 in order to refocus resources on Series 6 objectives and allow for faster recycling of its systems business capital.

“We remain committed to developing, constructing and selling utility-scale solar power plants,” states Mark Widmar, CEO of First Solar, in the release. “Series 6 has the potential to be a transformational product and provide attractive returns to our shareholders. As we accelerate the cash conversion cycle from our systems business, we will further enable this important transition in our business.”

In light of First Solar’s announcement, SunPower, which is another U.S.-based vertically integrated company, says it is evaluating strategic options for 8point3. In a company release, SunPower says it and First Solar will coordinate a review, which will include, but is not limited to, a potential replacement partner for First Solar.

“After approximately two years of successful operational performance, we have proven that a diversified portfolio of high-quality renewable assets is an ideal vehicle to drive stable cashflow growth for investors,” says Tom Werner, SunPower president and CEO, in the release. “We will work with our financial advisors to evaluate all alternatives for our investment in 8point3, including a potential replacement partner for First Solar, as we believe 8point3 can continue to benefit from owning long-term, high-quality renewable assets.”

Given that bankrupt firm SunEdison’s TerraForm yieldcos recently found a buyer in Canada-based Brookfield Asset Management, Mercom’s Prabhu thinks SunPower would likely be able to replace First Solar with a new co-sponsor if necessary.

“There is a good chance they will find a solid partner,” he says. “A strong financial company with deep pockets would be ideal, but large energy conglomerates could also be interested.”

As of press time, First Solar and SunPower both say they don’t intend to disclose further developments with respect to this process except to the extent a specific course of action is approved, the process is concluded, or it is required by law or otherwise deemed appropriate. Meanwhile, the companies add, the sponsor-appointed leaders of 8point3 remain committed to managing the partnership.

In concert with its sponsors’ announcements, 8point3 has
SOLAR RACKING & TRACKING JUST GOT EASIER

No other tube product on the market can match our Gatorshield® superior strength, reduced weight, advanced corrosion protection and formability. Choose Allied Tube & Conduit for all your tubing and fabrication needs.

Allied Tube & Conduit - Your Reliable Solar Source!

UL2703 Compliant
Engineered Solutions
Meet your specific tube strength requirements

©2017 Atkore International, Inc. All rights reserved.
released its financial results for the first quarter of fiscal year 2017, during which the yieldco reported revenue of $9.9 million, net loss of $5.3 million, adjusted EBITDA of $13.1 million, and cash available for distribution of $22.1 million. As of the end of February, the yieldco’s portfolio totaled interests in 945 MW.

“Our high-quality solar portfolio performed well, as we exceeded our key financial metrics for the quarter while once again raising our quarterly distribution,” says Chuck Boyn- ton, 8point3 CEO, in the announcement. “Despite the sponsors’ review of alternatives with respect to their interests in the partnership, I want to assure our investors that we do not expect this process to have an impact on our financial results for the year. Given our cashflow profile, we are well positioned to achieve our guidance for the year, as well as reach our 12 percent distribution growth rate for 2017.”

Prabhu suggests First Solar’s potential sale of its 8point3 interests is not necessarily indicative of an issue with the viability of the yieldco model, itself.

“8point3 Energy was the only pure-play solar yieldco, and all of the other renewable yieldcos are different in their portfolio makeup and business model,” he explains. “Most of them have recovered somewhat after the SunEdison collapse. This decision by First Solar is more about where they as a company are going than a referendum on yieldcos in general.”

A Closer Look At 2016’s Historic Jobs Growth

The Solar Foundation has launched an interactive Solar Jobs Map, which provides data on the number of solar jobs in every U.S. state, metropolitan area, county and congressional district in 2016. The new map builds on the nonprofit’s recently released National Solar Jobs Census 2016 report and reveals the impact of the nation’s historic solar jobs boom down to the local level. In addition to the map, The Solar Foundation has produced 50 state-level fact sheets and released an analysis of the economic impact of the solar labor market nationwide and in five states: California, Florida, New York, Ohio and Texas.

As previously reported, the National Solar Jobs Census 2016 found that solar industry employment increased by a historic 25% nationwide from 2015 to 2016, for a total of 260,077 solar workers. This growth occurred across all regions of the country - the number of solar jobs increased in 44 of the 50 states from 2015 to 2016. In 21 of the 50 states, solar jobs grew by 50% or more.

Metropolitan areas across the nation also saw historic solar jobs growth from 2015 to 2016, as the data in the Solar Jobs Map shows. For example, solar jobs in the Cleveland metropolitan area doubled, for a total of 1,632 solar workers in 2016, and the number of solar jobs in the San Antonio metro area increased by 146% to 1,767 workers. Solar jobs increased 78% nationwide from 2015 to 2016, for a total of 260,077 solar workers. This growth occurred across all regions of the country - the number of solar jobs increased in 44 of the 50 states from 2015 to 2016. In 21 of the 50 states, solar jobs grew by 50% or more.

Metropolitan areas across the nation also saw historic solar jobs growth from 2015 to 2016, as the data in the Solar Jobs Map shows. For example, solar jobs in the Cleveland metropolitan area doubled, for a total of 1,632 solar workers in 2016, and the number of solar jobs in the San Antonio metro area increased by 146% to 1,767 workers. Solar jobs increased 78% nationwide from 2015 to 2016, for a total of 260,077 solar workers. This growth occurred across all regions of the country - the number of solar jobs increased in 44 of the 50 states from 2015 to 2016. In 21 of the 50 states, solar jobs grew by 50% or more.

Metropolitan areas across the nation also saw historic solar jobs growth from 2015 to 2016, as the data in the Solar Jobs Map shows. For example, solar jobs in the Cleveland metropolitan area doubled, for a total of 1,632 solar workers in 2016, and the number of solar jobs in the San Antonio metro area increased by 146% to 1,767 workers. Solar jobs increased 78% nationwide from 2015 to 2016, for a total of 260,077 solar workers. This growth occurred across all regions of the country - the number of solar jobs increased in 44 of the 50 states from 2015 to 2016. In 21 of the 50 states, solar jobs grew by 50% or more.

Metropolitan areas across the nation also saw historic solar jobs growth from 2015 to 2016, as the data in the Solar Jobs Map shows. For example, solar jobs in the Cleveland metropolitan area doubled, for a total of 1,632 solar workers in 2016, and the number of solar jobs in the San Antonio metro area increased by 146% to 1,767 workers. Solar jobs increased 78% nationwide from 2015 to 2016, for a total of 260,077 solar workers. This growth occurred across all regions of the country - the number of solar jobs increased in 44 of the 50 states from 2015 to 2016. In 21 of the 50 states, solar jobs grew by 50% or more.

Metropolitan areas across the nation also saw historic solar jobs growth from 2015 to 2016, as the data in the Solar Jobs Map shows. For example, solar jobs in the Cleveland metropolitan area doubled, for a total of 1,632 solar workers in 2016, and the number of solar jobs in the San Antonio metro area increased by 146% to 1,767 workers. Solar jobs increased 78% nationwide from 2015 to 2016, for a total of 260,077 solar workers. This growth occurred across all regions of the country - the number of solar jobs increased in 44 of the 50 states from 2015 to 2016. In 21 of the 50 states, solar jobs grew by 50% or more.

Metropolitan areas across the nation also saw historic solar jobs growth from 2015 to 2016, as the data in the Solar Jobs Map shows. For example, solar jobs in the Cleveland metropolitan area doubled, for a total of 1,632 solar workers in 2016, and the number of solar jobs in the San Antonio metro area increased by 146% to 1,767 workers. Solar jobs increased 78% nationwide from 2015 to 2016, for a total of 260,077 solar workers. This growth occurred across all regions of the country - the number of solar jobs increased in 44 of the 50 states from 2015 to 2016. In 21 of the 50 states, solar jobs grew by 50% or more.

Metropolitan areas across the nation also saw historic solar jobs growth from 2015 to 2016, as the data in the Solar Jobs Map shows. For example, solar jobs in the Cleveland metropolitan area doubled, for a total of 1,632 solar workers in 2016, and the number of solar jobs in the San Antonio metro area increased by 146% to 1,767 workers. Solar jobs increased 78% nationwide from 2015 to 2016, for a total of 260,077 solar workers. This growth occurred across all regions of the country - the number of solar jobs increased in 44 of the 50 states from 2015 to 2016. In 21 of the 50 states, solar jobs grew by 50% or more.

Metropolitan areas across the nation also saw historic solar jobs growth from 2015 to 2016, as the data in the Solar Jobs Map shows. For example, solar jobs in the Cleveland metropolitan area doubled, for a total of 1,632 solar workers in 2016, and the number of solar jobs in the San Antonio metro area increased by 146% to 1,767 workers. Solar jobs increased 78% nationwide from 2015 to 2016, for a total of 260,077 solar workers. This growth occurred across all regions of the country - the number of solar jobs increased in 44 of the 50 states from 2015 to 2016. In 21 of the 50 states, solar jobs grew by 50% or more.

Metropolitan areas across the nation also saw historic solar jobs growth from 2015 to 2016, as the data in the Solar Jobs Map shows. For example, solar jobs in the Cleveland metropolitan area doubled, for a total of 1,632 solar workers in 2016, and the number of solar jobs in the San Antonio metro area increased by 146% to 1,767 workers. Solar jobs increased 78% nationwide from 2015 to 2016, for a total of 260,077 solar workers. This growth occurred across all regions of the country - the number of solar jobs increased in 44 of the 50 states from 2015 to 2016. In 21 of the 50 states, solar jobs grew by 50% or more.

Metropolitan areas across the nation also saw historic solar jobs growth from 2015 to 2016, as the data in the Solar Jobs Map shows. For example, solar jobs in the Cleveland metropolitan area doubled, for a total of 1,632 solar workers in 2016, and the number of solar jobs in the San Antonio metro area increased by 146% to 1,767 workers. Solar jobs increased 78% nationwide from 2015 to 2016, for a total of 260,077 solar workers. This growth occurred across all regions of the country - the number of solar jobs increased in 44 of the 50 states from 2015 to 2016. In 21 of the 50 states, solar jobs grew by 50% or more.
INTRODUCING THE ALL NEW HERCULES SELF CONTAINED TRACK RIG, STR-20

THE MOST VERSATILE PLAYER ON THE WORKSITE

• THREE QUICK CHANGE ATTACHMENTS
• 360 DEGREE ROTATION
• AUTO PLUMB AND LEVEL
• LARGER TRACKS
• 10' TRANSPORT HEIGHT
• FIT TWO UNITS PER TRAILER
In 2016, The Solar Foundation found that with 260,077 solar
able and local energy source. “

The solar industry is generating well-paying jobs every-
where from Detroit to Miami to Salt Lake City, and in states
from Ohio to Texas to South Carolina,” says Andrea Luecke,

In 2016, The Solar Foundation found that with 260,077 solar

NYC Surpasses 100 MW Solar Milestone

The Big Apple has hit a big milestone! New York City residents and
businesses have installed more than 100 MW of solar and are using
the power of the sun to generate clean, renewable power, according
to utility Con Edison. Specifically, the company says its customers in
the city have completed 9,700 projects totaling 101.2 MW, enough to
power more than 15,000 homes.

Just a decade ago, solar panels were rare in New York City, but Con
Edison says the utility, Sustainable CUNY (at the City University of
New York), government agencies, and other parties have encouraged
residents and businesses to consider solar as a way to reduce their en-
dergy bills and protect the environment.

For example, Utley’s Inc., which makes prototype containers for
the cosmetics and liquor industries, installed a 24 kW solar project on
its manufacturing building in Queens in 2015 and estimates the com-
pany’s annual electricity savings at about $5,000.

“Solar panels have been a great investment for our business,” says
John Utley, who owns the company with his brother George Utley. “We expect to recoup our
investment in less than five years. It was a great business and envi-
ronmental decision.”

Con Edison says it tries to
make the interconnection pro-
cess as easy and quick as possible
for customers who choose solar,
and the company does not require an engineering review for systems
under 25 kW. The utility, itself, has even installed 200 solar panels on a
roof at its headquarters building in Manhattan.

Con Edison notes it is also a member of the Solar Progress Part-
nership, a group of six New York utilities and four leading solar com-
panies, and Con Edison recently proposed a new program to place
solar panels on its rooftops and properties and make that power avail-
able to low-income customers, a group that now has limited access to
solar.

“One of the most striking trends within the transformation of
the energy industry is the move of customers to renewables,” says Mat-
theW Ketschke, Con Edison’s vice president of distributed resource
integration. “We want clean energy, including solar, to be available for
customers of all income levels and regardless of whether they live in a
house or an apartment. We also advocate policies that ensure funding
for the kind of robust grid that makes solar energy possible.”

Suniva Announces ‘Significant’ Layoffs

Citing “continued downward market pricing pres-
ures,” Suniva Inc., a Georgia-based manufacturer of
solar cells and modules, has announced a “significant
reduction” in its workforce.

When reached for comment, a Suniva spokesper-
son said she was unable to offer additional details,
including the timing of the layoffs and the number
of workers involved. In a press release, Suniva says
the layoffs affect “employees in all areas of company
operations” at both its Saginaw, Mich., and Norcross,
Ga., plants.

However, according to the Georgia Department of
Economic Development, Suniva submitted a WARN
Act disclosure on March 29 that the company had laid
off 131 employees at its Norcross facility. This comes
only a few months after Suniva celebrated an expan-
sion at the location, which also serves as the compa-
y’s headquarters. As of press time, it is unclear how
many workers might remain at the Norcross facility
and whether operations are ongoing there.

In a WARN Act disclosure to the Michigan Work-
force Development Agency, Suniva explains it laid
off 59 employees at its Saginaw plant on March 29.
A local ABC12 report notes the new layoffs follow a
previous round of job cuts at the facility in February.
Citing a plant manager and a former Suniva employ-
ee, the local report says Suniva is closing the Saginaw
facility; however, the Suniva document says the plant
“will remain open with a reduced staff.”

“Although it is possible that additional termina-
tions might occur in the near future at the Saginaw
Together, we power gigawatt businesses worldwide.

For those with the vision and courage to create the world's power from renewable energy sources, you'll need an ally who understands this industry and can help protect your investment – wherever in the world you operate.

Travelers Global Renewable Energy has more than 25 years of experience providing specialized insurance products and service solutions to our customers. Our underwriting teams and in-house risk control and claim professionals have a deep understanding of renewable energy exposures. They can help you minimize risks ranging from equipment breakdown to employee safety, and address complex issues unique to renewable energy claims. So whether you're a solar or wind farm developer, the manufacturer that makes the parts, or the company that maintains the facility, we can help protect your operations – wherever they are – for the long term.
facility, no additional terminations have been scheduled at this
time," the document adds.

In the press release announcing its company-wide layoffs, Suniva provides only the following explanation, which makes several fiery claims about market hurdles:

The reductions come as U.S. solar manufacturers face attack from the continued growth of global manufacturing overcapacity, particularly in Asia, and the ongoing influx of foreign imports, which continue to drive down domestic prices. Since 2013, when the U.S. government instituted anti-dumping and countervailing duties against manufacturers in certain countries, additional new global overcapacity has continued to drive U.S. market prices to levels that challenge responsible economic operations for U.S. manufacturers. The resulting faltering economics have led to similar actions at multiple companies in the manufacturing, construction, and development segments of the U.S. industry over the last 12 months.

Suniva remains committed to U.S. manufacturing and continuing forward as America’s leading manufacturer of high-efficiency and high-quality solar products. The company is actively investigating all economically responsible operational structures and will aggressively pursue all avenues that create a fair and rational market for U.S. manufacturers in this important industry.

Although Suniva is a U.S.-based company, Hong Kong-based Shunfeng International Clean Energy has owned a 63.13% equity interest in the manufacturer since October 2015. In its full-year 2016 financial report, Shunfeng revealed - unsurprisingly now - that Suniva “has been operating at a loss.” - Joseph Bebon

America’s Electric Co-ops Are Going Big On Solar

By the end of 2017, the total solar energy capacity of America’s electric cooperatives will be five times what it was two years ago, according to data released by the National Rural Electric Cooperative Association (NRECA). This year, co-ops are on pace to add 480 MW of solar, which would bring their total capacity to 873 MW. This more than quadruples the 180 MW reached in 2015 and represents a twenty-fold increase over the 37 MW capacity in 2010.

In addition, NRECA says that over the last two years, cooperatives have expanded their solar footprint from 34 states to 44 states. Among states where co-ops have been actively developing solar, Georgia ranks first, with a total of 122 MW - followed by New Mexico, Hawaii, Colorado, Arizona, Maryland and North Carolina.

“Electric cooperatives continue to aggressively pursue solar as an energy source and are the leaders in community solar,” says NRECA CEO Jim Matheson. “Co-ops across the nation are laboratories of innovation and are responsive to member needs as they work to power and empower millions of American families and businesses.”

NRECA, a national service organization that represents the U.S. more than 900 private, not-for-profit, consumer-owned electric cooperatives, also provides some insight into what is driving the growth in co-op solar. In a nationwide survey conducted between December 2016 and January 2017, co-ops were asked to identify the factors driving their decision to offer or support solar programs, including community solar, utility-owned solar and rooftop installations. According to NRECA, 68% of respondents said they were motivated by a desire to increase consumer satisfaction, 59% cited consumer demand for solar offerings, and 43% pointed to the decline in the cost of solar development.

NRECA adds that much of the growth in both deployed and planned solar can be attributed to collaboration among co-ops. Forty-two percent of co-op solar projects are joint efforts involving either the generation and transmission co-ops (also called power supply co-ops) or fellow distribution co-ops, according to the survey.

“Cooperation among cooperatives is one of our core principles. The fact that more than 40 percent of co-op solar capacity comes from collaboration among co-ops demonstrates that this principle is truly transformative,” states Matheson. “Just in the last year, nine generation and transmission cooperatives announced they will be pursuing solar development with their distribution co-op members. We fully expect that number to increase this year.”
Soltec specializes in the manufacture and supply of single-axis solar trackers. Its global operations and workforce of over 500 people blend experience with innovation. The company has manufacturing facilities in Spain, Brazil, and China, as well as offices in Argentina, Chile, Denmark, India, Israel, Italy, Mexico, Peru, and United States.

With a strong commitment to renewable energy and the environment, the company is highly dedicated to innovative research and product enhancement to offer the industry's premier technology.
Five Unique Rooftop Solar Projects

Installers discuss how current racking and mounting solutions helped them complete challenging projects. by Joseph Bebon

"Solar is so adaptable, it’s unbelievable. You can pretty much put it anywhere,” says Phil Cavallo, president and CEO of Massachusetts-based installer Beaumont Solar. Nonetheless, that doesn’t mean solar projects are without their challenges, and some installs are undoubtedly more difficult than others.

In fact, as sustainability and clean energy grow more popular among homeowners, corporations, governments and utilities, solar companies are already being tasked with getting creative and figuring out how to best meet the needs of a diverse group of customers. That is especially true for a number of rooftop solar installers, which have relied not only on their own experience and adaptability, but also on the vast capabilities of current racking and mounting solutions, in order to complete some of their most unique projects.

A project with teeth

Beaumont Solar recently tackled an installation on a saw-tooth roof at the New Bedford, Mass., plant of men’s suit maker Joseph Abboud Mfg Corp. Built back in the 1900s, the manufacturing facility had a roof that needed repair, so Joseph Abboud thought it a good opportunity to add on-site solar at the same time. Beaumont Solar coordinated with the roofing contractor and installed a 1.3 MW solar array, which Cavallo calls a "beautiful marriage of old and new.”

As Joseph Abboud President Anthony Sapienza pointed out in a recent announcement, “When you look at our facility, you immediately see a big, tall smokestack across the street. This is how our facility used to get powered, first with coal and then with oil. Now we are almost completely self-sufficient, producing our own clean energy, without emissions, and significantly reducing our energy costs.”

The building has over 40 saw-tooth roof sections with windows on their north-facing sides - a design Cavallo notes was popular with older factories in order to provide ventilation and light for workers down below. On the sections’ south sides, though, are 22-degree ramps that face 180 degrees due south. In other words, Cavallo says, the saw-tooth roof was surprisingly “perfect for solar.”

That’s right: The odd-shaped roof required no panel or racking tilting, and the modules were mounted flat along each saw-tooth section’s surface.

Because the roof’s wooden decking wasn’t quite strong enough to support the load of the solar panels, Beaumont Solar installed stanchions and opted for heavy-duty, long-span rails from DPW Solar that could stretch far from one beam to the next. Furthermore, the saw-tooth sections weren’t perfectly flat, so the company had to adjust the L-foot attachments a bit to account for a small curvature where necessary.

“The rest was pretty standard solar installation, meaning we just clipped the panels down, installed the inverters and wired up,” says Cavallo. However, he emphasizes that although the saw-tooth design was ideal for solar production, the unique roof created some major logistical challenges.

For instance, the saw-tooth sections were like “little mountains” the installation team had to maneuver around. Cavallo says, “When you have a flat roof, you can basically walk anywhere you want, but a saw-tooth design requires you to walk all the way down to the end of one section, then walk all the way up from the other, just to get to where you need to be.” That could get tiring, considering the Joseph Abboud plant has a 272,000-square-foot roof.
Staging the project proved to be another issue. The saw-tooth design left little space to store all of the materials, including the project’s 4,127 solar panels, so Beaumont Solar had to leave the majority of its inventory across the street. At night, the company would get a police detail that allowed the crew to resupply the roof with more gear and new materials for the next day. “That’s not typical. You’d usually get a crane, load everything up and have everything right at your fingertips from the beginning. Then you’d just rock and roll,” says Cavallo.

Solar as architecture

California-based Baker Electric Solar doesn’t see many houses with standing seam metal roofs, but that didn’t stop the company from installing a solar array for a customer’s modern-style home in Carlsbad, Calif. As of this writing, Baker has completed the 14.72 kW installation and is waiting for the customer to finish the construction process on the brand-new home before commissioning the array.

Jay Miller, director of operations, says the vast majority of houses Baker works on have tile roofs, and the company most often uses Quick Mount PV’s Tile Replacement Mount. “We’ve been using them for about a year now, and they’ve been saving us a lot of labor and tile costs because the mounts basically generate spare tiles in case some break,” he says.

For the Carlsbad project, however, Baker turned to S-5! clamps, which Miller deems “perfect for this type of application.”

“It’s kind of like how brakes work on your car,” says Miller. “It basically squeezes the standing seam securely enough to where it’s considered a structural attachment point. You’re not penetrating the roof. That’s the beauty of it. The only holes we had to cut for this project were for conduits to get down into the building for electrical wiring.”

In order to meet an interesting request from the customer, Baker also added L-feet and tilt legs from Unirac to lift the panels up from the five-degree roof pitch and make the solar modules stand out. Although this helped maximize the array’s energy production, the decision was driven mostly by aesthetics.

“During a typical install, we’re in parallel with the roof and mount straight to it for a low-profile look. On this project, the back stanchions are adjustable legs, which all had to be adjusted to the same length so the whole row would cover the same angle. It’s like a mini ground-mount project, but on a roof,” explains Keith Randhahn, Baker’s director of engineering, products, services and policy.

“This particular home is very modern looking,” he adds. “The customer had specific architectural details he wanted to highlight on his property, including wanting to see his PV system on the roof and not just have it blend in.”

Randhahn and Miller both suggest Baker likely could have gotten the same amount of energy production if the company kept the project flat and just added a few more solar modules, but Randhahn says, “It’s cool to see homeowners recognize that solar is not necessarily ugly, not something that needs to be hidden, and that it can add to the aesthetic appeal of a building.”

“We’re really starting to see customers proud of their solar,” concludes Miller.

A barrel of hurdles

Although California-based Vista Solar completed an installation at DPR Construction’s San Francisco office in 2014, Sam Kim, asset performance manager of Vista Solar, says it remains one of the company’s most unique installs to date. In part, it was due to the tough logistics of working in a major city, but mostly, it was because the building has what Kim calls a “highly constrained” rooftop that was primarily barrel shaped.
“Imagine a ship upside down - that’s what the roof looks like,” explains Kim. “It wasn’t a regular pitch, and every penetration attachment needed to pivot and swivel. In addition, we had to custom-make blocks for every footing.” Although Vista Solar tried to come up with an in-house racking and mounting solution, which Kim says often saves the company on overall costs, the company had to “switch gears” after it became apparent that option wouldn’t work for the barrel roof.

“We had to re-engineer the plan and work with Silverback Solar, which had a solution for us that met the need for the attachment points every 20 feet in terms of our span. Normally, we’d do about an eight-foot span,” says Kim. “That was pretty tricky, but it all came together quickly after that.”

Vista Solar built the 118 kW solar array as part of a full retrofit in order to help DPR Construction’s San Francisco location become among the first buildings in the city to reach net zero energy status.

“You’re always going to find a new challenge no matter how long you’ve been in this industry,” comments Kim. “Of course, you might have some cookie-cutter roofs you’ve done plenty of times before where you can get in and out pretty quickly - but you’ve never seen it all.”

District-wide rollout

As of this writing, Maryland-based Standard Solar Inc. has completed 28 of 30 rooftop solar projects in Washington, D.C., for the D.C. Department of General Services (DGS). The majority of the installations are located at schools, with the remaining arrays built at educational buildings and police and fire facilities. Ranging from 108 kW to 560 kW, the commissioned solar projects total about 7 MW.

The rooftop arrays are the result of a power purchase agreement (PPA) with DGS signed at the end of 2015. In partnership with local energy technology company Nextility and solar finance and development firm Sol Systems, Standard Solar started building the arrays in the first few months of 2016.

In a 2015 announcement, D.C. Mayor Muriel Bowser said, “This PPA doubles down on my administration’s commitment to renewable energy and sustainability - using district government assets as staging grounds to capture the sun’s energy and power our building portfolio.”

Though successful, Standard Solar had to devise some innovative designs and overcome logistical issues for the projects. Tony Clifford, the company’s chief development officer, says, “It’s not only 30 different buildings; it’s 30 different buildings in a high-density urban area. That was a major challenge.”

In addition, C.J. Colavito, Standard Solar’s director of engineering, says the company set a “very aggressive goal” to maximize the system size on every rooftop possible because the renewable energy credits (RECs) in D.C. are especially valuable compared to some other regions.

“In order to take advantage of the RECs, we needed to shoehorn as much PV in and produce as much power as we could,” he says, adding that’s why Standard Solar decided to use the Ten K Solar DUO system on most of the D.C. projects. According to Colavito, the Ten K Solar solution is a fully integrated, dual-tilt system that includes two back-to-back modules, built-in ballasted racking and electronics.

“I kid you not: It has north-facing modules, and it actually makes sense financially and from a technical perspective,” says Colavito. “Half of the modules are pointed south, and the other half are facing north. We have a lower tilt on the north side and a higher tilt on the south side, and it enables us to get very high energy density.”

In some cases, Colavito adds, the Ten K system allowed Standard Solar to install panels “unusually close” to HVAC or other equipment on the rooftops, “even though we knew it was going to shade most hours during the winter before noon.”

He explains, “One of the reasons we chose Ten K is that they have a unique module that has built-in module-level power electronics, and every cell within the module is wired in parallel. So, if you shade one cell, only that cell is affected and the rest of the cells in the module operate optimally. We wouldn’t typically
be as aggressive with the layout in other regions, but because the production-based incentives were so valuable in D.C., it was well worth it to get those extra five or so panels on the roof.”

On a few of the projects, however, Standard Solar used a variety of other racking and mounting solutions, including a five-degree tilt, ballasted mounting system from PanelClaw; S-5! clamps; and an extruded aluminum, rail-based system from Mounting Systems Inc. All told, Standard Solar avoided making any roof penetrations, save for on four projects.

Colavito says the company also didn’t need to customize any of the racking and mounting solutions it used: “They all did what we expect from our racking and mounting providers. These systems are carefully engineered and designed, so making significant modifications is not advisable.”

In addition to the design details, the company had to figure out how to pull off a district-wide endeavor in such a dense, urban area. As Colavito explains, “These installations were simultaneously engineered, managed and built into one big, complicated construction schedule. Just permitting cranes, managing access to the buildings and finding parking - all of that was very complicated logistically and from a project-management standpoint.” He adds that doing a project in D.C. required meeting a lot of rules and permitting regulations, and the company had to secure approvals from a wide variety of organizations before even getting started.

Nonetheless, Standard Solar’s Clifford suggests such challenges can be “readily overcome” through “careful planning and innovative installation approaches.” He asserts that the D.C. project demonstrates “how transferable this type of success can be throughout cities in the U.S.”

Panel-mounted exoskeleton

Last year, New England solar installer ReVision Energy completed a 60 kW project atop the Keene, N.H., manufacturing facility of Tree-Free Greetings.

As an environmentally friendly greeting card company, Tree-Free Greetings had wanted to go solar; however, although standing seam metal roofs are common in the commercial and industrial space, the company’s existing metal roof was already underbuilt and couldn’t support the additional weight of a solar array, according to ReVision Energy project manager Chris Lee.

The solution? A steel exoskeleton.
Travis Genatossio, operations specialist at ReVision, says, “The customer reached out to structural engineering outfits to look for a fix. We provided a ballpark estimate of what the additional load for a solar project would be, and the architectural firm came up with a solution by building and attaching a steel exoskeleton through the roof to the structural support steel framing in the facility, as opposed to the roof deck.” The exoskeleton consists of steel I-beams outside and above the roof, and Genatossio says the solution was more efficient and likely less expensive than if Tree-Free Greetings had built a completely new roof.

After the architectural firm installed the structure, Lee says, “The racking and mounting we used was very similar to a residential job, where we put in aluminum L-feet and rails and modules on top of that. But what we did do is bolt to the I-beams, which acted essentially as rafters would on a normal roof.” ReVision opted for IronRidge’s XR1000 rail solution, whose strength Lee says allowed for wider spans per attachment point and, thus, reduced the number of steel I-beams necessary for the exoskeleton. “We didn’t need to modify the IronRidge racking, itself, and used standard components,” he says. “The custom part of the job was putting in the I-beams and fastening to them in a way that would be structurally sound.”

Given the steel exoskeleton, one laborious challenge for ReVision was the need to through-bolt each L-foot into the I-beams. The installation team had to drill each hole, by hand, in the field, and Lee notes, “The crew probably went through 30 or 40 drill bits and a lot of oil.”

Despite the drilling issue, the exoskeleton actually provided some inherent benefits due to the excess room available underneath the new structure. For example, Lee says the crew was able to prepare racking with pre-wired optimizers on the ground, lift it onto the roof, square it up with the holes in the beams and secure the bolts.

“Then we were able to land modules very quickly because we didn’t even need to clip them,” he says. “We had techs underneath the array doing the wiring, and this created a kind of manufacturing mode. It worked tremendously well and efficiently to wire the array after the modules were placed down. It was kind of like a ground-mount project.”

“It’s not every rooftop job that you can literally climb underneath the entire solar array with comfortable working clearances,” adds Genatossio. “Usually, these installations are only a few inches high off the roof deck.” Furthermore, Genatossio says the extra space will be “great
for any necessary maintenance in the future,” and the raised structure will allow the array to “run a little cooler and better with the additional airflow, especially during the summer months.”

The exoskeleton also allowed ReVision to try a new safety solution. “We need to tie off and stay safe the entire time, and this array went right to the edge of the roof,” explains Lee. “So, we ended up buying some I-beam clamps for safety - typically used by steelworkers when welding together substructures - and fastened them to the beams. It worked out tremendously well and allowed us to walk up and down the outside perimeter of the array.”

All that said, Lee and Genatossio wouldn’t necessarily recommend using an exoskeleton unless absolutely necessary, as the solution took additional time, design and materials. If necessary, though, and if the aesthetics of steel beams are not a big concern to the customer, an exoskeleton could be an odd, but viable, option.

New challenges ahead

As mentioned, solar power is attracting new customers every day, and with the increasing mix of adopters comes a demand for solar companies to meet a variety of customer needs. That includes solar installers and equipment providers, both of which appear ready to take on any future challenges.

“In general, there’s probably a racking and mounting solution for just about anything you want to do on an installation,” says Standard Solar’s Colavito. “It’s really a function of what the right product is for your application.”

And as for installers, their project portfolios will undoubtedly keep expanding and become more diverse. The solar industry is not only growing; it is adapting.
Drones In Solar: Opportunity Awaits

Newly certified U.S. commercial drone operators since late August 2016: 37,000. Newly installed U.S. solar capacity in all of 2016: 14.8 GW.

These numbers, laid out in March by the Federal Aviation Administration (FAA) and Solar Energy Industries Association (SEIA), respectively, painted a picture of two growing industries from two different worlds. In a speech, FAA Administrator Michael Huerta discussed the “new age of American aviation,” the drone industry, which is “moving at a quicker pace than anything we’ve seen before,” he said.

Meanwhile, in a SEIA/GTM Research report, which touted 2016 as the best year yet for U.S. solar, SEIA President Abigail Ross Hopper mentioned that “more people are benefiting from solar now than at any point in the past.”

Both industries, however, admitted some expected speed bumps to come. Huerta brought up a “unique set of challenges” the drone industry faces before more widespread adoption can take place, and Hopper mentioned a “changing market” for U.S. solar, which is expected to experience a 10% dip this year in newly installed capacity.

When Solar Industry checked in on the drones-in-solar market last summer, the FAA was just finalizing its new rules for commercial drone operators, now known as remote pilots. Compared with the agency’s former Section 333 exemption requirement, the Part 107 rulemaking established a far less onerous process for becoming certified to commercially fly drones.

Under Section 333, if someone wanted to commercially fly a drone - e.g., make a profit from the operations or use it as part of his business - he had to file a lengthy application with the FAA and, among other requirements, obtain a pilot’s license.

Now, under Part 107, in order for someone to become a commercial drone operator, he must get a remote pilot airman certificate, which includes passing a TSA screening and a remote pilot exam at a testing center (or an online test for anyone who already has a pilot’s license).

So, what’s been happening over the last nine months? No, not every solar company has brought its own drone on-site or hired a third-party drone services company. And yes, as the FAA admitted, there are still plenty of obstacles to overcome in the commercial drone industry.

Nonetheless, if you want to bring unmanned aircraft into your solar business, there are certainly opportunities already out there - whether you want to show off your project by getting a bird’s-eye shot, survey a landfill for a potential project or slash the time it takes to manually inspect panels.

For Hannah Solar Government Services (HSGS), the technology has been proving itself for getting aerial footage of solar projects - from the pre-construction phase to the finished product - and surveying and measuring sites, including checking for any obstructions on a roof, says Emily Johnson, sales and marketing administrator for the Charleston, S.C.-based, veteran-owned solar installer.

“When you have a solar PV system that has so many solar panels, it’s hard - if not impossible - to take a traditional photo of the whole system,” she explains. “The drone allows you to go hundreds of meters up in the air to photograph the entire system.” In turn, it “puts the final product into perspective and makes it something tangible,” she says.

For Virginia Beach, Va.-based HAZON Solutions, which has been commercially operating drones for a couple of years (since the Section 333 era), the FAA’s new drone rule-making played a role in the company’s newest venture, the HAZON Drone Capability Development program, which is targeted toward enterprise clients - including large utilities and renewable energy companies - that want to bring drones into their businesses.

“The 333 waivers were so difficult to come by and so cumbersome to get,” explains Ed Hine, director of drone capability development at HAZON. “But Part 107 has lowered that barrier of entry and really made it possible for any business - that can make the business case for it - to get into the drone space.”

The company also provides aerial inspection services for infrastructure such as transmission lines and bridges, but Hine says the growth of the renewables industry “presents a great use case for drone operations.”

“I think there’s no doubt about it that it’s provided all the more opportunity to go out and fly a drone,” he adds.

Bill Hanrahan, HAZON’s director of operations, notes, “It’s amazing how many solar farms are going up now.” In turn, he explains, companies are simply looking for a “reliable, cost-effective way to inspect them.” Particularly, Hanrahan says he finds the most work on the East Coast, especially in solar-rich Virginia and North Carolina.

Likewise, Washington, D.C.-headquartered Measure, a trade-marked “Drone as a Service” provider, sees the growth of both the drone and renewables industries as a boon for the company.

Roughly nine months after federal rules were established for commercial drone operators, unmanned aircraft are proving their viability in the solar industry.

by Betsy Lillian
“The combination of the Part 107 commercial drone rules and the growth of the renewables industry has increased the demand for drone solutions in the solar industry,” says Jesse Stepler, chief operating officer of Measure, which has also been commercially deploying unmanned aircraft for a few years. “As further regulations will enable the industry’s ability to perform energy inspections, we can only expect that uptick to continue.”

Although Part 107 laid vital groundwork in the quest toward widespread drone adoption, there are, indeed, more rules that need to be established before it can happen. For example, if someone wants to operate beyond the parameters of Part 107, he must apply for an additional waiver from the FAA, which, as of press time, has not issued one since January. These operations include flying beyond the visual line of sight (BVLOS) of the pilot, at night or over other people.

For solar, though, that doesn’t necessarily pose a big problem.

Gretchen West, co-executive director of the Commercial Drone Alliance, points out that the use case is already there for solar companies: For the most part, they wouldn’t need to fly over other people, considering the remote locations of large-scale projects, or fly BVLOS, considering a project wouldn’t stretch beyond what the pilot can see from the ground.

West brings up an interesting potential application, though: using a “swarm of drones for one operator.”

In this case, you’d need an additional waiver from the FAA to fly more than one drone at a time, but if you’re looking for an even faster way to inspect your project, “it’d be a good use case,” West says.

Meanwhile, the technology is still advancing — such as augmenting safety features and bringing more autonomy to an operation — and many solar companies are still exploring what exactly drones can offer, Hanrahan points out.

“I think we’re about to enter into a phase where we’ll see mass adoption of those drone operations into the larger industries,” he adds.

Measure’s Stepler agrees: “Drones will inevitably be integrated into energy industry workflows. The real question is in what form.”

Both HAZON and Measure bring up what they call a “hybrid approach” to companies’ drone work: They conduct their own operations in-house and then call upon drone service providers for the more complex jobs.

Though there is “plenty of positive interest in the solar industry for drones and the value they bring,” Stepler claims, “most companies are new to the technology and do not necessarily have the ability to build and scale a drone program” — which is where turnkey drone solutions providers come in.

If you’re looking to incorporate drones into your solar business and want to do it yourself, West stresses the importance of understanding the rules of Part 107, which includes restrictions on where to fly (e.g., away from airports and many military facilities) and requirements for filing certain data with the FAA.

“Understand where and how you can operate,” she suggests, adding that this includes gaining a broad understanding of the technology itself and taking a look at what insurance is required. “That creates a safe environment for all of us,” she says.

After all, there still exist privacy, safety and security concerns for drones: “We’re seeing bad reports in the media about drones being used in reckless ways — and that’s not necessarily done by our commercial industry,” West says.

As HSGS’ Johnson emphasizes, safety is certainly key: “We will use the drone for any and every project we do — no matter the size, system type or location. However, we do take extra precautions to make our clients aware that we have a drone and the location is safe for a commercial drone to fly. That is probably the most important part.”

Joining the new age

Considering the technology’s ability to reduce time, cut costs and increase safety for workers, it’s easy to predict a not-so-distant future in which drones are ubiquitous with so many industries, including large enterprises like solar. But don’t ever count out the power of humans.

“At this point in time, the drone is just a tool,” West says. “It’s not replacing jobs when it comes to inspecting solar panels.”

“If there’s a problem, a human still needs to go and fix it,” she explains.

Meanwhile, pointing back to the FAA’s and SEIA’s statistics on the widening solar and drone industries, there are a lot of drones going up in the air, and there’s a lot of solar power joining the grid. With newfound opportunities to become a drone pilot or hire a drone pilot increasingly emerging, why not take a look at what the “new age of American aviation” can bring to your business?


In addition to serving as an associate editor at Solar Industry magazine, Betsy Lillian is editor of sister publication Unmanned Aerial Online (unmanned-aerial.com), covering commercial and civil drone news.

---

A solar array at Zackin Publications, publisher of Solar Industry and Unmanned Aerial Online.

As companies “get more comfortable” using them, they’ll continue to realize the benefits of drones; then, “it’ll be the way to do [solar] inspections,” he says.

Likewise, Hine says many companies are still testing unmanned aircraft, running analyses and seeing if they can really “fold them into the mix and replace current practices with drone operations.”
Why Green Mountain Power Is Embracing Energy Storage

The Vermont utility touts the benefits of large-scale storage and off-grid customer solutions.

by Josh Castonguay

It’s simple, really: The energy industry needs to change. The bulk grid electricity system is antiquated, inefficient and costly to maintain. The current system has remained largely unchanged for the past 100 years, and it is no longer sustainable, given the threat of climate change that brings increasing severity of damage from storms. Imagine what the outcome would be for any other business that lost more than half of its product before it got to customers.

At Green Mountain Power (GMP), it became clear that we had to forge a new path with innovative grid solutions that would transform this delivery system as we know it today, and an integral part of a transition to a distributed energy system is energy storage. This can come in a few forms, including thermal energy storage, which has been around for decades in the form of controlled water heaters and electric thermal storage units, and battery energy storage, which has more recently become a viable option on the grid because battery pricing is significantly declining. We realized early on that we needed to learn as much as we could, as quickly as we could, about how to tap into the many value streams that storage can provide our customers in transitioning from the bulk grid to a more cost-effective energy system that puts homes, businesses and communities in the center.

Large-scale storage, large-scale benefits

Our first venture into grid-scale energy storage was our Stafford Hill Solar/Storage Park. This started as a 2.5 MW landfill solar project and evolved into a solar and storage facility. In late 2013, shortly after we began design on the landfill solar project, the Vermont Department of Public Service and the U.S. Department of Energy joined forces to offer a grant to a project that deployed energy storage. GMP quickly partnered with a Vermont company, Dynapower, to design an integrated storage solution that would be paired with the already planned PV system on the landfill. At that time, based on the value streams, it made sense to look at two types of battery systems: lithium-ion and advanced lead acid.

We had developed a few key use cases to be provided by the energy storage project, including peak shaving, solar smoothing, frequency regulation, power quality/voltage management, and grid resiliency/islanding of a nearby emergency shelter. With this in mind, we developed a system that consisted of four 500 kW Dynapower multiport inverters, with each inverter connected to 625 kW of solar PV, 600 kWh of advanced lead acid batteries and 250 kWh of lithium-ion batteries for a total of 2.5 MW of PV and 3.4 MWh of battery storage. This design allowed for fast ramping provided by the lithium-ion batteries, with the longer-duration energy provided by the advanced lead acid batteries. Today, we are able to achieve both the fast ramping and longer energy duration, all with lithium-ion technology.

A main value stream that was identified for the system was...
participation in the ISO New England frequency regulation market, which was recently updated in terms of allowing new technologies such as battery storage. The Stafford Hill facility was the first battery project in ISO New England territory that was accepted into the frequency regulation market, and it provided ISO New England with a solid baseline of how well a fast-acting battery could perform against a market signal.

In addition to the revenues received to directly lower costs for customers from the regulation market, the solar+storage system has been successfully deployed to mitigate our peaks. On Aug. 12, 2016, New England hit its summer peak during mid-afternoon. We dispatched our Stafford project against that peak, providing nearly 2 MW of peak-reducing value from a combination of the solar and the storage during the peak hour - saving GMP customers nearly $200,000. That amount of savings demonstrates the tremendous value of storage to lower costs for customers and forge a new energy future.

In addition to grid-scale energy storage, behind-the-meter energy storage will play an increasingly important role in our grid transformation. Leveraging this type of energy storage creates an even more granular level of control and power quality management. With tight energy platform controls connected to distributed, behind-the-meter storage, we can optimize voltage on the grid and run the system much more efficiently, such as by using a technique called conservation voltage reduction.

Conservation voltage reduction, or CVR, is a practice whereby you lower the operating voltage of the distribution system and reduce the amount of energy consumed by certain types of loads. The trick is in how to ensure that your voltage will never drop below acceptable ranges as you move further down the distribution feeder. This is typically mitigated by setting voltage regulators to take into account the drop across the distribution system and results in an uneven voltage distribution down the line. With distributed storage resources, you can begin to tap into the reactive capabilities of the inverters and provide a much smoother voltage profile across the distribution network. The potential even exists to remove traditional voltage regulation equipment such as line regulators and capacitor banks. And, of course, behind-the-meter storage will provide the host customer with a clean, quite-maintenance-free backup power system that will automatically kick in during times of outage.

Just like grid-scale storage, these behind-the-meter systems can all be aggregated and utilized to reduce peak energy demand and reduce costs for all of our customers. If there is one word that I would use to summarize energy storage, it would be “flexible.” As sure as I write this today, there will be even more value streams down the road provided by having a fast and flexible energy resource distributed around the grid. The vast majority of grid issues are resolved with either load, generation, reactive power, voltage controls or a combination thereof - energy storage can provide it all!

Going off the grid

As we began to deploy our energy home transformation offering known as the “eHome,” which is a comprehensive energy makeover focused on reducing customers’ cost and carbon while improving their comfort, it only made sense that we evolved and started offering customers a package that included battery storage and, from there, the ability for customers to go off-grid.

We look at the off-grid option as serving two main purposes: First, if a customer simply wants to disconnect - or is building and does not want to connect to the grid in the first place - we make that possible. Second, we believe there will be strategic locations across our system where it will actually become more cost-effective to serve the customer via an off-grid solution, rather than with traditional poles and wires.

Although we believe that the vast majority of customers will benefit from being interconnected to each other and sharing energy resources on the power grid, there will be pockets where it becomes more costly to maintain long, rural poles and wires in our Vermont service territory than it would be to serve customers through an off-grid solution. An example of this for GMP came in the form of a Vermont state campground. The only electrical loads at this campground were a few bathroom facilities with lights and hot water, and the park is only open during the summer months. This small amount of electricity usage still required a long, single-phase distribution line to feed it. This line required routine maintenance, such as tree trimming, and had to be put back up anytime a storm rolled through and knocked it down. It became clear that serving this small load on a seasonal basis could be easily achieved with an off-grid system, thus not only improving reliability for the campground, but also reducing costs for all of our customers by eliminating the need to maintain the line.

All of this work shows a focus on transforming our energy future; how we produce, deliver and consume energy; how we leave the planet better than when we found it; and how we improve customers’ lives through reduced cost, improved comfort and greater reliability. The grid of the future will be one that relies on many interconnected, choreographed resources all working together to turn an energy-delivery model that is barely 50% efficient today into one that is more efficient and sustainable for homes, businesses and communities.

Josh Castonguay is vice president of innovation at Vermont-based utility Green Mountain Power.
Utility-Scale Solar Pricing: Trending Down and Opening New Markets

As solar continues getting cheaper, there are both opportunities and hurdles utility-scale developers should consider.

by Kurtz Stowers & David Cieminis

Utility-scale solar system costs have steadily declined across the U.S. in recent years, falling between 14.9% and 17.4% in 2016 alone and pushing power purchase agreements (PPAs) into a range competitive with fossil fuel generation. This downward pricing trend will continue as efficiencies increase, making the price of solar more and more competitive in U.S. power markets.

Although the impressive pricing decline of recent years is projected to slow in 2017, solar at its core is a technology, and technologies generally decrease in price over time - especially considering panel technology and costs. That means utility-scale solar’s role as a competitive and attractive energy source will keep growing as the U.S. focuses on expanded domestic energy production.

This downward pricing trend is opening up new development opportunities for the solar industry, and while challenges still exist to future projects, solar developers should continue to benefit from lower costs and industry innovations.

LCOE reflects industry improvements

As project efficiencies and output expand, the cost to build and operate projects declines, resulting in a lower levelized cost of electricity (LCOE) and more competitive pricing. LCOE is a key indicator of utility-scale solar project costs and accurately represents solar’s advantages over fossil fuel generation, as it reflects the value of long-term, fixed-rate contracts compared with commodity price volatility. For instance, 8minutenergy’s Springbok solar farms in California have LCOEs between $52/MWh and $58/MWh of electricity, which are competitive with or below traditional fossil fuel generation costs.

Viewed on the whole, utility-scale solar’s price decline looks steady over time, but it has been marked by large drop-offs, followed by leveling-off periods, followed by larger step-changes. For example, 2016 was a large step-change year. The investment tax credit (ITC) extension paired with overall panel and module pricing declines, as well as lower balance-of-system costs, to make new investment and capacity increases possible.

Overall, the downward trend has not been due to one silver bullet steadily bringing down pricing; rather, all aspects of the industry have been working to drive costs down and lock in lower project costs. For instance, as operation and maintenance (O&M) has become more efficient and technological.

Data Source: Lazard’s Levelized Cost of Energy Analysis, Version 10 (Dec. 2016)
improvements paired with lessons learned have increased capacity factors, the downward trend of utility-scale solar pricing proves to be more stable.

“Thousands of steps in the right direction”

O&M efficiency is often overlooked as an aspect of utility-scale solar’s downward price trend. As solar has increased penetration in different regions across the country, O&M providers have been able to increase their utilization rates and reduce costs alongside project proliferation. So, instead of having two people working on just a couple of plants, those same two people can cover four or five projects. Because O&M costs are reduced through more efficient scheduling, less downtime for on-the-clock O&M employees, and less travel time to reach more projects, developers can offer a lower PPA price to the customer.

Technological advances have also boosted O&M efficiency. For instance, remote monitoring now reduces on-site time requirements, and improved project engineering designs lead to more resilient projects with fewer maintenance needs.

Project megawatt-hour prices have also been driven down as solar capacity factors increase with the same fixed capital costs. Improved panel efficiency is certainly among the largest factors here, but overall cost reductions come from many small lessons learned across thousands of hours of experience building projects over the years, including the following:

- Improved inverter efficiency;
- Larger inverters leading to lower overall inverter costs per watt;
- Lower-cost but higher-quality trackers creating less downtime from mechanical breakdowns and higher capacity factors;
- Lower labor costs per megawatt through more effective use of labor; and
- Better use of data to improve foundation piles for structures.

With the industry taking thousands of small steps in the same direction, capacity factors have grown significantly over time, rising from 21% in 2010 to nearly 27% in 2014.

You might also remember how changing voltage for collection led to more efficient inverters, which improved inverter efficiency and helped projects lose less output as they went through the DC-to-AC conversion. Similarly, improving project designs to optimize spacing between panel rows, as well as using slightly different single-access tracking, has increased the amount of energy produced from the same space compared with just five years ago.

Non-traditional markets

These industry trends driving prices down while increasing generation efficiency are especially promising in non-traditional markets, which have historically seen low project penetration and where utilities can now procure solar cheaper than other new generation. Just like with increased O&M efficiency and capacity factors, as projects start going into a new market, costs decline as solar expands, creating learning lessons and economies of scale that further drive down the LCOE.

Although each state’s unique environment creates different pricing scenarios, solar’s technology and hardware trends will generally remain consistent regardless of location, providing a competitive and advantageous option for utilities. In this setting, factors that account for solar’s viability include the cost of land, the cost of interconnection and the cost of labor - all of which are generally positive in non-traditional states.

For instance, across Texas and southeast states like Georgia and Alabama, land and labor are generally cheaper than in more-developed states like California or the Northeast U.S., which can make projects cheaper up front during construction. Solar demand in these traditionally underdeveloped states is often driven by utilities, making interconnection cheaper and faster, which can allow for lower cost on the back end during operation.

While promising, non-traditional solar markets also can be challenging, in that solar as an energy source is relatively unknown and may require additional partnership outreach to successfully develop a project. Working closely with utilities, landowners, local governments and environmental groups from the start can streamline development timelines, further
The 800 MW Mount Signal Solar Farm near Calexico, Calif. Photo courtesy of 8minutenergy

reducing project costs and maximizing community benefits.

Public Utility Regulatory Policies Act (PURPA) contracts are also expanding solar development in non-traditional markets, but they are subject to more volatility than voluntary utility procurement based on cost. PURPA demand has been credited with a sizable percentage of the current utility-scale solar pipeline outside of state mandates, but demand is subject to state regulatory change. We’ve recently seen this impact in Idaho or Montana, where projects were no longer financeable after regulatory changes to contract length or avoided-cost rates.

Therefore, although the PURPA opportunity hasn’t passed, it’s a risk for some business models and requires strong relationships with the key stakeholders making regulatory decisions. This tension is what makes the market both interesting and challenging, and developers that decided to go long in PURPA markets should be realistic about the fact that rules can change suddenly and quickly to turn a market from hot to cold.

**ITC step-down, rising interest rates**

Even with these overall solar pricing trends, it’s important for utility-scale solar developers to consider the hurdles still facing our industry. The December 2015 ITC extension resolved many outstanding financing concerns, but the ITC value will begin stepping down on an annual basis after 2019.

Developers will have to continue seeking efficiency gains as the ITC step-down begins in order to stay competitive on price with other resources. Similar to the wind industry, solar projects should be able to extend the 2019 ITC rate by making capital expenditures on projects by December 2019. The Internal Revenue Service has not yet issued guidance on the 2019 ITC, but analysts expect projects could still qualify for 2019 rates even if they start construction in 2020-2021 by meeting certain requirements.

The pricing trend information we’re seeing shows that forecasted declines in technology, component and soft costs all seem to be outstripping the annual ITC value reductions. Even though the ITC value will change, cost declines through continued technology and efficiency improvements should continue to more than offset scheduled reductions.

In addition to continued cost declines, corporate demand for renewables should keep utility-scale solar competitive through the ITC’s decline. A 2016 Advanced Energy Economy report found 71 of Fortune 100 companies have set renewable energy targets, and this demand often comes from large manufacturing or shipping facilities located in rural areas - which feeds back into rising utility demand for solar in non-traditional markets.

Indeed, one of the largest factors that might slow utility-scale solar’s price decline could be completely outside industry control: interest rates. We’ve been operating in a near-zero interest rate marketplace for the majority of solar’s large-scale growth, starting in 2008 through today, and many industry analysts have feared this could change moving forward via Federal Reserve interest rate increases.

However, the Fed’s March interest rate hike ironically drove 10-year Treasury rates slightly lower, from 2.6% down to between 2.35% and 2.5%. The Fed has hinted at only one or two more potential rate increases in 2017, so we’ll likely only see minor increases in expected project returns, which is reasonable and positive for the solar industry.

As developers consider potential long-term risks, they should remember to take guaranteed longer-term contracts, as opposed to considering merchant PPAs, because they are better for raising debt. Longer-term debt increases equity returns, allowing companies to increase debt and offer lower PPAs while still achieving the same internal required equity returns.

Although energy prices have increased in value between 2% and 3% over the past 10 years, recent natural gas price declines have created financing risks among which customers push for 10- to 15-year PPAs. Utilities and end users prefer these shorter-term contracts to reduce supply-side risk, but they could be discounted toward the end of their contract terms, quickly deteriorating overall project economics if energy prices change before PPA expiration.

**An undeniable outlook**

In this era of rising capacities and declining costs, solar has unmatched benefits as an energy source. Not only does it provide valuable on-peak power, but it also requires a considerably smaller land footprint than wind projects, making finding suitable siting locations easier with lower property acquisition costs and minimal environmental impacts.

We’ve come a long way in solar adoption, and at less than 2% of national electricity generation, we can continue to gain market share. This outlook will only improve as solar-plus-storage hybrid projects start to spread, allowing sales to shift from peak to later parts of the day and revenue from ancillary services, with even greater capacity factor improvements. It’s exciting to contemplate what the future of America’s solar industry holds, but as a whole, the future of utility-scale solar project pricing is undeniably bright.

Kurtz Stowers is vice president of origination and David Cieminis is director of origination at independent solar power developer 8minutenergy.
A new 3.9 MW solar installation built atop Boston Business Park is expected to help the University of Massachusetts, Boston (UMass Boston) avoid up to $5 million in energy costs over the next 20 years through virtual net metering, according to Borrego Solar Systems.

National Development, Altus Power America and Borrego have announced the completion of the large rooftop solar array at Boston Business Park, which straddles the Boston/Dedham line and is home to several warehousing and distribution companies. The solar project is expected to generate 4.8 million kWh of energy annually.

“We were thrilled to work with Altus Power and Borrego Solar on such a landmark installation - one of the largest solar installations in New England - which not only adds a great deal to the property but, more importantly, fulfills a major goal of National Development to make our buildings as sustainable as they can be while being innovative in the process,” says Andrew Gallinaro, senior vice president of asset management at National Development, which owns Boston Business Park.

Altus Power owns the solar installation and will sell the energy produced to UMass Boston through a net-metering credit purchase agreement. Virtual net metering is a utility billing mechanism that enables the off-taker to receive energy credits on its utility bill from a remotely located installation.

“Powering up this solar system and starting to deliver clean energy savings to UMass Boston marks an important milestone for Altus Power and our development, construction and real estate partners,” says Gregg Felton, managing partner of Altus Power.

Borrego Solar built and developed the array, and Jared Connell, the company’s Massachusetts director of project development, states, “This project demonstrates the remarkable evolution of Massachusetts’ solar market. When we began developing and installing solar here in 2007, there were only 3 MW of operational solar plants and virtual net metering had just been enacted. We’re now able to cost-effectively construct massive rooftop projects that provide significant economic and environmental benefits for all stakeholders.”

Competitive Energy Services (CES) advised UMass Boston on this solar project. “CES has assisted UMass Boston with energy-related issues since 2011,” explains Zac Bloom, director of sustainability for CES. “The five UMass system campuses combined are the largest off-takers of virtual net-metering credits in the commonwealth, and the 3.9 MW solar array at the Boston Business Park will be one of the final PV systems installed in their portfolio, bringing their total off-take to about 50 MW.”

Bloom adds, “The solar array will provide important financial savings to the university, and UMass is thrilled to help yet another solar project reach commercial operations in Massachusetts.”

S-5! Clamps Secure Panels For Congregation Project

Utility costs in Hawaii are among the highest in the U.S., so it’s not uncommon to see solar panels installed as part of larger projects in order to take advantage of the state’s plentiful sunshine. After repairing a 30-year-old standing seam roof, the
Word of Life Christian Center in Honolulu installed an 82 kW solar array, attached with clamps from S-5!

To cover the cost of the roof repairs, as well as the crystalline solar panels, the Word of Life Christian Center entered into a power purchase agreement under which any unused electricity is sold back to the local power company. This required no money down and allowed the congregation to save money from day one. The solar system consists of 241 340-W P17 modules from SunPower, each secured with Mini Clamps from S-5! Almost 50% of the roof is covered with solar panels, and the system is projected to produce 124.9 MWh in the first year.

“After the roofing work was completed, we installed the solar panels in three different portions of the roof,” explains Kurt Blum, project manager for installer Hi-Power Solar. “They were mostly southwest and southeast facing, but there was also a northwest-facing roof.”

Blum adds, “It was a pretty straightforward install. We had to work around some HVAC equipment, but that’s on almost every job. We used the S-5! clamps because they’re easy to work with and they don’t penetrate the roof. The roofer was on-site a couple times, making sure we weren’t messing up his work.”

Blum says the aluminum S-5! clamps stand up to the salty air of the island, and before any installation, the roofer coated the entire standing seam roof and gutter system with Gaco Roof Coating to improve water tightness. The solar panels were attached with approximately 450 S-5-U Mini Clamps with the DualRack Standard Rail. “Hawaii occasionally has some hurricane-force winds, so it’s important to have a properly engineered system,” concludes Blum.

GE Unit Builds Solar Throughout Northeast

Through its Current subsidiary, General Electric (GE) has been building solar projects both for itself and for a diverse range of customers in the U.S. Northeast. The global conglomerate first established Boston-based Current in late 2015 as a start-up unit to integrate GE’s solar, energy storage, LED and electric vehicle businesses. According to GE, Current now has a solar project portfolio of more than 17 MW. That includes a mix of solar carport and ground-mount projects under way or completed in several northeastern states.

“The clean energy movement continues to surge ahead, and businesses all over the Northeast are leading the charge, including right here at GE,” says Erik Schiemann, general manager of solar at Current. “Smart companies are realizing that solar isn’t just good for the environment, but it can help their bottom lines, too.”

GE says it has invested in on-site solar installations through Current at eight of the parent company’s own regional facilities, including in Bridgeport, Conn.; Lynn, Mass.; Marlborough, Mass.; Billerica, Mass.; Hooksett, N.H.; Schenectady, N.Y.; North Greenbush, N.Y.; and Rutland, Vt. These installations add up to more than 9.4 MW of solar carport and ground-mount power for a total savings of more than $13.8 million across the sites, according to GE.

In addition to the projects at GE facilities, Current is working on or has recently completed solar installations for outside customers in the Northeast, including the following:

• Partners Healthcare’s Spaulding Rehabilitation Hospital Cape Cod in Sandwich, Mass., will debut a 1.1 MW carport and ground-mount installation that will produce the equivalent of 70% of the hospital’s electricity consumption. The healthcare provider is also installing two carports at its Newton-Wellesley Hospital facility, which will save more than $4.4 million in energy costs.

• Life care provider Seabury has installed solar ground-mount solutions to save more than $600,000 at its Life Plan community in Bloomfield, Conn.

• Smith & Wesson’s new 2.6 MW solar carport project at its Springfield, Mass., industrial facility will provide approximately 10% of the site’s energy needs and offers a lifetime savings estimated at $2.8 million. The site also upgraded its lighting to more efficient LEDs from Current, further reducing energy consumption and energy costs.

• The Town of Wallkill, N.Y., commissioned a 2.4 MW solar plant on a capped landfill, which will provide more than $2 million in savings.

East Windsor Township Flips Switch On Project

Officials in East Windsor Township, N.J., recently completed a new solar project at the township’s police court building. According to a press release, the 448 kW solar array is located to the rear of the municipal building on land donated to the township for this purpose by McGraw Hill.

Mayor Janice S. Mironov explains, “The solar array is designed to generate 577,093 kWh of electricity annually, offsetting nearly 100 percent of the police court building’s energy use and resulting in a savings to the township of approximately $527,933 over the 15-year term of the agreement. The township selected this site noting it is the most energy-intensive municipal building user, as it operates on a 24/7 basis and, therefore, provides the greatest opportunity to realize financial savings.”

Mironov adds, “This project, completed at no cost to our taxpayers and delivering more than a half-million-dollar cost reduction, is a prime example of ‘going green and saving green.’”

Under the terms of a power purchase agreement (PPA), East Windsor will pay the project owner $0.0585/kWh, approximately half of the rate the township currently pays to Jersey Central Power & Light. After the initial 15-year period, the township retains the option to renew the agreement for two additional terms of five years each. If the township chooses to extend the PPA, savings to East Windsor taxpayers could exceed $1 million.
New this year - SPI is co-located with North America’s largest storage trade show, Energy Storage International (ESI), and Hydrogen + Fuel Cells North America. The updated Smart Energy Microgrid Marketplace moves indoors to connect all things energy. Here’s what you can expect this year:

» **18,000+ attendees:** Installers, contractors, C&I professionals, energy storage companies, project developers, utilities and more.

» **650+ exhibitors:** From solar to storage and smart products.

» **50+ international delegations:** We’re working with the USDOC to bring foreign delegations to SPI.

» **24 hours** of dedicated networking opportunities.

» **All in one location:** Everything takes place at the Mandalay Bay Convention Center

Register today at www.solarpowerinternational.com
The Top 10 PV Tracker Suppliers Of 2016

NEXTracker and Array Technologies Inc. (ATI) “remain far and away the leading suppliers of PV tracker systems globally,” according to IHS Markit analysts. In a new research note, the analysts rank the top 10 PV tracker suppliers of 2016, a record-breaking year for the solar industry overall, and provide an outlook for the global tracker market.

IHS Markit’s Camron Barati tells Solar Industry, “Overall, the global PV tracker market grew in 2016, as more developers and [engineering, procurement and construction (EPC) contractors] continue to adopt tracking solutions for their utility-scale projects to take advantage of the improved levelized cost of energy (LCOE) of such systems.”

The U.S. was the biggest PV tracker market worldwide, but Barati notes, “Asia joined the Americas in reaching the gigawatt-scale market size for PV trackers in 2016, with the EMEA region lagging behind, primarily due to the lower level of utility-scale demand in such markets. The EMEA region will likely experience significant growth for tracker solutions as utility-scale demand grows, particularly in emerging markets in the Middle East.”

As for the top 10 tracker suppliers, Barati explains, “NEXTracker and Array Technologies collectively shipped over 5 GW DC of PV tracker components globally in 2016, accounting for nearly 50 percent of the global tracker market during the year in terms of product shipments.”

Written by Barati and IHS Markit analyst Cormac Gilligan, the research note says NEXTracker supplied the most distributed systems, which made up two-thirds of shipped trackers among the top 10 suppliers, and ATI supplied the most centralized systems, which accounted for the remaining one-third of products shipped among the leading companies. Ultimately, IHS Markit ranks NEXTracker the No. 1 tracker supplier of 2016.

Although First Solar ranks third on the list and “maintained shipment levels at the gigawatt scale,” according to Barati, the vertically integrated solar company lost tracker market share last year. The research note says, “This has coincided with First Solar’s announcement to downsize its EPC business and to exit the structures market in 2016.”

Ranking sixth, SunPower, another vertically integrated solar company, also lost tracker market share. Barati says this is mainly “a result of the company’s utility-scale project deployments with its turnkey Oasis solution, which has historically depended on the lumpiness of the company’s development business, but may be less tied to self-developed products in the future.”

The research note points out that Arctech and Convert Italia rose to the top five in 2016, thanks to “success in emerging tracker markets outside of the United States in Latin America, the EMEA region and India.”

Aside from NEXTracker and ATI, the study says GameChange Solar, Soltec and Sunlink saw the most growth in the U.S., the world’s largest tracker market. However, because the U.S. PV market is expected to experience a slump in 2017, the research note says that “developing international markets for trackers will be key for maintaining growth, along with developing niche solutions for small-scale applications and sites with less-than-ideal land types (uneven terrain, obstructions, etc.).” Primed international markets, according to the analysis, include Mexico, Brazil, Turkey, Jordan, Australia and India, among other regions.

Looking forward, Barati says, “Growth for the PV tracker market is expected globally in the years ahead, particularly in markets outside of the United States in Asia and Latin America as suppliers continue to convince developers and EPCs to utilize their solutions in light of the demonstrated benefits in terms of higher generation yields and broader power production over the course of the day versus fixed-tilt systems.”

He adds, “Pricing will be the primary barrier for many growth markets, but such issues are already being solved by the large international suppliers and domestic market entrants.”

- Joseph Bebon

Yaskawa - Solectria Solar Partners With Sunworks

Yaskawa - Solectria Solar, a U.S. commercial PV inverter manufacturer, has announced a partnership with solar systems provider Sunworks.

Sunworks will install co-branded PVI 50/60TL transformerless three-phase string inverters, which are a part of Yaskawa - Solectria Solar’s commercial string inverter line. Sunworks will continue to utilize other Yaskawa - Solectria Solar commercial products in addition to the PVI 50/60TL depending on project needs.

“Sunworks has initiated its ‘Powered by’ program, which is tailored to exceed customer expectations, reduce installation time and enhance production. Yaskawa - Solectria Solar was chosen after extensive evaluation to be our partner of choice for this program,” comments Robert Lopez, Sunworks’ vice president of procurement.

The alignment of the two solar companies aims to create new opportunities and benefits for customers. Sunworks will begin installing Yaskawa - Solectria Solar inverters in a 2.8 MW ground-mount project located in Buttonwillow, Calif. Yaskawa - Solectria Solar says its PVI 60TL solution helps optimize BOS, reduce labor costs and maximize energy harvesting for customers.
North America’s Most-Attended Solar Event
Moscone Center, San Francisco

- Hear it here first! Be part of the first major U.S. solar event of the year
- 18,000 visitors connect with 550 international exhibitors
- The perfect match! Intersolar is co-located with ees (electrical energy storage)
New York VDER Order Is An Important First Step

In March, the state of New York reached a milestone. The first phase of the Value of Distributed Energy Resources (VDER) order was approved by the New York Public Service Commission (PSC), setting the state on a path toward a modern system with clean energy and customer participation at its core.

There were several reasons to celebrate this progress, especially in the near term, but there were also a few areas of concern.

On the bright side, New York’s smaller rooftop solar customers can now rest assured that net metering will remain in place. This order allows residential and small commercial rooftop customers to be fully and fairly compensated for years to come for the valuable clean energy they deliver daily to the grid.

Additionally, large commercial customers already connected to the grid and certain community solar projects that have progressed toward completion will be grandfathered into the current rates. These types of actions are the steps this industry needs to be successful because they provide regulatory certainty and strong market fundamentals.

We were also pleased to see a directive in the order for the New York State Energy Research and Development Authority and the New York Green Bank to further invest in solar growth and expanded access. This will help secure affordable financing so the benefits of clean energy can be felt throughout the entire state, including in underserved communities, which will still need additional measures.

And with ambitious goals such as Gov. Andrew Cuomo’s NY-Sun goal of 3 GW by 2023 and the state’s overall clean energy standard goal of 50% renewables by 2030, improvements like these are essential.

That said, there is still room for improvement. Although the order begins the process of identifying the economic and social benefits that distributed resources, like solar, provide to the state and the grid (an important goal of New York’s Reforming the Energy Vision process), it doesn’t establish a fair compensation rate that reflects the full and actual value for new community solar development - or for municipal and larger commercial solar projects. For instance, the new rate significantly undervalues the way distributed solar reduces the need for costly grid upgrades.

We fear this will hinder solar access for low-income customers, along with upstate residents and businesses, as it will be hard for many New Yorkers to access the benefits of solar if they can’t install it on their own roofs.

And though rooftop solar is a great option for many, some of New York’s energy consumers - including low-income families, renters, and homes or businesses with a shaded roof - face physical or financial barriers to going solar through the rooftop model. A successful program should enable customers to cost-effectively take part in a shared solar energy project.

So, although we applaud the PSC for its collaborative process and the Cuomo administration for its commitment to building a robust solar industry, which today supports more than 8,100 New York jobs, there is still work to do.

The phrase may be “in a New York minute,” but we’re hoping state leaders take some time with this one to make sure this program is implemented in a way that expands clean energy access and its benefits to all New Yorkers, and we’re looking forward to working together to make that vision a reality.

- Sean Gallagher

Ohio House Passes Repeal Of Renewables Mandate

Here we go again: Only a few months after Gov. John Kasich, R-Ohio, vetoed a similar bill, Ohio lawmakers have advanced new legislation to repeal the state’s renewable energy mandate.

In June 2014, Ohio became the first U.S. state to roll back its clean energy mandates after passing a law that implemented a two-year “freeze” on the state’s Alternative Energy Portfolio Standard. Last year, the Ohio legislature passed a bill that would have effectively extended the freeze by turning the requirements for utilities to purchase renewables and invest in energy efficiency into voluntary goals, with no compliance obligations, through 2019. However, Kasich vetoed the bill last December, thus reinstating the utility mandates on Jan. 1.

Seemingly determined, though, the legislature has redoubled its efforts to do away with the standards. In a 65-31 vote at the end of March, the Ohio House of Representatives passed H.B.114, a bill that again aims to repeal the renewable energy
mandates and instead make them optional goals. H.B.114, which also targets state energy-efficiency requirements, has gone to the Ohio Senate for consideration.

In a blog post, the House Republican Caucus refers to H.B.114 as a “pro-business bill” that “encourages economic growth [and a] free-market system.” Bill sponsor Ohio State Rep. Louis W. Blessing III, R-Colerain, says he is “pleased” with the bill’s passage and is looking forward to “more spirited discussion as it heads to the Senate.”

In a separate blog, House Democratic Leader Fred Strahorn, D-Dayton, speaks out against the bill, saying, “If Ohio's economy is on the 'verge of a recession,' as the governor has claimed, rolling back state renewable energy standards will threaten future job growth and could harm consumers, workers and the environment.”

National business group Advanced Energy Economy (AEE) claims H.B.114 is objectively worse than H.B.554, the bill vetoed by Kasich last year. According to AEE, H.B.114 would deprive the state of $10 billion in advanced energy market opportunities created by the re-instatement of the state's standards on Jan. 1.

Oregon Solar Program Selects Winning Projects

Business Oregon, a state economic development agency, has approved 15 utility-scale solar energy projects to enroll in the new Solar Development Incentive program.

Created in the 2016 Oregon legislative session, the program encourages development of 2 MW to 10 MW solar photovoltaic projects in Oregon by providing an incentive per kilowatt-hour of electricity generated. The agency says the utility-scale solar sector is nascent in Oregon; therefore, developers face higher costs by being the first to take on such projects in the state.

According to Business Oregon, qualified projects in the program will receive a monthly payment of $0.005/kWh for up to five years. The program is capped at 150 MW worth of projects, but the 55 applications that Business Oregon received totaling 293 MW of solar energy capacity.

The 15 projects selected to date represent 116 MW of the total 150 MW capacity and are mostly located in central, southern and eastern Oregon. The agency says additional award announcements from the application pool are forthcoming, but because this is a one-time enrollment incentive program that closed in January, Business Oregon is no longer accepting applications.

To date, the awardees include the following: Coronol Energy, with two projects totaling 20 MW; Cypress Creek Renewables LLC, with three projects totaling 23 MW; ET Solar, with three projects totaling 28 MW; NextEra Energy, with one 5 MW project; Obsidian Renewables LLC, with two projects totaling 18 MW; Pine Gate Renewables, with two projects totaling 11.9 MW; SolarCity, with one 8 MW project; and Sunthurst, with one 2 MW project.

Utah Sounds Death Knell For Solar Incentive

Utah Gov. Gary R. Herbert has signed into law a bill that will fully phase out the state's residential solar tax credit.

Utah homeowners can currently claim a $2,000 income tax credit for installing rooftop solar, but the new law will drop the incentive to $1,600 in 2018 and decrease the available amount by an additional $400 each year, until the solar tax credit is completely eliminated after 2021.

Bill sponsor Republican State Rep. Jeremy Peterson cited state budget concerns and argued Utah’s growing solar industry no longer needed the tax credits to thrive. In February, local solar advocates considered the phase-out a compromise and decided not to contest the bill, with Ryan Evans, president of the Utah Solar Energy Association, telling the Salt Lake Tribune, “Solar energy is becoming more and more affordable every year, and I think we can absorb this.”

Nonetheless, solar groups remain concerned about other policy issues that might hinder solar in Utah. In November, for example, utility Rocky Mountain Power (RMP) proposed controversial changes to the utility’s net energy metering (NEM) program for new rooftop solar customers. A group of solar companies denounced the plan, and the proposal is scheduled for regulatory review later this year. Solar Industry's February 2017 issue featured an op-ed by an RMP representative, titled “In Defense Of NEM Changes.” In it, the author explained RMP’s reasoning and declared, “We are interested in working with the solar industry in finding a path forward that is fair to all customers.”

Advertiser Index

<table>
<thead>
<tr>
<th>Advertiser Name</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aten Solar</td>
<td>34</td>
</tr>
<tr>
<td>Atkore International</td>
<td>7</td>
</tr>
<tr>
<td>DPW Solar</td>
<td>8</td>
</tr>
<tr>
<td>Ecobilium Solar</td>
<td>19</td>
</tr>
<tr>
<td>ICC Evaluation Service LLC</td>
<td>18</td>
</tr>
<tr>
<td>Hercules Machinery Corp.</td>
<td>9</td>
</tr>
<tr>
<td>Mission Solar Energy</td>
<td>35</td>
</tr>
<tr>
<td>PMC Industries</td>
<td>12</td>
</tr>
<tr>
<td>Quick Mount PV</td>
<td>2</td>
</tr>
</tbody>
</table>

S-5! ................................................ 17
Shoals Technologies Group .......... 36
Solar Power International .......... 29
Intersolar North America .......... 31
SolarRoofHook .......................... 5
Soltec .......................................... 13
Travelers Insurance .................. 11
2017 Northeast Drone Show .......... 27

Irradiance Sensors
& Temperature Sensors
Available in RS485 Modbus
and Analog Ranges
Made in Germany.

IMT Solar™
(716) 276-8466
IMTSolar.com

MAY 2017 ▶ Solar Industry 33
Renewables To Persevere Amid CPP Rollback

On March 28, President Trump formally shifted direction in U.S. climate and energy policy with the release of an executive order to review and likely attempt to roll back the U.S. Environmental Protection Agency’s Clean Power Plan (CPP), as well as other climate executive actions. Aimed to reduce carbon pollution from existing power plants, the CPP was the cornerstone of President Obama’s climate policy to transform the nation’s power sector and deliver on the country’s commitments outlined in the Paris Climate Agreement. Interestingly, the Trump order was largely silent on whether the U.S. should stay or withdraw from the accord - though later reports indicate the White House could make a decision on the pact in advance of the G-7 meeting.

As we wait for the full picture of Trump’s energy policy to take shape, it’s important to take stock on what the likely demise of the CPP will mean for the booming renewable energy sector. There is no denying that long-term investment in the nation’s renewable energy infrastructure would have benefited from the CPP’s goal of reducing carbon-dioxide emissions from the power sector by 32% by 2030. The near-term reality, however, is that the president’s order is unlikely to impact the continued growth in the renewables industry.

Renewable energy provided 70% of the nation’s electricity capacity additions over the past two years, with more than 22 GW of new solar and wind generation installed in 2016 alone. In fact, the renewable energy sector garnered a whopping $96 billion in investments over the same period and is currently the largest source of private-sector infrastructure investment in the U.S. This growth has created hundreds of thousands of new jobs and generated hundreds of millions of dollars in tax revenue for local communities, mostly in remote rural areas. This market momentum will no doubt continue, with more than 90 GW of solar and wind contracted or expected to be installed over the next five years.

What’s driving this growth? The simple answer: economics! America’s renewable energy industry is growing rapidly because of declining costs and increasing demand by residential and corporate electricity consumers alike - a trend that will continue for the foreseeable future, aided by bipartisan federal tax policy and forward-looking red- and blue-state policies.

Of course, any federal energy policy limiting carbon would help renewables. Yet even without a regulatory mandate, the current renewable energy growth trajectory being driven by competitive power market economics suggests we may be able to stay on track with the CPP’s original emissions-reduction objectives. The renewable energy sector will continue to be a major source of modern, price-competitive and virtually emissions-free power. That’s a win-win-win - for consumers, system reliability and the environment.

Furthermore, Trump is a businessman and a politician. He has surrounded himself with a number of other notable businessmen and advisors, including Energy Secretary Rick Perry, who are well versed in the role of renewables as an infrastructure and power generation engine of investment and economic growth. In April, Perry said, “We are committed to developing, deploying and commercializing breakthrough technologies and developing the necessary policies that will help renewables become competitive with traditional sources of energy.” This is an encouraging sign from an administration that will need to work with Congress to decide on whether to move forward with a truly “all of the above” energy strategy, which includes a major role for renewables.

We are also looking ahead to possible tax reform. Renewable energy incentives are scheduled to ramp down; meanwhile, conventional energy tax incentives are permanent. Tax reform will offer the opportunity to update tax and energy policy to drive more investment in energy infrastructure and innovation. Will the administration and Congress invest in continued renewables growth and ensure a level playing field? Let’s stay engaged to ensure as much.

Todd Foley is senior vice president of policy and government affairs at the American Council On Renewable Energy.

---

We Buy and Sell Surplus Solar Products

Lower than Manufacturer’s Pricing!

Due to volume purchasing, we also secure lower fixed pricing on new products!

Aten Solar • 800-310-7271 • atensolar.com
Our solar modules combine state-of-the-art technology with unprecedented quality. And we do it right here in the USA.

With high-powered panels up to 360W, our modules are ideal for rooftop installations.
Wire Harnesses... Simplified.
You tell us which installation set-up you prefer... a traditional combiner installation, or our simplified bla installation like this. We have engineered solutions for both AC & DC systems. The choice is yours, we just want to be part of your next project!

Shoals offers a complete Balance on Tracker solution, including:

- Shoals Tracker
- bla (Big Lead Assembly)
- Shoals Interconnect System
- SnapShot Monitoring