

May 2016

EDGE Advisory

Distributed Energy Finance Report



EDITOR'S INTRODUCTION:

View from the EDGE

Welcome to the EDGE Advisory: Distributed Energy Finance Report for May 2016. Technology, financing and market innovations are disrupting the energy markets and creating massive opportunities for deployment of distributed energy projects and services. EDGE Advisory provides current market intelligence on the distributed energy markets, updates on federal and state developments impacting the markets, and interviews and insights of industry experts. We focus on the cutting edge of the ongoing energy transition, where market and business innovations take place.

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Jim Wrathall, Elias Hinckley and Merrill Kramer, Editors

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- The Future of NY-REV: A New Model for Distributed Energy in New York
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Yieldco Mathematics: How Better Financial Modeling Can Improve Yieldco Prospects – A Conversation with David March, Managing Partner, Entropy Investment Management LLC

In 2013 yieldcos began their exponential climb as a financing vehicle for energy projects. Yieldcos were touted as a transformational vehicle for unlocking value in electric generation assets and reducing capital costs. In 2015 the yieldco market crashed down to earth, dropping 43 percent in average value. The tailspin has continued into 2016.

While some investment managers are questioning the yieldco model, yieldco managers are largely reaffirming their value in the market. In a recent investor call, Michael Garland, CEO of Pattern Energy, a large independent power company, said, “We believe [the recent volatility] is very healthy for Pattern and the sector, as it allows us to highlight the strength of our corporate strategy, the robustness of our cash flows and soundness of our growth strategy.” Other yieldcos, including NRG Yield, 8point3 Energy Partners, and Abengoa Yield, also have reaffirmed their commitment to the model and expectations of renewed growth in 2016.

How can yieldcos regain investor confidence? Yieldcos are intended to provide investors with an attractive dividend plus growth, while providing an accessible and attractive source of capital to the energy developer to improve earnings and operations. Do Yieldcos really achieve their goals?

Sullivan & Worcester’s Elias Hinckley caught up with Dave March of Entropy Investment Management to discuss the yieldco markets and the challenges that exist from a developer’s perspective.

MR. HINCKLEY: Entropy sells a lot of operational generation assets into the market, so clearly you are paying attention to the changing landscape for yieldcos and have some thoughts on that part of the market. What would be really interesting is your perspective on what went wrong, or that the market is getting wrong about yieldcos.

MR. MARCH: I have thought about this model and what parts work and what parts don’t work. I wanted to better

understand the value and equity pricing of a yieldco and so put pencil to paper to attempt to derive the mathematics underlying these businesses. My motivation was to identify strategic aspects a yieldco might be able to exploit in order to help differentiate themselves in the market and provide a more robust and compelling value creation story.

MR. HINCKLEY: So rather than a purely theoretical exercise, you decided to test and prove a value story for yieldcos?

MR. MARCH: Right, I wanted to actually codify the mathematics which define a yieldco’s value. I laid out a clear set of generators:

1. **Dividend Value.** The base asset group, over the productive life of the asset pool, assuming a declining energy production rate, due to panel degradation (solar), wear, and induction loss (wind). To simplify, I created a composite average asset rather than integrating across all assets.
2. **New Asset Purchases.** This is the value of new assets acquired from the excess cash from the IPO over the amount needed for working capital.
3. **Reinvestment.** Reinvestment of non-distributed cash flow into new assets. It assumes reinvestment into assets that closely mimic the composite asset described above.
4. **Operational Efficiency Gains.** This is improvement in cash flow based on better performance and lower operating costs generated by the consolidation (economies of scale) and focused management.
5. **Developer Cost Improvement.** The amount that the developer is able to reduce development and construction cost by their partnership with the yieldco and how much the developer will share with the yieldco from that improved cost basis.

And I made a couple of other assumptions for simplicity:

- I ignored currency risk on the assumption that currency exposure can be effectively hedged as part of the operating management.
- I also ignored differential counterparty risk. I assumed that the asset portfolio is sufficiently large to mitigate, and the simple fact that I don't think the market will support the IPO if counterparty risk management is poor.
- I ignored interest rate effects, because these will have a uniform impact on all yieldcos and so won't be a good basis for differentiation across the yieldco sector.

yieldco will have no differential financial value. The more integrated the development process and the better and more effective control of costs, the higher the potential growth derived value of the firm. If independent developers are used the yieldco must "share" these savings in a significant way so that the developer is committed to selling the assets to the yieldco (this may require some form of development and or construction financing supplied by the yieldco). Finally the yieldco must find ways to enhance the productive life of the assets; as long as an asset makes a positive marginal cash contribution the activity should be continued.

MR. HINCKLEY: That certainly brings a much more quantitative approach for yieldcos to consider. Hopefully some of the managers will pick up on this approach. Thanks Dave.

The calculation looks like this:

$$\lambda_1 \times \left\{ \frac{D_i \times (1 + P_o)}{(1 + e_d)} \times \left[1 - \left(\frac{1 + e_d}{1 + i} \right)^n \right] \right\} + \lambda_2 \times \left\{ \frac{(T_c - WC_r) \times D_i \times (1 + P_o)}{(1 - e_d)} \times \left[1 + \left(\frac{1 + e_d}{1 + i} \right)^{n + dt} \right] \right\} + \lambda_3 \times \left\{ \frac{FC - D_i - dWC_r}{(i + e_d)} \right\} + \lambda_4 \times \{(PMV - C_D) \times S_D\}$$

MR. HINCKLEY: So that's a lot more rigor than we've seen in trying to show the best value proposition for a yieldco. What did you find?

MR. MARCH: First, a yieldco should focus on improving operating cost structure and cash flow returns. Second, a yieldco should focus on driving down development and construction cost. The relationship between the yieldco and the project or pipeline development must create further synergy as compared to efficient external markets, or the

SunEdison's Bankruptcy Filing

On April 21, SunEdison – which created two yieldcos – TerraForm Power and TerraForm Global – filed for Chapter 11 bankruptcy protection. Facilitated by an energy market awash in plentiful and relatively cheap money, SunEdison accumulated debt to unsupportable levels as the result of an overly aggressive acquisition strategy. While there was plenty of appetite for growth within SunEd, the staggering pace of buying was done largely to build a pipeline of assets that could be sold into its affiliated yieldcos.

As of this writing, both TerraForm Power and TerraForm Global remain outside of the bankruptcy proceeding. Both have asserted they have adequate liquidity to continue operations and that the yieldcos' assets will not be available to satisfy SunEd's creditors in bankruptcy. The yieldcos have the benefit of owning both hard assets and long-term streams of revenue, though whether they can remain free of SunEd's bankruptcy (and TerraForm Power's obligation to buy assets as part of SunEd's acquisition strategy will no doubt receive scrutiny from SunEd creditors) remains to be seen.

Key:

D_i	Dividend
P_o	Productivity Increase in Operations
E_d	Energy Decline per year
T_c	Total Cash Balance from IPO
WC_r	Working Capital Requirement: How much of total cash must be kept for working capital
n	productive life of asset
dt	increase in productive asset life for the newly acquired assets from the excess IPO cash
FC	Free cash flow after tax
dWC_r	change in working capital requirement as asset base grows. Basically the ratio of working capital to total assets.
PMV	Private Market Value: What an asset would sell for in a private market exchange
C_D	Developer's cost in the asset
S_D	Sharing percentage of the developer to the yieldco. The developer will have lower costs as part of the yieldco. Defines how much of the savings the developer shares with the yieldco.
λ_i	Lagrangian Multipliers

NEW YORK'S REFORMING THE ENERGY VISION— OPPORTUNITIES AND OBSTACLES ON THE HORIZON

By Joshua L. Sturtevant

We have written about the backdrop of NY-REV in previous issues of the EDGE Finance Advisory. This update discusses the opportunities and obstacles emerging as the proceeding is unfolding.

The Reforming the Energy Vision (REV) docket opened by the New York Public Service Commission (PSC) is an attempt to prepare for a more resilient and energy-efficient future. REV's major thrust is to create a decentralized and resource-diverse power supply system that is less susceptible to disruption caused by a single event. The goal is a more dynamic and reliable system.

REV seeks to encourage adoption of Distributed Energy Resources (DERs), which are defined to include both energy efficiency measures and distributed generation resources. To further this goal, the program includes incentives for installation of fuel-efficient power units, development of renewable resources such as solar and wind, and development of microgrids and community solar approaches. With the influx of DG energy, the PSC envisions a marketplace where generation owners can participate by providing their generation to the grid, and where customers will be able to compare and choose providers of energy.

On the other side of the equation, incumbent utilities will continue in their role as distributors of energy, but will also step into the role of marketplace operators. The utilities have agreed to act together in a new capacity, as a Distributed System Platform (DSP), that will serve as a neutral gatekeeper



between the providers and buyers of energy. The DSP's function will be to coordinate grid-wide DER activities as a market administrator, almost as a "mini" distribution-level independent system operator (ISO). The proposed reforms redefine the role of public utilities and redistribute some of their functions, while recognizing that "macrogrid" entities still serve a public interest purpose in a decentralized power world.

In addition to setting forth the DSP/DER framework, the PSC Order initiated proceedings on a number of other REV-related items that would need to be addressed to ensure the success of the new approach. The other items include net metering, community net metering, community choice aggregation, low-income

affordability, new functions for the Green Bank (a state-sponsored financial entity working to increase private investment in clean energy), the development of a Clean Energy Fund, interconnection, and microgrids, among others. The PSC is currently in the midst of stakeholder engagement to flesh out the on-the-ground realities of how a DER-centric market model will operate. Below we describe the directions being taken at this point in the process.

Distributed System Platforms (DSPs)

The DSP role is envisioned to be filled by the incumbent utilities. The DSP will be positioned between the DERs and retail customers (which

will sometimes be the same entities) on the one hand, and, on the other, the New York Independent System Operator (NYISO), which is the bulk wholesale market used by utilities and other wholesalers to buy and sell power, transmission, and ancillary services.

The DSP will serve as a marketing platform and trading clearinghouse for buyers and sellers of DER output. The DSP will also support use of DERs by providing information, communications, interconnection, and dispatch services. The utility, as the physical grid operator in its “mini ISO” role, will have the real-time ability to dispatch the entire system, including DERs. Key to REV is the idea that utilities’ financial incentives will be realigned to ensure efficient and

effective distribution of the power generated by DERs. Therefore, rates will be developed that reward utilities for successfully providing enhanced services that meet the policy goals of REV. To ensure independence in the system, utilities that serve in the DSP role will be prohibited from owning DER resources except under limited circumstances.

Distributed Energy Resources (DERs)

On the other side of the generation/distribution coin under REV are the DER providers. Under REV, DERs include not only combined heating and power (CHP) systems, cogeneration, renewables such as solar, wind, and biomass, but also energy efficiency,

conservation, and demand response systems. In the interest of resiliency, the REV program encourages all energy users, and particularly large commercial users such as hospitals, universities, hotels, offices, and residential buildings, to install DERs. In some cases, therefore, end-use consumers will also own DERs.

The online interface operated by the DSP will empower customers to choose the source of their electricity, and will likely give the utility information to balance grid load and potentially plan for DER infrastructure improvements based upon the available resources. Pricing of DER outputs and utility charges under the DSP model will require an adjusted measure of rate setting, with different inputs for cost recovery. The process of determining pricing mechanisms is currently underway as part of Track Two of REV.

Uniform interconnection procedures will be necessary to allow DERs to interact with the larger grid, a key underpinning of REV. Utility interconnection capabilities will be instituted in two phases: phase one will be oriented toward streamlining approval processes for smaller distributed generation projects such as residential solar, and phase two will be oriented toward a comprehensive ability to integrate interconnection processes into system planning and operation. Interconnection has been identified as a key issue with respect to DERs, but also provides some potential pitfalls as discussed below.

Hurdles to Overcome

While REV potentially creates opportunities for market participants and customers, it faces significant challenges. Several identifiable hurdles will need to be overcome if the initiative is to achieve ultimate success, including:

The New York Green Bank (NYGB), a division of the New York State Energy Research and Development Authority (NYSERDA), is a state-sponsored financial entity which works directly with private institutions to help stimulate investment into the clean energy sector. The NYGB has been active in recent months. Publicly announced portfolio projects include:

- \$5.5 million to municipalities participating in New York’s property-assessed clean energy (PACE) program
- \$4.0 million in revolving construction loans to support New York-based United Wind’s installation of over 160 distributed wind energy projects
- \$25.0 million to support a new warehouse credit facility for Level Solar, a residential solar installer
- \$20.0 million to Renew Financial to allow it to expand its consumer lending program in New York

NYGB is positioned as a major component of NY—REV. While NY—REV is currently in the planning stages, the NYGB’s influence has already been felt – as of year-end 2015, market participants have proposed over \$1.0 billion in investments to the NYGB, which corresponds to approximately \$4.0 billion in clean energy projects once private capital is accounted for.

1. **Ensuring collaboration between stakeholders.** The PSC has implemented an efficient and inclusive stakeholder feedback process. However, two potential problem areas have been noted by initiative participants and observers. First is a lack of consumer feedback. Second, while the working group process has been relatively smooth to date, it will not be surprising to see more divergent views emerge as details solidify and implementation becomes more imminent. A recent example was the lack of ability to find consensus over the price of generation, a critical component of REV. Therefore, the energy and focus required to keep all key stakeholders in the fold may increase over time.
2. **Structuring the rule to minimize regulatory complexities.** Many expect REV to serve as a template for other states going forward. It can similarly be viewed as a test case or test battleground for those who stand to lose out under alternative power futures. FERC separately has exempted qualifying cogenerators, small power producers, and certain wholesale power generators from FERC rate regulation. And in a similar vein, the PSC has determined on a preliminary basis that DER providers will not be subject to rate regulation by the state. Yet the PSC is still reviewing what oversight might be required under REV in light of the types of products and services that DERs can sell or purchase. It has stated that some supervision “could become necessary” in order to ensure both consumer protection and fair competition. Even if FERC issues are avoidable, it is clear that avoidance will take careful structuring. Additionally, aspects of REV, including net metering and microgrid generation/storage, need similar attention to address—or, optimally, avoid—regulatory issues.
3. **Technical issues need to be resolved.** One of the central tenets of REV is that technology can be utilized to more fully integrate end-use customers into the energy procurement process, leading to greater customer choice. However, the technology needed to facilitate those types of interactions is costly, complicated, and clearly needs to operate flawlessly. New York’s energy grid, by and large, lacks the ability to handle the “two-way traffic” that the REV initiative contemplates. Everything from meters to distribution networks themselves will need upgrades to be able not only to deliver, but also to take delivery of, the energy that is being produced. The grid will also need to interface with instantaneous buy/sell decisions by DERs and consumers, who in some cases will be one and the same entity.
4. **The role of utilities—and repercussions of changing roles.** While the transition to a utility-as-“mini ISO” framework has merit, challenges in the form of possible workforce retraining or redeployment, addressing legislatively mandated rates of return, potential losses of shareholder value, and transfers of property all need to be addressed. It is not clear that the PSC, to date, has sufficiently addressed these issues.
5. **Timing.** Even if the ultimate vision of widespread, clean distributed generation is highly desirable to many New Yorkers, there could be practical implications inherent in the time it takes to transition from the current status quo to the new vision. Proponents may need to pragmatically accept that lead times on these changes could be measured in years rather than months or quarters.
6. **Price increases — particularly shocks — will be detrimental to the final success of REV.** While one of the premises of REV is that money will be saved by consumers—in large part due to increased customer choice, increased proximity to generation sources, and increased ability to own generation assets—it is also true that the changes contemplated by the plan will cost money. This is a risk for politicians who need to ensure that constituents are aware of both the risks (despite the difficulty of those conversations) and the benefits of REV, and that price increases and shocks are minimized.
7. **Security, particularly the rising threat of cybersecurity, presents unique problems.** The PSC must contend with the very real issue of cybersecurity risks associated with giving generation responsibilities to independent entities. Distributed generation resources are arguably physically safer from attack than large, centralized plants and generally increase the resiliency of the grid. However, new market entrants need to be connected to the macrogrid via the Internet, which will allow for many new entry points for cyber-attackers to enter the main grid framework. Against this backdrop is the reality that the reliance on technology to manage the grid in a distributed generation environment will increase exponentially at just the point in history that the number of entities with the technological capability to threaten the grid seems never to have been higher. While these problems are clear, their resolutions remain murky. As a policy matter, it

makes sense to push some of these costs onto utilities. While REV does this, it is also true that not every vulnerability will be to utility-owned or controlled assets in the system. Presumably insurance products and technology solutions will be created to address this concern, making it a potentially promising area for entrepreneurs.

8. **Uncertainty impacts investment.**

Traditional investors, including those who invest in long-term project-financed assets, value certainty above all else. In the context of REV, the largest current unquantifiable risk is the lack of clarity regarding which policies will ultimately be implemented. That is why many investors are currently sitting on the sidelines until final determinations on everything from the value of generation to the cost of security and regulatory compliance are made.

Conclusion

New York's REV initiative is ambitious and will serve as a guide for regulators in other jurisdictions moving toward various versions of the "grid of the future." The PSC estimates that the energy savings, reduced line losses, and other cost reductions under REV could save New Yorkers between \$1.4 billion and \$2.1 billion a year.

However, the road to attaining the true DER/DSP dichotomy that is one of REV's goals remains fraught with perils. Exceptions to rules threaten to swallow some of the more innovative aspects of the plan. Realization of the savings quoted by the PSC is contingent on proper execution and the removal of uncertainty from the plan.

Even to the extent that these problems are addressed, it is not inconceivable that resolution will take longer, even much

longer, than some market participants have discussed. However, with any transitional period comes disruption, and it is clear that policymakers in New York are considering the difficulties that will arise during this period of change. The fact that the task is difficult does not make it less worthwhile—indeed the opposite may be true. Those deploying disruptive technologies, and those with the appetite to develop projects speculatively, could be big winners in such an environment.

The REV process, even if implemented efficiently, will be a bumpy ride. But it could provide entrepreneurs and customers with great benefits and could well serve as the testing ground for any number of ideas that will shape the future of energy generation and distribution in America.

For more information contact Merrill Kramer at mkramer@sandw.com or 202-775-1224 or Joshua Sturtevant at jsturtevant@sandw.com or 617-338-2892.

Achieving success in distributed energy projects requires more than an innovative financial model. Transaction efficiencies are a key determinant of success. Regulatory and transaction costs for lawyers, bankers and accountants can make or break a project, or even a business model.

Transaction processes should be carefully tailored to match the economics of distributed energy projects and investments. For more information on innovative approaches to achieving transaction efficiencies, please visit: <http://go.sandw.com/edge-advisory>

Net Metering In Play In New York

By Merrill Kramer and Morgan Gerard

A proposal submitted on April 18, 2016 to the New York Public Service Commission by a coalition of New York investor-owned utilities and the State's largest solar rooftop developers would replace net metering in New York with a formula tied to the locational value to the grid of the on-site generating facility.

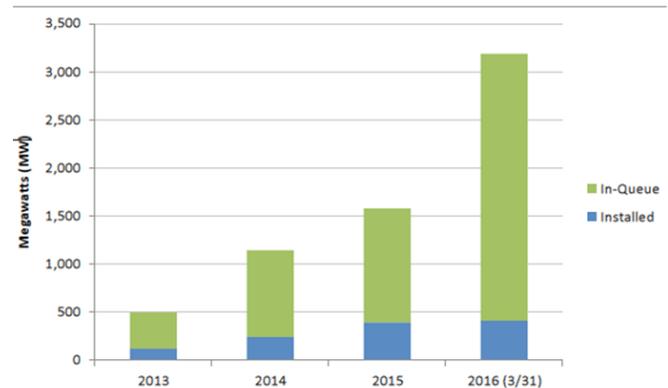
Net metering is a program that has been adopted by 45 states and the District of Columbia to stimulate the development of distributed generation. Under net metering programs, utilities generally will compensate on-site generators for any excess generation at the utility's retail rates. Net metering programs have been very successful. In New York, net metering has resulted in over 3,100 MW of eligible resources installed or awaiting approval in the utilities' interconnection queues. These queues more than doubled in the first three months of 2016. Much of the recent development has employed a variation of net metering called community distributed generation, or CDG, as well as virtual net metering. CDG's are shared power projects where multiple customers join together to obtain renewable energy from a single project. The community project typically is located on a remote site. The electricity from the project is "virtually" metered as if the customer's allocated share of the project was located on the customer's site. Like net metering, CDG projects receive billing credits at the customer's full retail rates.

Utilities largely oppose net metering as it is disruptive to the traditional utility model in which the utility sells power to customers at its retail rates, and buys power from independent power producers at wholesale rates.

On December 23, 2015, the New York Public Service Commission issued a Notice to solicit comments for establishing an interim successor to net metering within the context of its Reforming the Energy Vision, or REV, docket. The Commission reasons that REV necessitates a transition from traditional net metering since the new framework will envision many on-site, distributed generation assets selling electricity through an online platform for purchase by retail customers within the distribution network. Thus, distributed generation will no longer "over-generate" and be eligible for net metering compensation; rather, generators may be able to sell all of their energy to an end consumer other than the utility. Creating a price for energy sold by distributed generation is the new focus of the Commission and energy market participants, and a successor model is proposed to go into effect by the end of this year.

Chart 1: Growth of Non-Wind Net Energy Metering in New York

Net Metered Resources Installed and In Queue, Statewide



On April 18, 2016, a consortium consisting of all the major New York utilities and three of the State's largest solar developers filed joint comments with the NYPSC proposing a replacement for the current net metering model. The coalition is notable since net metering is usually a contentious topic for these parties, and an arrangement that may be palatable to both the utilities and solar developers could gain traction.

To replace net metering, the Joint Commenters propose paying on-site generators using the formula: LMP+D+E. Under the formula, LMP represents the locational value of the power, including the wholesale price of energy, transmission congestion charges, and transmission line losses; D represents the locational distribution benefits over and above the LMP benefits, such as local load relief, and E represents the environmental benefits from the project, such as the value of the Renewable Energy Credits (REC's) and other emission reduction benefits. Certain projects may be able to monetize additional value through wholesale markets, including the wholesale capacity and ancillary service markets.

Among other things under the proposal, in exchange for receiving the value of E, all customers receiving net metering credits would forego the ability to retain or sell RECs, which would be transferred to the utility.

FINANCING PROJECTS UNDER NEW YORK'S 'REFORMING THE ENERGY VISION'

INDUSTRY LEADERS ROUNDTABLE DISCUSSION
Sullivan & Worcester Conference Center, New York City

With some of the highest electricity prices in the United States, and still reeling from massive disruptions to the State's electric service caused by Hurricane Sandy, New York has undertaken a major reform of its electric utility industry.

Five senior business leaders came together in October in New York to share their thoughts on how the New York initiative, called 'Reforming the Energy Vision,' or REV, will impact

project development and financing in New York. The five are **Robert Curry**, former New York Public Service Commissioner and manager of SteepRock Advisors, LLC; **Sarah Zemanick**, Director of Sustainability for Cornell University, one of the State's largest energy consumers; **Jacob Worenklein**, Chief Executive Officer of US Grid Company, a microgrid development company; **Mike Panteloganis**, co-head of Power and Infrastructure for Investec Securities, and **Merrill Kramer**, an energy project finance lawyer at Sullivan & Worcester LLP and formerly manager of a private equity energy fund. The moderator is **Elias Hinckley**, Chair of Sullivan & Worcester's Energy Finance Practice.



MR. HINCKLEY: Bob Curry, how does the NY REV program work, and how effective has it been so far?

MR. CURRY: REV is split into two phases: Track 1 proposes what the State is going to do, and Track 2 lays out how the program is being paid for. We are currently in Track 1. Track 1 requires utilities to build and operate a market-based platform to improve capital efficiency, shape electricity customer load, integrate distributed energy resources and encourage energy efficiency and renewables, all from a marketplace perspective. The principal architect of the program is Richard Kauffman, who is the energy czar for New York and a former Goldman Sachs partner who also worked at the Department of Energy. Richard is trying to build free markets, and that's not an easy thing to do, as we all know.

California is doing something similar, but approaching it differently. In California, the agenda for renewables and the electric utility system comes from the State legislature. In New York, there's hardly any legislative involvement. The program instead comes out of the NY Public Service

How do you create a marketplace where the utility accepts a market design that provides it with no growth?

Bob Curry



Commission. The PSC is now considering the elements of Track 2, which is out for comment. In the meantime, there are demonstration projects being developed that are being funded through another state agency called NYSEDA [New York State Energy Research & Development Agency]. The Green Bank, also under the auspices of Mr. Kauffman, is providing financial support at this stage of the market.

The challenge to the PSC is to create a marketplace structure with appropriate incentives so that the criteria used for picking demonstration projects are financially viable, are scalable concepts, are replicable for different locations, and can be promoted while leaving the utility financially intact. Financially intact means that the utility is able to service its debt, pay its dividend, and stay in business. The ultimate challenge is to create a marketplace where the utility accepts a market-based design that provides it with no growth. Con Ed's growth is miniscule, 0.8 percent year over year. With that environment, how do you encourage a win-win for both the consumer and the developer and, of course, the utility.

MR. HINCKLEY: Michael Panteloganis and Merrill Kramer, from a lender and investor perspective, what do you need to see before you invest time looking at a potential investment.

MR. PANTELOGIANIS: From a banking perspective for investing in the power space, we need regulatory certainty. We need a supportive framework that fuels capital spending, whose regulatory tenet provides for elements of revenue certainty, and a way to earn the revenue that will ultimately yield the ability for an investor to service its debt and earn a reasonable equity return. Our investors

also need to have an understanding of the capital costs inherent in developing some of this thought. Having a framework in place that provides transparency and a way for people to expend their capital is very important.

You additionally need the constituents around the framework to be supportive. California is a good model in that it moved its big three utilities to go out and seek the power resources that were needed. Thousands of power purchase agreements have been signed that have fostered the growth of renewable energy over the last 10–15 years. So it's got to be all in. Everybody around the program has to be supportive. Otherwise it becomes difficult to achieve these objectives.

MR. KRAMER: Private equity generally looks at the same things Mike mentioned that lenders look for. Equity investors are seeking to financially leverage their investments. They require visibility to the regulatory path for earning their target returns. This includes the ability to timely secure contracts, interconnections, transmission access and permitting. That being said, private equity is willing to take more merchant and other risks than banks. Equity additionally looks for a strong management team that can control costs and provide investors comfort in their risk analysis.

Mike mentioned the California program. One important difference between the California and New York programs is that in California the legislature provided a clear mandate that included standard offer contracts; by providing investors with a clear contract path, California created critical mass, ease of entry into the market, rapid development and a path for capital entry into the market. In New York we are in a transitional period where none of that clarity exists. If, when and how the REV framework ultimately is established will determine the success of the New York experience.

The Market for Microgrids

MR. HINCKLEY: Jay Worenklein from US GridCo, microgrids are a significant part of the REV discussions. Can you give us a perspective on what a microgrid is?

MR. WORENKLEIN: Sure. In a nutshell, a microgrid is a component of the larger grid which has the ability to have its own generation, distribution, system controls, software that people dispatch in a proper method, and interconnections to allow it to separate from the grid. It is essentially a microcosm of the entire grid.

MR. HINCKLEY: Jay, you have active microgrid projects in development in the State that are pre-REV non-demonstration projects, so they presumably work on their own economics. With the uncertainty overhanging the REV Program, does that create friction for companies actively planning to participate in the market?

MR. WORENKLEIN: We are in a unique and, I think, wonderful environment right now. We have forces in New York thinking about how to step back from what is and was into what should a power system really look like, and to create something that is highly workable. That in itself creates opportunity.

Microgrids are a tale of two missions. Mission number one is to allow users, customers and communities to fashion a system that meets their own unique needs. If an industrial company, say, has a major site, as we have in Connecticut, with the ability to add massive data centers and other operations well protected from a security point of view, and wants to use that opportunity to develop the town, building a microgrid presents an economic development

We saw pictures of nurses carrying babies in incubators down 20 flights of stairs, and old people who were in the middle of surgery – an aquarium where many of the fish died, and a police station. These episodes show the dire need for reliability. [Microgrids are] an opportunity to give communities within the electric grid the ability as part of redevelopment to create and fulfill their own objectives.

Jay Worenklein



opportunity to bring in business and jobs. The local government is enthusiastic and the local utility will cooperate with it. This is in Connecticut, which doesn't have the REV process. So some projects have an independent economic development focus.

Then take Far Rockaway. All the talk in New York State following Hurricane Sandy was about how we had to do something about Far Rockaway, a community that was devastated by the storm. Or a major housing project in Coney Island which has 2,500 families, not a small housing development, that had its substations flooded and destroyed by Hurricane Sandy along with a hospital – we saw pictures of nurses carrying babies in incubators down 20 flights of stairs, and old people who were in the middle of surgery – an aquarium where many of the fish died, and a police station. These episodes show the dire need for reliability. It's an opportunity to give communities within the electric grid the ability as part of redevelopment to create and fulfill their own objectives.

In the first case of the data center, people will need extraordinary reliability. They will pay premium pricing for a site that will give them everything they need, such as long-term access to backbone communications, transmission lines, and energy storage. In the second case you have different drivers – you are developing a microgrid solely for the purpose of helping the utility develop a more resilient, more reliable operation.

Part of what's driving Mr. Kauffman and other people involved in REV is to provide these services much more efficiently. I had the pleasure of working on large central station generation and distribution and transmission for most of my career. What we're doing in New York is to

The nation's grid is underinvested and needs hundreds of billions of dollars of investment over the next 20 years or so. Utilities necessarily need to be partners in this undertaking.

Jay Worenklein

basically displace the need for these billion dollar massive investments to be built at ratepayer expense to support the population growth in New York — by encouraging demand side management, energy efficiency, smarter systems, and reducing demand. When these elements are in place these systems could be a lot cheaper. They will be a lot cheaper. REV is the opportunity to take all these different objectives and, with one policy formulation, say that there are better ways to do this, subject to the following constraints: We want to protect the utility.

I'd like to add to Bob's comments. If you talk candidly to the members of the New York Public Service Commission and to the Governor's office, one thing that they know is that utilities are the social safety

net of our cities, our state, and our country. People who live in New York City, even in the very finest buildings in New York City, let alone the poorest, are not going independent of the grid; okay? We are not going to have people basically taking care of their own needs in their own little apartments. The country will always be dependent on a strong utility grid, and therefore a strong utility, that can serve them for a very, very long time.

Governments know that they really need strong, viable utilities with visible earnings growth, with the ability to raise equity as well as debt on a predictable basis for themselves. One of the rules proposed under REV is that utilities may not be partners or equity owners of microgrids. I'm concerned

We're trying to find global solutions using our own campus as a living laboratory.

Sarah Zemanick

that you're not giving utilities enough incentive based on their self-interest as well as the public interest by allowing them to take some equity in the situation. The government leaders driving the process in New York have responded, "Don't worry. We know we've got to take care of utilities. They have plenty of incentives. They need to create a resilient utility system, they'll need billions of dollars of investment, and we will take care of that."

I am focused at US Grid Company on fixing the entire grid. The nation's grid is underinvested and needs hundreds of billions of dollars of investment over the next 20 years or so. Utilities necessarily need to be partners in this undertaking.

Reconciling Environmental and Economic Goals

MR. HINCKLEY: Sarah Zemanick from Cornell University, you have a broad mandate, which is not just reliability, but also a set of climate goals. As a value proposition, how do you put a value on specific things like reliability and resilience? Is that difficult to do in the marketplace? How does that conversation go when you say, "Well, we've got climate value and resilience value," and on the investor side, they're like, "Well, we need revenue"?

MS. ZEMANICK: That conversation is interesting, to say the least. Our campus has a public goal to become carbon-neutral and more. We also wish to do it in a way that has global impact. So we're trying to find global solutions using our own campus as a living laboratory.

We have a 37-megawatt optionally islanding microgrid system already on campus, we are developing solar through a net metered arrangement, and are working with a local wind farm using a wholesale contract for differences. As you state, we have triple bottom line criteria coming from administration, but they're insistent that we not pay any premium for our green power and not put any economic value on the environmental attributes. So we need to accomplish our goals based on grid parity. It's very challenging.

MR. WORENKLEIN: Are you looking for a job right now, by any chance? (Laughter.)

MS. ZEMANICK: I might be when I'm done.

MR. WORENKLEIN: Because what you just described is impossible. Full stop. (Laughter.)

MS. ZEMANICK: Well, we have one project online. But we're also required to be true to our academic mission and make sure that we have research and teaching opportunities in all the projects that we've done. To that end, we've worked with Distributed Sun as our solar developer, and they've been able to leverage the NYSERDA subsidies as well as bring in private investors who can monetize the federal tax incentive; our long-term Power Purchase Agreement brings in the rest of the funding. Our ability to make all this happen financially depends a lot on the net metering processes combined with the relatively lucrative program subsidies from NYSERDA.

More recently, we've run into issues with interconnection on the grid side of the house, with debate with the utility over what upgrades are necessary to safely interconnect these projects. The utility proposal would add 25 - 30 percent additional capital expense on top of the projects to make that happen. So these types of projects can be increasingly difficult as NYSERDA grant money disappears. Without remote net metering, the value of the electricity coming out of the solar farm depends on where you send it. We have varying rate structures in our NYSEG territory which is an additional challenge; and, of course, the looming loss of the federal tax credit. We have been able to pull our program off based on a set of favorable circumstances and a creative and helpful developer, but it's getting more difficult to achieve these kinds of goals.

MR. HINCKLEY: The other big piece of the program is energy efficiency and energy management technology, which, to me, seems to be best motivated by time-of-use pricing and real-time price signals. Bob Curry, is that something that we can expect to see down the road?

MR. CURRY: For some reason, within the last decade the New York State Legislature passed a bill saying that you could not have residential mandatory time-of-use pricing. I discovered that when I was the commissioner and started to make a fuss. I asked: "Why don't we have someone in the legislature introducing a bill to take this away?" Well, the origins of this were so murky that no one wanted to take it on.

There's a great level of sensitivity at the PSC and the Governor's office that that has to go away as part of the REV, or independent of REV. Time-of-use pricing on a very broad scale is important. It's used now in the industrial and commercial markets. How it's going to change I can't say, but they assure me it's going to happen.

MR. HINCKLEY: Merrill is there still is a way to go out and get those assets built, but not quite as efficiently, without time-of-use pricing? I'm interested to get your perspective on what that marketplace looks like for energy efficiency, energy management tools and demand response within the confines of New York.



MR. KRAMER: Sure. As Bob mentioned, some customers receive time-of-use price signals, but its confined to the larger commercial and industrial customers. They're not true time-of-use price signals, but simpler signals that encourage peak shaving to avoid incurring peak demand charges. There are also vehicles available in the New York Power Pool that place value on demand response, but those vehicles generally are not accessible to most customers.

As a result, the principal economic driver behind energy efficiency projects and the like in today's New York market is retail displacement. What that means is that an energy user will build a project "behind the fence" or "behind the meter." They'll look at their retail utility rates and their energy consumption and then build a project sized to displace their retail purchases rather than sell the power into the wholesale markets. The arrangement is particularly attractive with the downstate utilities, where retail rates can be anywhere from 18 cents to 24 cents a kilowatt hour. Under those circumstances there's room for a customer to achieve significant savings. In the case of CHP or cogeneration, where the facility also generates steam for hot water, heating and cooling, the increased efficiencies and energy savings make these projects a win-win for the customer and for the developer. The arrangement also satisfies one of the key requirements of the lending and investment community, which is to get a long-term contract with a creditworthy offtaker.

Providing power in this fashion also provides utility system benefits. It reduces strain on the grid, freeing up substation and transmission line capacity, perhaps avoiding the need for capital spend by the utility to meet system growth. That being said, that customer project may not be located where it is most valuable from an overall grid standpoint. A project's maximum system value will be where the project can relieve transmission congestion, avoid the need for new generation on the other side of a bottleneck, avoid line losses, and avoid or defer construction of new substations, transmission, distribution, and other expensive system

upgrades. And the reason the project is not built at that location is that the customer and project developer are not receiving adequate information and price signals about what the true cost of power is at one site versus another.

What REV is trying to accomplish is to have these price signals in the market to cause efficient investment decisions to be made to locate projects where they maximize their value to the system, not simply to a particular customer. These price signals are created by designing a market-based platform for buying and selling energy, and having time-of-use or smart meters in place. Until that happens, energy will be understood by us for the most part as a monolithic kind of commodity. Since it is not unbundled, it is not yet understood by its component parts and how each provides different value to customers and the system, things such

as system stability, voltage support, frequency response, operating reserves and the like. These are things that the FERC refers to as ancillary services. There is a market for these products on the wholesale level where they are unbundled and separately valued and priced by the market. REV is trying to establish a market-based platform where these prices and values will exist and be provided in real time to customers and the marketplace so that they can respond to those signals. In essence REV seeks to create a market in which there is efficient price setting, response and competition.

In the short term, since none of those things are in place, the New York Public Service Commission is attempting to promote market entry by providing artificial, regulatory-set price signals, while also creating sufficient financial incentives for utilities, who will run the new market trading platform. Utilities might have a natural incentive to discourage other participants from entering the market where it would reduce utility earnings, which are tied to the utility's capital investments.

Until that market happens, the projects that we will mostly see either are ones that receive NYSERDA funding, or the ones that can sell to one or more customers on a net metering basis.

It's difficult for a Wall Street-oriented organization to work on transactions that are less than \$20 million... that's where the regional local banks play an important role.

Michael Panteloganis



The larger projects, like the microgrid projects Jay was discussing, will be part of an evolving process. I don't think Mike would finance these projects today because you can't really price what the transmission or distribution parts of those projects are worth. The price signals simply are not out there.

MR. CURRY: When the straw proposal for Track 2 is fully vetted and Con Ed files its rate case at the beginning of next year, a lot of the certainty you all are looking for from an investment standpoint is going to get somehow formulated in the rates, because that's ultimately where the certainty will be expressed by the regulator: "If you do X, you will get Y in return."

Until that gets out of the conceptual stage and into the really hard rate-making context, it's difficult to have the certainty to encourage broad investment, except if you have specifically identified customers who are creditworthy and can sign PPAs, etc.

Uncertainty is not something that our investor base appreciates and wants exposure to. What goes into getting money flowing is what have been the buzzwords of today's panel: certainty and transparency.

MR. HINCKLEY: The other embedded piece of that question is the focus on distributed resources or behind-the-fence projects, and the smaller scale of those projects. What is the scale at which you have interest? If I show up at

your door and say, "I've got \$80,000 for projects; will you underwrite them?" You're going to say "Why did you call me?" What is institutional capital generally looking for in terms of scale?

MR. PANTELOGIANIS: A lot of that is driven by the demand for capital. Today there is a lot of capital out there to feed good opportunities at very attractive yields for equity; but, by virtue of the competition for this capital, we tend to trend up in terms of deal size because of the nature of our business and the way we're compensated. It's really difficult for a Wall Street-oriented organization to work on transactions that are – let's call it less than \$20 million. I think that's where the regional local banks have to come in and play an important role in providing capital, but otherwise they need the same requirements that we need on Wall Street.

We have clients who just haven't reached that level that are working with the Green Bank, that's got a charter to fuel renewable energy assets and growth in New York State. But there are also other, smaller banks that come to mind. A good active player in the Northeast is Bridge Bank. They and other regional banks are there for – call it 2, 5, 10, \$15 million transactions. Then we come in when the number becomes 20, 25 and higher.

It's a great opportunity for regional banks to jump in. But by virtue of the structure in place on Wall Street, our projects just need to be larger.

MR. HINCKLEY: Jay, on the other side of this, where are you going to get your capital from? Are the capital markets limiting the projects you'll look at?

MR. WORENKLEIN: Financing will ultimately not be the barrier here. Our projects are of significant size. If there is a compelling community need, credit can be found to solve the problem.

For example, there are players that feel it is so important to strengthen Far Rockaway, to help strengthen Coney Island, that they are thinking about a special governmental utility or other programs where people actually wish to make investments. If there's a compelling case from the community and public point of view, there will be ways to find either utility, governmental, or other involvement that will make credit sense.

In the project finance area, Mike will recall in the period that he was at Chase and at WestLB and that I was at Lehman and Soc Gen, where projects went from a billion

dollars – massive natural resource projects, massive utility projects – to cogeneration projects, where we were looking at \$10 million. We had people saying to us, how are we going to finance \$10 million projects?

We put together a \$200 million facility which is basically to say, when you have projects of the \$10 million scale and you don't really want to do the brain damage of a full-scale project financing, we said, "If your projects have the following characteristics associated with them" – a turnkey EPC contract from a major contractor, a creditworthy offtake contract, etc., we'll put together a full facility." We syndicated it broadly and had the ability to fund smaller projects.

With really small projects, this is where your point, Mike, about the Green Bank, is very important, but not just the Green Bank. There are people out there who have viable businesses securitizing small contracts, small energy efficiency contracts which meet a certain credit profile, or the Green Bank eager to provide credit support behind those projects to enable them to be assembled together.

So there are ways in which to ultimately get energy efficiency projects, demand side management projects, and the like to be financed on a basis with credit support, or where

Master funding models drive financing costs down, including by diversifying investor risk, and by being able to tap into the public markets.

Merrill Kramer

the project is viewed as so important to New York and its goals, that we're going to find a way where the government is going to provide some credit support behind the project.

We haven't talked about corporate credit. Let's say I am setting up a demand side management business. I am

interested in doing something that I think is so powerful in terms of savings to be achieved by housing projects or other kinds of tenants. I set up a company, I go out and raise equity for a company that will, in fact, be in the business of doing these small projects.

I will come to you, equity investor, and I will say to you, "There is a business here that is a multibillion dollar business, and the business is highly efficient and it makes so much sense. Why don't you put some anchor equity into it, we'll get some governmental money attached to it, and we will create a company where we will, by issuing corporate debt and corporate equity, finance a very large-scale initiative which makes fundamental economic sense. So don't think about projects alone; think about corporate entities that have a market opportunity now that could be so substantial that investors actually want to be able to go into the business.

MR. HINCKLEY: Bob, going back to your point about setting the rate path for REV, the PSC timeline for this is fairly aggressive. Are we being unrealistic in our timeframe for when these rate cases will be completed? Does this uncertainty overhang persist for longer than we think?

MR. CURRY: In the absence of the kind of demonstrated need that Jay was just talking about, it's going to take a while to get through this process. Without stating anything but the obvious, The Quadrennial Energy Review published by the Department of Energy said, you're going to be paying more for your electricity. That's not something that is often said publicly. There are a lot of different interests involved in this process that need to be reconciled. There is no true incentive yet developed for the investor in utilities, let alone the Long Island Power Authority, which deals with 3-plus million people on the island.

With all the effort that's going into demonstration projects to see if things can be scaled up, that other piece hasn't crystallized yet. The key at the end of the day is whether there will be sufficient incentive and certainty. Will the rating agencies say grace over this? Will the equity analysts say grace over this set of changes? And they're not going to know whether they're going to say grace until they see a rate case. REV's success will turn on big scale utility involvement. I don't think that will happen in the rate case for the Spanish-owned New York utility – New York State Electric & Gas. We have international problems with them.

MR. HINCKLEY: Sarah, you have a demonstration project in Track 2. What is your driver at this early stage in proceeding

with the project? How much of your motivation is driven by wanting to help design the State program and how much was an opportunity to get a project done inside the existing framework without having to wait for some of this uncertainty to resolve?

MS. ZEMANICK: Despite the ‘mission impossible’ description I gave earlier, we have to convince our administration to take a long view on these projects. What is the price of power going to be in 30 years? I don’t know. Currently it is around 3 ½ cents/kwh. We are in a region where there’s a glut of Shale Gas.

We figured out the technology and the business model. We got folks who figured out the financing. Where we ran into a wall is with the utility interconnection. When you get either to a certain size project or if you’re the first mover in an area with a project and there are some utility upgrades that are required, or you’re the second or third person in but you trip a capacity threshold, the utility screens and limits hit you with all of the costs of that next upgrade. The screens are not adequate to evaluate the distributed generation resources. We were unable to convince Iberdrola [NYSEG] to think creatively, to work with us to look at some modernization of the screens, or to bring in some ancillary equipment to mitigate the issues that were identified. These issues are going to be encountered by lots of folks trying to do DER.

MR. HINCKLEY: We’ve heard two wildly different figures

for the price of power. Bob, can you provide a little bit of context? Why the vast difference in pricing Upstate versus Downstate?

MR. CURRY: Upstate doesn’t have the same capacity constraints as downstate. There is an Upstate/Downstate divide on transmission. NYPA, the New York Power Authority, which is in charge of selling the Niagara River’s cheap bounty into the rest of the state, has capacity charges that it lays onto people like the Port Authority and the New York City Housing Authority, each of which get almost all their power from NYPA. It can really aggregate as you come further Downstate. And Long Island’s worse, for whatever that’s worth. There are all these things in aggregate.

MR. HINCKLEY: Merrill, as we look at this marketplace, the uncertainty, and the scale challenges we’ve discussed, are there participants outside of the Green Bank who are active investors in this marketplace? In addition to the regional banks, who should developers, consumers, or contracts or be thinking about as a place where they have a reasonable expectation of finding capital for their projects?

MR. KRAMER: Sure. There’s no shortage of capital out there. A lot of capital is sitting on the sidelines looking for the opportunity to deploy where projects meet the requirements I mentioned – an experienced management team, being able to control costs, a long-term PPA. From the regulatory side, Sarah mentioned an important issue – interconnection that could potentially delay a project and increase costs.



The biggest issue in attracting private equity then is scale. Scale directly affects investor returns. The soft costs of doing a 1 or 2-megawatt project such as legal costs, permitting costs, accounting, financing and overhead costs are generally the same for a 20-megawatt or a 200-megawatt project. Without scale, these costs demonstrably eat into investor returns.

Jay mentioned a real opportunity here for funding sources to walk in with a model that rolls up projects. Models out there include Yieldcos, master limited partnerships, mezzanine funds and the like. These models require projects to satisfy some sort of standardized

requirements. The model will be driven by the financial community, not the regulators. These master funding models drive financing costs down, including by diversifying investor risk, and by being able to tap into the public markets.

The cash is there. And also the corporate credit. What you



also have that is particularly attractive with REV for portfolio financing are a lot of diversified commercial energy users with multiple loads whose reliability is essential — like hospital chains, public universities, hotels, office buildings and the like. Where corporate leaders or asset managers have the vision, they have an opportunity to do

a roll-up that solves the scale issues, the corporate credit and the collateral security issues, and provide additional value to the grid contemplated under REV.

MR. HINCKLEY: Thank you. I want to make sure we get a chance for the audience to ask questions.

AUDIENCE MEMBER: I have a question for Mr. Worenklein. On the microgrid side, what size generating facility will we need in Downstate in order to compete with the grid in terms of price?

MR. WORENKLEIN: I don't see a size constraint; I see an objective constraint. What is your real need? If your need is of a certain type, then a 2-megawatt project works perfectly. There are places in New York City, which — I didn't believe until I saw it — which are completely off the grid. They're primary producers and have redundancy they create for their customers with their own power, for example, the massive housing project, Mitchell-Lama in Co-Op City.

The resilience issue, the reliability issue, is such that people will pay extra for power. You can be economic in meeting your own objectives with a small project or with a large project, but it's quite possible to find a lot of projects there that will be self-sufficient as a microgrid because of the needs that the community has and seeks to achieve.

AUDIENCE MEMBER: Why don't more people know about REV? It seems like it's the same people always talking to each other in the same room.

MR. CURRY: I'll give you a quick answer. It is all inside baseball all the time. Regrettably, it's tough to sell this, because people are inured to the pitch, "Oh, don't worry, this is going to save you money," because even if it does save you money, if those of you in the ConEd service territory have ever looked at your bill — and I have, carefully, and I complained about it, and was told by ConEd that it was written by the Legal Department of the Public Service Commission — there is no clarity here at all. It's all obfuscation, well-intentioned; caring, loving, well-intentioned efforts.

(Laughter.)

MR. CURRY: But this is inside baseball. It's very difficult to get a groundswell of interest here. But we're trying to make it sufficiently attractive to those inside baseball that we effect the savings, we effect the changes in the marketplace that are inevitable, and that we lead them, we're not driven by them; and that, at the end of the day, we have truly transformed the energy vision. That's the intent.

MR. KRAMER: I'd like to add to that. From a marketing standpoint, you always try to keep the message simple. But what we're talking about here is something very complicated. We're not just talking about getting your electric rates down and saving you money. We're talking about unbundling electricity and creating a bunch of different competitive products in the market.

For any of you who trade energy products in the New York Power Pool or PJM, it's like looking at a Chinese menu in Chinese. Unbundling power to create competitive products is a complicated message for the public. People don't understand ancillary services; they don't understand VAR support. The trick is how to move to a situation where we're providing increased value and efficiency in the market, but keeping the story simple.

I'm reminded of Denzel Washington's line in the movie "Philadelphia" where he's a lawyer defending Tom Hanks and is cross-examining Jason Robards about why the firm fired the Hanks character. Denzel Washington keeps asking Robards, "Explain it to me like I'm a fifth-grader," "explain it to me like I'm an eight-year-old." If you can follow that advice, then you can get the message out. But if to do so you have to explain ancillary services and all that, eyes are going to glaze over and you won't get there.

MR. HINCKLEY: You touch on an important point, which is we don't educate anybody about energy at all. It's a black box for most of society. The idea that we can educate about something this complicated is really difficult without people having that fundamental understanding.

MS. ZEMANICK: I might offer, Tompkins County in Ithaca as an example -- granted, a bit of a unique community we joke it's 10 square miles surrounded by reality but more people there know what REV is and are involved, and we have community groups.

Part of my job is engagement in education -- that just it's not accessible to most people, either the language, the ancillary services. You need to tie it back to something that people care about. At least in Ithaca, Tompkins County, people will get it when you talk to them in terms of climate change or their own energy costs. Our solar program, Solarize Tompkins, has been incredibly successful. People are interested in residential solar, in community solar. We're now doing the same kind of education model, trying to get people interested in geothermal and other renewables. Just bring it down to a level where it is accessible and people have a ramp to get involved. You just need to bring it down to a level where they can see a personal connection.

AUDIENCE QUESTION: It was mentioned that there may be time-of-day pricing for residential in the future. Any likelihood of going as far as demand charges for residential? That might stimulate the storage business and possibly provide an alternative for, for example, net metering, maybe in conjunction with something like a value of solar tariff? How far can the instinct to protect the residential market from the actual markets be fought, I guess is my question.

MR. CURRY: In the straw proposal, staff is putting something out there with the concept that a demand charge may be viable in New York State. You can pick up the comments online when they come in if you can find them. There's a lot of discussion. A minimum bill also is the source of a lot

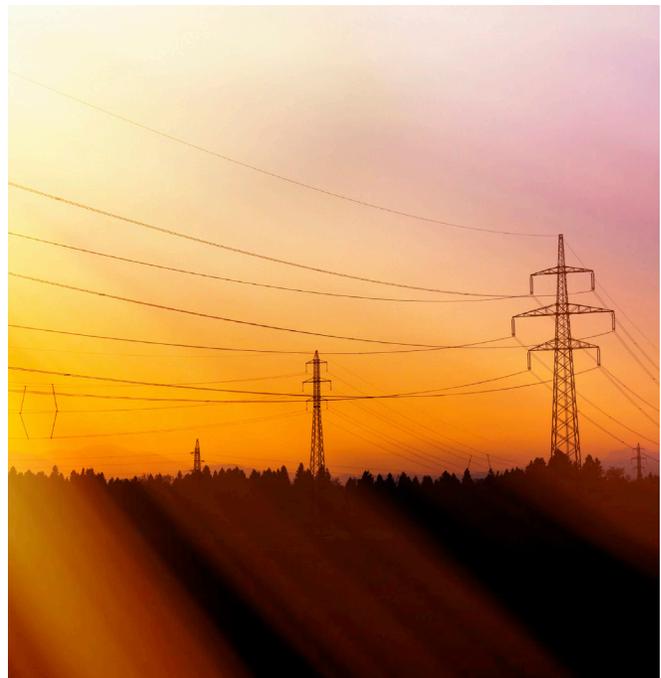
of discussion. And utilities want to get rid of net metering as fast as they possibly can; that's a source of a lot of discussion.

This particular framework that's been put out there for this comment really gets to the teeth of a lot of the things that will justify or not justify the financing at the end of the day.

AUDIENCE QUESTION: I had a question about financing those really small energy efficiency projects. What role can the ESCOs play? Are they passé at this point? You know, they benefit from multiple revenue streams in those projects, so perhaps that's part of the answer.

MR. KRAMER: The value of the ESCOs will depend on the size of the energy efficiency project. In many cases energy efficiency projects result in a reduction of load at the sites, so there is really no retail sale that's being made.

If you get into economies of scale, where you, say, install energy efficiency projects to serve more than one load, like community projects, then ESCOs can play a valuable role. Let's say you're putting in a central heating system to save money, and it makes more economic sense to size it to serve two buildings rather than one. ESCOs can play a role because they're better at interfacing with the utility. Anyone who's close to a customer, can interface with a utility, and can do billing, and already is licensed on the retail side in the State has a head start on other people.



But ultimately in my view it's going to depend on if they can guarantee the savings to the customer.

MS. SANDS: That's why they need the ESCO, because they've got the big balance sheet.

AUDIENCE QUESTION: I want to thank the panel; it's been very insightful. In preparation for REV, there's a lot of uncertainty about what's going to happen; we see the model evolving towards on-site generation and microgrids. From the financing side, do you see certainty in preparing the buildings for these microgrids and on-site generation, so doing the energy efficiency measures within the building to reduce the size of the demand?

And from the developer's standpoint, the same question: Do you find yourselves building your infrastructures with the future in mind and making changes to your buildings to make sure that you're sizing your renewables and your on-site generation properly?

MR. HINCKLEY: Well, I would say as a threshold issue, you've touched on an important point. There's a much broader real estate community out there that's not really engaged in this process in the same way but obviously plays an important role thinking about things like deployment of efficiency.

MR. KRAMER: Let me take a quick stab. From a commercial standpoint, one of the big issues in future adoption will be the existence of triple net lease arrangements; another is where steam is supplied on a building-wide basis. Those things have to change. For a new building, you probably want to set up the utility metering system in a way that the building owner or asset manager can share in the value of the savings and is incentivized to make these large investments. In many tenant situations energy is simply a pass through item.

MS. ZEMANICK: We are actually in a debate in Tompkins County. Ironically, natural gas is constrained from an economic development standpoint, so there's a big debate in the county right now about do we get a new gas line through NYSEG or do we convince these folks that they can build their buildings energy efficient with heat pumps or some other source.

MR. CURRY: You could also take the California perspective, which is they changed the building code 20 years ago to demand efficiency, as well as earthquake preparedness



and other things. No one in New York has been willing to step forward and try to legislate that here for some reason.

MR. HINCKLEY: That brings us to the end. Thank you again all for coming. And everybody who joined by phone, thank you very much for taking the time to join us.

For more information contact Merrill Kramer at mkramer@sandw.com or 202-775-1224.

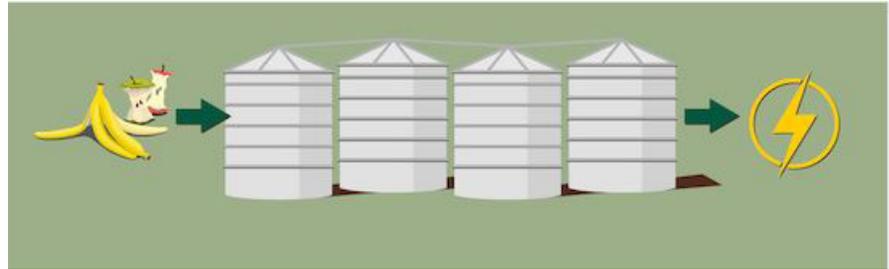
ANAEROBIC DIGESTERS GIVE UNIVERSITIES FOOD FOR THOUGHT

By Merrill Kramer

Food waste is a major problem in the US. Studies show that around 40% of all food produced in the US gets wasted at some point in the food chain. According to the EPA, food waste is the second largest category of municipal solid waste sent to landfills, accounting for 18% of their waste stream. Left to decompose in landfills, food waste creates methane gas, a lethal greenhouse gas that contributes to climate change and global warming. EPA has found that, pound for pound, the comparative impact of methane gas on climate change is more than 25 times greater than carbon dioxide.

Universities are not immune from contributing to the organic waste problem. University meal programs serve food buffet-style to students and don't want to run the risk of running out of food. The average college student generates 142 pounds of food waste a year, and campuses as a whole throw out a total of 22 million pounds of uneaten food annually. Universities thus are a major contributor of food waste to landfills. Tackling the food waste problem has become increasingly important to colleges. Food waste is one of the least recovered recyclable materials in the US. College programs such as composting, tray-less dining and the Food Recovery Network where uneaten food is delivered to feed the needy only begin to solve the problem. Universities are increasingly considering anaerobic digestion as a solution as they expand their green initiatives.

Anaerobic digester systems provide a means for schools to recycle campus waste while satisfying multiple goals of



reducing their carbon footprint, lowering their energy costs, reducing use of fossil fuels, capturing an important source of renewable energy, and creating campus laboratories for educating students on socially responsible behavior.

What is Biodigestion?

A biodigester is basically a large, fully enclosed tank into which you collect organic waste. Anaerobic means the absence of oxygen. If you lock anaerobic microbial organisms in a sealed environment without oxygen, but with plenty of food and other organic waste, the microbes produce methane-rich gas through their digestive process. Essentially, it's the natural process of decomposition technologically revved up to optimal speed and efficiency. The trapped methane gas is then cleaned and used to generate electricity and steam for heating and cooling via a combined heating and power (CHP) or cogeneration system. The biogas also can be directly used to produce steam in boilers for hot water and heating. Leftover organic solid waste can be used as fertilizer, a soil enhancer or be further composted.

Anaerobic digestion is seen as a holistic, albeit more technically complex

solution to food waste than University recycling and composting programs. When properly structured, installing a biodigester can also be a money-maker for the University by reducing electric, heating, waste disposal and operating expenses.

Food for Thought

Biodigestion is not entirely new to campuses. A number of Universities have been at the vanguard of installing biodigestion systems as part of their sustainability missions. In 2011, the University of Wisconsin Oshkosh built the first commercial anaerobic biogas system in the United States. The 370 KW facility converts 10,000 tons of organic waste per year to generate approximately 8 percent of the University's electricity needs. Michigan State University has developed a \$5.1 million biodigester that converts around 10,000 tons annually of organic waste through an approximately 350 KW system that powers ten campus buildings. University of California Davis entered into a third party off balance sheet project finance arrangement to build an \$8.6 million biodigester that converts 18,000 tons of organic trash annually into 5.6 million kilowatt-hours to satisfy 4% of the campus' electricity needs.

Project Financing for Biodigester Projects

Deciding to construct a biodigestion facility involves undertaking a variety of risks, including construction cost overruns, delays, performance risk, technology problems and operating cost overruns. Financial risk is a major consideration. Construction of infrastructure projects requires review and consideration of balance sheet and credit issues. Undertaking large capital expenditures can run afoul of bond indentures and also affect a University's credit rating. Sustainability programs often find their proposed projects competing with other capital projects. This is frequently an uphill fight as, unlike student housing, library and classroom buildings, owning and operating energy projects is not a core business of the University.

One structuring option that can minimize risks and overcome these political issues is to develop the project through a third party owned, off balance sheet project financing arrangement. Under a project finance structure, the University signs a long term power purchase and waste disposal agreement, or enters into a lease arrangement, with a third party developer that will guarantee the university savings off its energy and

waste disposal costs. In exchange, the project sponsor agrees to take on project risks including construction cost overruns, delay damages, under-performance of the facility, and operating and maintenance costs. These risks are not inconsiderable, as biodigester performance depends upon a consistent, stable quality of organic waste and bio-gas production. Importantly, a project finance structure allows a biodigester project to be built and financed off-balance sheet to the University. This allows the University to avoid incurring new debt obligations, using up its balance sheet, violating bond coverage ratios and otherwise running afoul of its bond indentures. It also allows the University to allocate project risks to a third party while guaranteeing savings to the University of energy, waste disposal, operating and maintenance expenses.

An additional benefit of a project finance structure is that it allows a private party to use depreciation and other tax benefits not available to not-for-profit Universities, thereby reducing the overall capital costs of the projects. The resulting savings can be used to fund other sustainability projects, provide scholarships, hire additional professors, or for other worthy undertakings.

Best Practices for Implementing a Biodigester Project

As discussed, a biodigester project can be a complex, risky and costly undertaking. To maximize the value of the project while minimizing its costs and risks, a University first should undertake a preliminary economic, design and engineering study to understand the financial and environmental feasibility of the project, and to ensure it is designed and built to optimize its value to the school. Consideration next should be given to funding and financing issues to understand the project's budgetary and balance sheet impact on the school, and to justify not just its environmental value, but its economic value to the Administration. Grants and state and federal governmental funding are often available for sustainability and renewable energy projects. Where funding options are limited, or to ensure a project's long-term benefits to the school, third party project financing structures should be considered either separately or in conjunction with grant money, that can limit both financial and project risks and utilize available tax benefits. Project financing often is the optimal vehicle for allocating risks to parties that are best able to manage those risks. In short, if properly structured to optimize its value and minimize its risks, a biodigester project can be both an economic and environmental proposition for a University.

*For more information please contact
Merrill Kramer at
mkramer@sandw.com or
202-775-1224 or
James Wrathall at
jwrathall@sandw.com or
(202) 775-1206.*



RENEWABLE AND DISTRIBUTED ENERGY OPPORTUNITIES IN THE MID-ATLANTIC

INDUSTRY LEADERS ROUNDTABLE DISCUSSION *Solar Energy Industries Association, Washington D.C.*

Sullivan & Worcester partnered with the Solar Energy Industries Association (SEIA) in November to co-host a roundtable discussion exploring renewable and distributed generation opportunities in the mid-Atlantic region.

*The panel was comprised of industry experts, including Commissioner **Anne Hoskins** from the Maryland Public Services Commission; **Dana Sleeper**, Executive Director of the Maryland, D.C. and Virginia regional chapter of SEIA; **Anmol Vanamali**, Financing Strategies Director at the D.C. Sustainable Energy Utility; **Bracken Hendricks**, President and Chief Executive Officer of Urban Ingenuity; and **Rick Moore**, Chief Operating Officer of Washington Gas.*

*Welcoming remarks were provided by **Rhone Resch**, President and Chief Executive Officer of SEIA, and the panel was moderated by **Elias Hinckley**, Chair of the Energy Practice at Sullivan & Worcester.*

Following are excerpts of the transcript from the roundtable discussion.

MR. HINCKLEY: Thank you to SEIA for hosting us. We very much appreciate it. Today we're going to move downstream from the energy policy discussion and really focus on what the actual implications are in the marketplace today and in the future. We're going to look at the programs that are out there right now, and how the market is developing in real-time. We will also try to look around the curve to see what's coming up to better understand where the opportunities will be as the market evolves.

I'm going to start with Rick. Washington Gas at its roots is a natural gas utility company, yet you're an active investor in the distributed energy marketplace. Why?

MR. MOORE: Washington Gas, our natural gas utility, is a 167 year-old company based here in D.C. We serve customers in D.C., Maryland, and Virginia. But WGL, the parent of Washington Gas, really is a diversified energy company.

In addition to the utility, we also have WGL Midstream, which is a business investing in pipelines and natural gas storage and asset optimization. We also have WGL Energy

Services, which is our retail energy marketing group, and WGL Energy Systems, which is our commercial energy group that does energy efficiency work for the federal government but also focuses on holding our assets and doing our work for distributed generation.

In looking at the natural gas business, you could describe it as owning energy delivering assets over a distributed geographic area through which we deliver energy and our customers pay us a more or less monthly fee. That's the natural gas business.

You could say natural gas is the original distributed generation technology, right? It's fuel until it hits that flame. That's really part of our core business – distributed generation – and that remains part of our core business.

So the move for a company like WGL into technologies like solar is a natural progression or addition to the work that we have always been doing. We're really trying to deliver the same benefit to our customers.

As we talk about distributed generation, we should also talk about a slightly broader concept: what we've been terming distributed impact. Distributed impact is a real combination of distributed resources, across different fuel types and different technologies to really deliver a broad range of benefits in this space.

MR. HINCKLEY: Anne, you sit on the Public Service Commission. It must be a fascinating time to hold this job, as there's a ton of transition going on. Around the country, we see really significant efforts to rethink what the role of the utilities should be.

Can you give us a little perspective on your role and how you're engaged in this process with the Commission?

MS. HOSKINS: Sure. And thank you. I just have to be clear these are my own opinions and I am not speaking on behalf of the Commission.

The Maryland Public Service Commission has been very active in advancing new technologies, new approaches to energy efficiency and distributed energy for a number of years. That said, we're not the commission that you're going to read about in SNL or in one of the other dailies as having a large comprehensive distributed generation proceeding right now.

Instead, I think the approach the Commission has taken has been to focus on different elements of what will eventually make up this distributed system. Probably the area that we've been the most in front of has been energy efficiency. I'm really interested to hear about the different approaches

that have been taken in the District, but Maryland has had very aggressive goals for energy efficiency and demand response.

So I'd say we focus quite a bit on energy efficiency. We just re-upped those goals and now have some of the more aggressive goals in the country.

On the renewable side, we have a renewable portfolio standard and we have metering. I don't think we've hit the types of penetration levels that I would like to see in Maryland. We are supposed to be receiving a proposed rule from the Commission's technical staff on the community solar initiative and I believe some of you are probably involved in that and I'm looking forward to seeing that proposed rule.

MR. HINCKLEY: Fantastic. Thank you. Dana, you're on the frontlines advocating for state and local policies to make this market work.

Can you tell us a little bit about your approach and how you're working to keep the market durable?

MS. SLEEPER: Sure. So MDV-SEIA, as you know, is a regional trade association and what we do is bring our members together on state level committees and discuss with them what is going to be most effective in growing their businesses.

If there is a particular policy that we've seen that's successful in other states, we discuss the merits as it might apply to, for example, the Maryland market. Then through a

Net Generation from Renewable Sources: Total (All Sectors), 2006-January 2016 (thousand megawatthours)

Period	Generation at Utility Scale Facilities										Distributed Generation	Net Generation From Utility Scale Facilities and Distributed Generation	
	Wind	Solar PV	Solar Thermal	Wood & Wood Derived Fuels	Landfill Gas	Biogenic Municipal Solid Waste	Other Waste Biomass	Geothermal	Conventional Hydroelectric	Total Renewable Generation at Utility Scale Facilities	Estimated Distributed Solar Photovoltaic Generation	Estimated Total Solar Photovoltaic Generation	Estimated Total Solar Generation
Annual Totals													
2006	26,589	15	493	38,762	5,677	8,478	1,944	14,568	289,246	385,772	N/A	N/A	N/A
2007	34,450	16	596	39,014	6,158	8,304	2,063	14,637	247,510	352,747	N/A	N/A	N/A
2008	55,363	76	788	37,300	7,156	8,097	2,481	14,840	254,831	380,932	N/A	N/A	N/A
2009	73,886	157	735	36,050	7,924	8,058	2,461	15,009	273,445	417,724	N/A	N/A	N/A
2010	94,652	423	789	37,172	8,377	7,927	2,613	15,219	260,203	427,376	N/A	N/A	N/A
2011	120,177	1,012	806	37,449	9,044	7,354	2,824	15,316	319,355	513,336	N/A	N/A	N/A
2012	140,822	3,451	876	37,799	9,803	7,320	2,700	15,562	276,240	494,573	N/A	N/A	N/A
2013	167,840	8,121	915	40,028	10,658	7,186	2,986	15,775	268,565	522,073	N/A	N/A	N/A
2014	181,655	15,250	2,441	42,340	11,220	7,228	3,202	15,877	259,367	538,579	9,536	24,785	27,227
2015	190,927	23,232	3,241	42,358	11,233	7,415	3,184	16,767	251,168	549,527	12,141	35,373	38,614

Source: U.S. Energy Information Administration, *Electric Power Monthly*

certain determination process through the committee, we elect to pursue certain priorities. So, for example, we're looking at removing the cap on PACE (property assessed clean energy) financing in Maryland this coming session because there's a lot of interest in PACE programs and the cap for commercial systems is something that's been burdensome in development. We look at those specific types of policies, analyze the situation, and then move forward with our legislative agenda.

MR. HINCKLEY: Thank you. Anmol, DCSEU is, to me, a little bit of an unusual entity or program. I'm familiar with it but I suspect that not a lot of people in the room really understand what it is you do and why. If you could give us a little background on that and the relationship between the Vermont Energy Investment Corporation and the District, I think that would be very helpful.

MR. VANAMALI: Absolutely and thanks again for inviting me to speak. And when it comes to the opinions, they will be mine and not representative of VEIC or our client base in the District.

So the DCSEU in its most basic form is a public benefits program that exists in many parts of the country. The Vermont Energy Investment Corporation is a contractor that manages this contract. We won this contract in 2010, and 2011 was the first implementation year. A surcharge on the ratepayers in the District gets pooled into the sustainable energy trust fund which is managed by the District, and in turn funds the DCSEU.

MR. HINCKLEY: Thank you. Bracken, you're developing a microgrid at the old Walter Reed site. You're also the program administrator for PACE here in the District and I know you've got some other things that fit underneath your umbrella. Give us a little bit of a sense of why this market and why now.

MR. HENDRICKS: Yes. What you just described are two things that actually sound quite different in terms of business lines. One is really focused on project development, making microgrids work. About making distributed energy a viable capital investment, and a viable project development opportunity for folks whose core business is just to do bricks and mortar transactions.

The PACE program, which we operate on behalf of the District's Department of Energy Environment – which was newly-rebranded to elevate the role of energy, which we really like – is about program administration. Again, it's about helping to move capital into projects that are viable.

I just want to step back for one second and comment on the structure of this panel.

There's the old proverb about lots of different wise men touching an elephant. One's touching the ear, one's touching the tail, one's touching the skin. They're all describing something different, but it's all the same elephant.

We've got regulators. We've got very large utility companies. We've got advocates, start-up businesses, government programs. And we're all looking in at something very fundamental that's happening in the D.C. market. This is a very deep systemic change not only in the regulatory framework or the nature of the systems that we're building, but also a change in the fundamental strategic infrastructure underlying the entire economy.

Over the past decade or so, we've seen a complete transformation of telecommunications, the ICT (information communications technology) revolution. Now in energy, we're seeing new thinking about data systems, about management of the flow of information to access substantially new productivity, efficiency, and economic value, in the physical environment.

The movement from what really has already happened with telecom and with data systems is now happening in the real economy, including energy. If you think about that change, what we're doing is really pushing data-enabled networks into the physical economy in a pretty fundamental way.

That's what a microgrid is. You're pushing energy development out to the source of use and – for the first time – we're starting to manage energy efficiency as if it was a deployable, dispatchable resource.

It used to be that energy was a commodity that was produced and put out on to wires with no visibility and then wasted



at the endpoint of use. Now we have this multidirectional communication which is opening up markets in a very, very fundamental way.

I was especially impressed by what Rick said and what WGL is thinking through. Here, you've got a hundred-year-old utility in the heart of the community that is used to operating in a commodity market. And they're moving into a market where they're trying to deploy capital intelligently into innovative technology-led projects – and they're trying to actually change what is the product that they're delivering.

And reflecting on what Anne was saying about the regulatory environment, we now have to regulate differently for a new product in a changing market. All of us, with our own little slice of this, are struggling to figure out how to actively engage in something that's changing in real time.

MR. HINCKLEY: I think you really hit on something. We are right in the middle of an inflection point and a transition. It brings me back to something we had talked about a couple of days ago: when we think of the old grid and its purpose, it was a stable grid that provided universal service that allowed the cheapest possible centralized model. Now we're fundamentally changing that. We have to rethink what the goals of our energy infrastructure are. You've actually done some interesting thinking around this notion of what should those goals be as we go forward.

MR. HENDRICKS: If what I said is true, that we're actually changing the operating system for how energy works in the economy, then I think it's really useful to go back to what got us here because the existing grid is this huge success story.

So let's go back to rural electrification. It was a really hard business challenge to push capital investment those last miles into rural communities and figure out how to pay for all that copper wire. How do we actually make this work as a business proposition?

Well, we developed a whole utility regulatory framework and we developed federal policies and state and local policies predicated on economic development. We pushed billions of dollars into capital investment that made the U.S. economy the beacon of middle-class success stories and small town economic growth that rested on electrification of communities.

And so what were the goals that created that success story? Universal, reliable, affordable, safe energy, right? You can tick down that list of goals and check each box. We have occasional blackouts, but if we don't have electricity for a couple days we're up in arms because we're so used to that reliability.

If we're now building an energy network that rests on these distributed energy systems, including microgrids and residential solar feeding back into the grid helping to build reliability, voltage control and other ancillary services, well, now, you've got other benefits that need to also be managed through regulatory proceedings. And this is why public service commissions and the old regulatory framework are at the heart of this.

So you need transparent markets, right? So we need to have two-way visibility on data systems. You need resilience. What happens in a world where climate change is real and where infrastructure is being impacted by weather? How do we deal with those resiliency issues? It also raises tremendous issues of privacy. If my data is fundamentally part of the market but it also is my own personal data, what are my consumer protections? That raises a whole set of security issues – national security and personal security – that are related, as well.

And then how do we put the low carbon energy on? I think clean is something that we're used to thinking of as a constraint put on the grid but low carbon energy is fundamental. So how do we make solar succeed? How do we make distributed renewables a fundamental part of the business model so it's pro-business to make clean energy part of these new networks?

And I think each of us in our own way is really chipping away at pieces of that goal-setting.

MR. HINCKLEY: Anne, Bracken hit on a few different value concepts which are not traditionally built into how we think about setting the price for power in a regulated environment. How is that being addressed within the confines of the Public Service Commission now, and do you see that really taking on a quantifiable value as we go forward – things like resiliency, security, reliability?

MS. HOSKINS: I think that certainly you made a lot of good points there. One recent proceeding that we had, which is an example of the types of proceedings that I think a broader constituency should start participating in, is our reliability proceeding.

We have a rule (RM 43), which came out of the experience many of you probably had with the derecho storm a couple of years ago and concerns about reliability and resilience. The Commission spends a tremendous amount of time, based on the legislative mandate, developing metrics to improve reliability. In those metrics, we are very focused on reducing the time and frequency of outages. One opportunity which really has not made its way into that proceeding is to understand how else we can improve reliability as we go forward.

We will set metrics, which I think commissions are very good at doing, such as setting data points or specific rules. But what seems to be missing in some of our proceedings are the more forward-thinking concepts of what different approaches should we take to get to that next level of metric.

Now when we're in this reliability proceeding, clearly, we are required to look at costs. One of the challenges, as you look at the concept of performance rate-making, is that as we look at all these metrics we need to be very clear about what our objectives are, what the trade-offs are. Then we need to hear from different voices.

If I could leave any kind of message today, it is that, even if the commission doesn't have a utility of the future proceeding or a REV-type proceeding, a lot of these issues are making their way into other standing proceedings. In our case, it might be through our EmPOWER proceeding, our reliability proceeding, or rate cases, which we have quite

frequently at this time. I know it's difficult to participate in all of these, but all of these different issues are coming up in these different kind of stovepipe proceedings and we need help by hearing from different voices to figure out what those metrics should be.

MR. HINCKLEY: Absolutely. That's a lot to manage. Rick, I want to do a little more level-setting as we get ready to dig a little deeper into the opportunities out here.

You are not exclusively focused on solar. I know you've got some microgrid possibilities in your development plans. Can you talk a little bit more about the breadth of technology that you're deploying in this distributed end-use market?

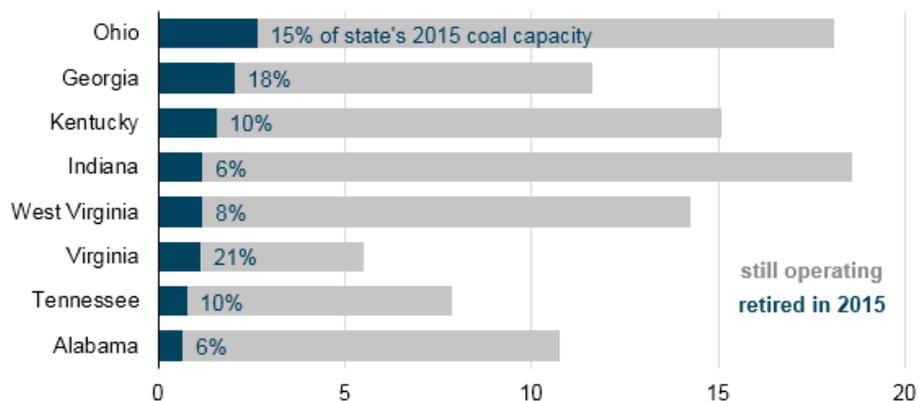
MR. MOORE: Sure. We think about having a diverse set of solutions and offerings as a way to serve our customers' needs and trying to address holistically their energy issues or energy desires.

One technology actually Anne and I were talking about over breakfast is fuel cells. At our own facility in Springfield, we have a LEED gold building. It's an interesting, I think, representation of how sustainable design can actually result not only in the environmental benefits of the LEED certification but also improve the quality of work life for your employees.

We have a Bloom Energy server deployed in our office there in Springfield. That fuel cell technology continues to gain momentum in the market and has strong support from WGL as we work with a number of providers to bring that kind of technology to the market.

Besides solar PV, we also are deploying solar thermal, and even have deployed some combination solar PV/thermal on residential properties on the West Coast, which is another interesting product.

Coal Plant Operating Status in Selected States *(net summer capacity, gigawatts)*



Source: U.S. Energy Information Administration, Form 860-M, Preliminary Monthly Electric Generator Inventory

We also do energy management. So we use software to help companies manage their energy spend and benchmark their energy use against industry standards. This also helps them compare across their own facilities how and when they're using energy in their larger facility footprint.

We are also continuing to look at energy storage. We've been involved in the energy storage market for some time but primarily as just an actively interested party. Now I think we've really turned the corner to look for tangible opportunities to deploy capital to stand-up storage. We're working with a number of smaller companies. We're talking to the big manufacturing companies. We're looking across the U.S. at the various geographies where solar storage works, primarily behind the meter. Although we are a utility, we're not an electric utility. So on-grid storage isn't really our primary focus. Rather, it's behind the meter storage for individual customers.

We're looking at wind investments. We're looking at biogas.

We're looking at waste-to-energy. We provide a carbon offset product. So that's what is in our stable at the moment.

We continue also to look at and work with other companies. I'm involved personally with a couple of energy incubators here in D.C. and also elsewhere. Their goal is to really identify real, ready-for-market products that are not currently being utilized but can be and should be as part of an all of the above energy strategy. What has been touched on so far is really this combination of a customer desire but also a framework that allows all technologies, not to be in competition with each other, but actually to work together to deliver all the benefits that we can for our customers and also our communities.

MR. HINCKLEY: Dana, programmatically, D.C. and Maryland have a really progressive set of policies compared to most of the rest of the country. But as I look at these markets, they're warm but not nearly as red hot as some other markets. I'm wondering if you've got a thought on what the hold-back is in these markets.

MS. SLEEPER: Yes, Maryland and D.C. are great examples of East Coast progressive markets. They have public service commissions and legislators who are very interested in progressive policies and looking at renewable energy.

That said, they're not necessarily as progressive as, say, California. That's just the reality. As Anne mentioned earlier, Maryland errs on the side of addressing specific issues rather than a holistic approach. So we might not see some massive piece of legislation in Maryland, saying we want a 50% RPS and all these other components as part of that. Rather, they tend to look at specific

items, like community solar, and study that and understand what the implications of such a program would be. In doing so, they take more incremental steps towards a renewable energy future.

There is a lot of development here and one of the things that a lot of the companies like in our region is the fact that it's not a boom-bust market. It's a very steady market. It's predictable and that's something that's been very helpful for companies looking to grow in the region. I don't necessarily see it as a bad thing. I think that we're going to eventually reach that scale but we're just taking slower steps to get there to make sure we do it the right way.



MR. HINCKLEY: Rick, thinking about this market compared to other markets around the country, I have a two-part question.

First, what is it you're looking for as an investor or a long-term owner of energy assets? Is it strictly a return-driven analysis or do you have a broader mandate?

Second, in looking at the D.C., Maryland and Virginia marketplace, what do you see as the restrictions or limitations on your enthusiasm for investment here?

MR. MOORE: Answering the first part, as an investor, we distinguish ourselves a little bit from the traditional investors in, let's say, solar as the example.

We are an energy company, looking for energy investments. We are looking to be long-term owners of energy-delivering assets. Folks in the market can talk about 10, 15 or 20 years as a long-term contract. Well, for us as a company 20 years is just not that long. It is our intention to serve our customers for at least that long and certainly well beyond that.

So we can be patient investors. When we enter a project as an investor, we're not looking for that first couple of years and an exit. We're looking to be participants in the life of that asset and to be involved with our customers for that entire time.

Also, as an energy investor, although we deploy our tax equity, we are not "tax equity investors." We're not looking solely for the monetization of rebates like the ITC, etc. Certainly that's a part of the financial component of the deal, but our interest is to leverage all available opportunities to make deals work for our customers and for our company.

We really look at these projects as energy projects – not as alternative energy projects, not as tax advantaged projects. These are energy investments, investments that we have been making, we are making, and we will continue to make.

AUDIENCE QUESTION: Distributed generation and distributed energy are also tied in to de-carbonization and we have some strict climate goals that we are looking to meet within the next few years – and, as you mentioned, that isn't a long time. How does the mainstreaming of climate mitigation and adaptation tie into what we're talking about here today?

MR. HINCKLEY: I think you hit on a great point. This goes to some of what Bracken was laying out. Bracken, when

you go out and talk to your investors and try to explain your vision, when you bring up things like climate, how do you frame that and how is that received?

MR. HENDRICKS: Right. And these two questions side-by-side are very interesting because one is talking about a very large overarching policy-driven goal but then the question is how do you actually get there and how do you build the project.

Having that policy certainty is certainly helpful, but what we're talking about is project-level investment – it's project finance. How do you deploy capital into a project knowing that you're going to have stable cash flows on a predictable timeframe?

One of the biggest challenges for us on the microgrid side has been putting together a project that's truly financeable. The problem is not the absence of capital; there's plenty of money circling in the U.S. economy. That money will flow to sensible projects.

Policy measures like the ITC create a stable flow that improves the return for these asset-level investors and it helps make the deal pencil.

At the end of the day, to achieve these carbon- and climate-driven goals, you have to translate them into transactions that pencil.

You mentioned the Walter Reed project. We were involved in helping a base-closing project. There was a competitive bid. A group of developers won the master development contract but, at the end of the day, they were real estate developers and they wanted to invest with a very specific risk profile in a very specific kind of asset. It was real estate. They knew how to deal with first costs. They knew what business they were in and how to manage the cost of building buildings. They didn't want to own a 20 or 30 year asset that's producing these lovely cash flows from selling energy. They're not a utility company. They're real estate developers.

We had to conceptually translate a clean energy project into a sensible layer in a larger real estate development. Then we had to look at what are the technologies, what are the capital solutions, and how do you structure it to bring in an outside investor who isn't a real estate developer but rather a company that wants to invest in long dated energy assets with very stable and predictable cash flows?

We brought in folks who were used to developing cogeneration projects. A lot of them looked at it and they said, “eh, it’s a small cogen project.” Then others looked at it as an optimization for thermal energy. But it had only a small group of customers and a small thermal load so it wasn’t that interesting.

But then when you started to layer in all these ancillary benefits to the grid – maybe we could monetize these ancillary services, maybe you could bring in solar and layer in large capital investments and get the benefits of the ITC, etc. You start stacking all of these sorts of benefits. Then you look at how to crush the cost side. Now you have a project that pencils and suddenly it makes sense to an outside investor. And the real goal is to bring in a long-term investor – and hopefully there will be some announcements there soon, and hopefully there will be more and more in Washington, D.C.

MS. HOSKINS: Certainly in Maryland, the climate goals that were set a few years ago ended up being very important policy drivers that helped support the eventual legislation and regulations that came after that. It’s a very important construct for us to be working under because that supported why we would be expanding our energy efficiency goals. It supported why the RPS was important. And the new Administration in Maryland has also just stated its continued commitment to these climate goals.

We see it in our energy efficiency proceeding. One of the issues in our last set of hearings on the subject was how do we analyze whether energy efficiency is effective. There’s a lot of debate around what the tests should be. One of the tests is the societal benefits test, which takes a broader view. We as a Commission did adopt the use of the societal benefits test as one of the metrics to look at when we’re trying to decide has this retrofitting or have these audits made a difference.

So from my experience, those goals are much more effective than some people think. They help us stay focused on what the rationale is for all these initiatives.

MR. VANAMALI: And I was going to quickly add that one way to align all our objectives with our climate goals is to marry climate goals with the price of carbon. So that way, when Bracken goes and tries to sell his green microgrid, he doesn’t have to make the moral case for it necessarily. There is a clear revenue stream that comes from selling the carbon credits.



MR. HINCKLEY: I want to refocus on investment, both in terms of the way you’re pursuing projects but also how you’re communicating this to investors.

What we’re talking about is the distributed market. These are small projects but they are often just as complex to execute as large projects. And there’s not nearly as much room in there to solve that complexity.

We spend a lot of time thinking about the process improvements or the standardization process that we can bring to the table to help get these deals done, including for example pricing portfolios on a per-watt basis.

But I’m curious, how do you address this fundamental shift in your approach to the energy marketplace? For big infrastructure projects, it didn’t really matter what a lot of those transactional pieces were because you still had plenty of room to get to that return. In an energy marketplace that is much more fragmented, is it difficult to work through on a bit-by-bit basis?

MR. MOORE: The key to that, as you described it, is there really needs to be a process and a function in your company to be able to evaluate and pursue projects or a large number of smaller projects. We’ve built that capability, leveraging some of the skills we have already. For example, in the retail market space, we have a credit evaluation process and a team. So we can bring that experience to try and more rapidly and comprehensively assess a series of small C&I solar projects, for example.

We also balance the evaluation of all those technologies and projects by having a diverse portfolio. By having

different types of projects, we spread our portfolio across a number of segments, so we're not, for example, solely weighted in solar.

On the transaction costs, at least in solar – small and medium C&I – we have standard paper now. Specifically, these are EPC criteria and components of an EPC. We've got a standard PPA. These documents are open-sourced, they're not proprietary. We've developed them over time and released them to the market. Now we're even seeing developers come back to us with our own paper, saying, "hey, would you be interested in a project that looks like this?" And we say, "yes, we really like the look of that paper."

That is really helping us to drive down the transaction costs. Like anything else when you start to build the function and you start to build the experience, then you just start having that comfort and capability to drive a larger number of projects through your funnel.

I think it's really required. It would be very difficult to recreate documentation for each – for example – small ground mount solar for an individual customer in a geography you've never been in before where you need to identify all of the components of the state incentives. If you're driving that for every project incrementally, that's a very, very difficult way to run a business.

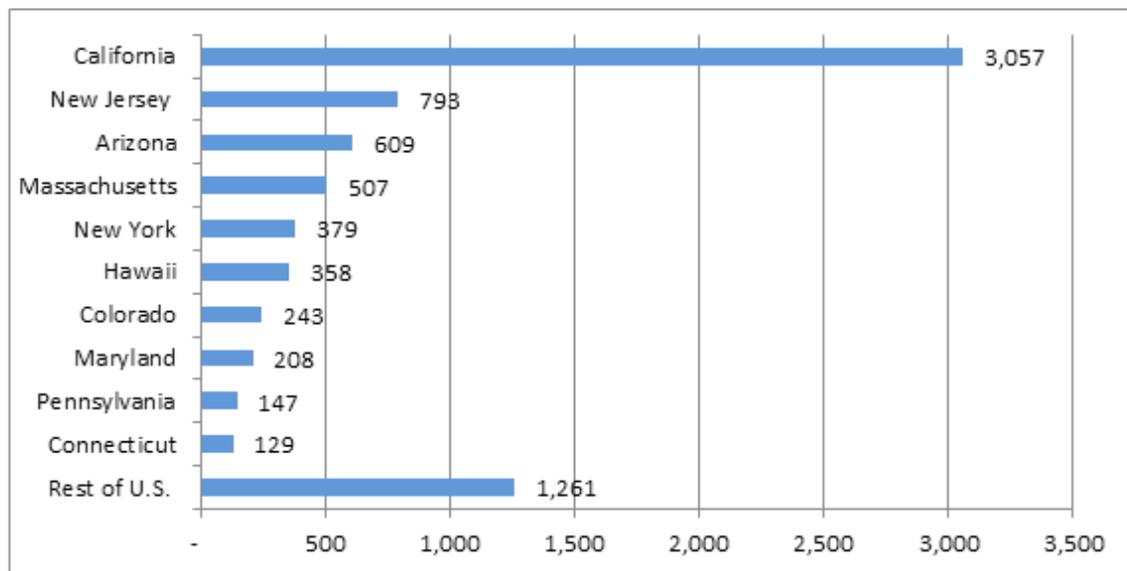
MR. HINCKLEY: Bracken?

MR. HENDRICKS: May I just jump in? This whole question of aggregation is huge and it's fundamental to building a market. We already have a lot of functioning markets that already do this. One of them is the real estate market. You have billions of dollars flowing through tiny decisions every day. One of the things that the D.C. PACE program (that Urban Ingenuity runs) and the DCSEU are trying to do together right now is create an integrated program for boiler replacement. People are investing in new boilers every day.

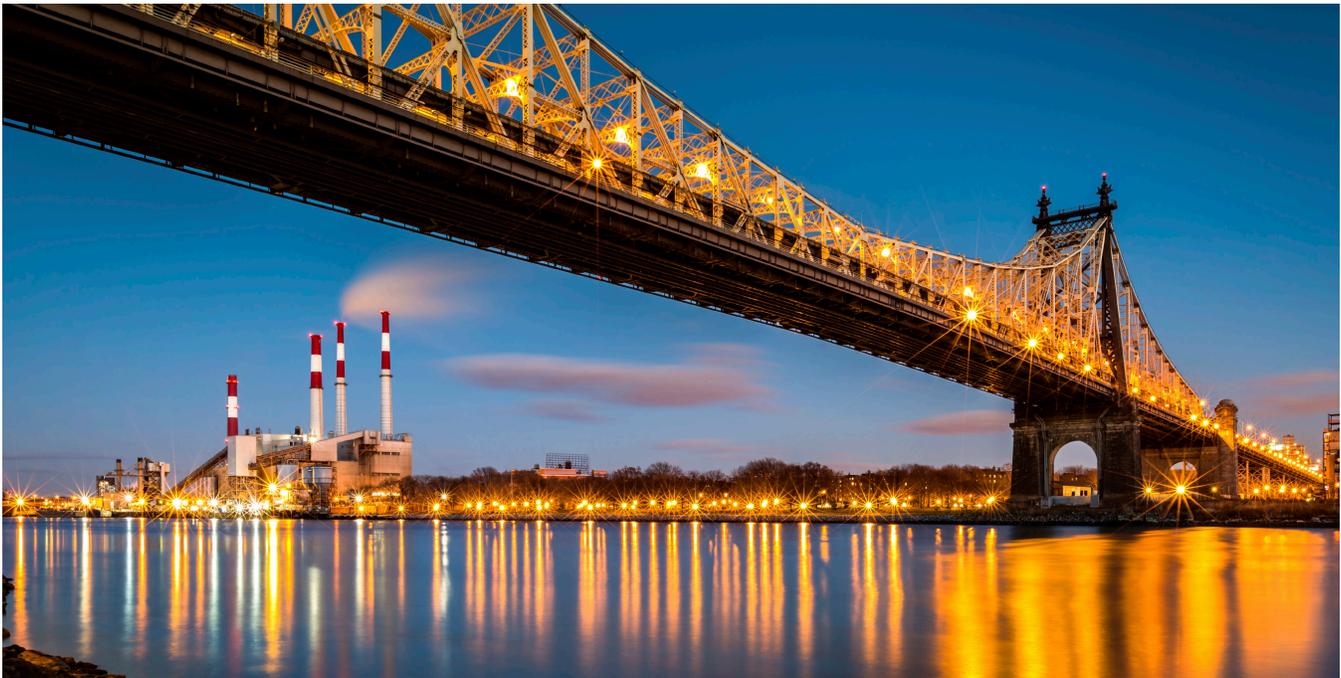
The question is how do we get some good incentives out there and get information to the point of crisis when there's a pain point. At the end of the day, as climate-motivated as a building owner may be, they're not necessarily going to think to swap out a \$500,000 system in their apartment building based on climate. However, there's this one moment when they're nearing the point of failure, when you can have a massive impact on that half-million dollar investment. If you do that 20 times, suddenly you're starting to have meaningful scale and you're aggregating.

Another place where this kind of aggregation has happened very successfully over the last 20 to 30 years in the U.S. economy is in affordable housing. There's this tremendous market that's massively underserved. We have things like

Distributed solar PV installed capacity, top 10 states, as of September 2015 (megawatts)



Source: U.S. Energy Information Administration, *Electric Power Monthly*



the Community Reinvestment Act. We have incentives that recognize a public good in making sure that low-income people can actually live in quality housing. You have little tax incentives and all these other incentives available and you have a whole industry where people layer low-cost debt, different sorts of subsidies and they put these projects together and they work.

MR. HINCKLEY: Anmol, you're trying to solve in a lot of cases what have historically been treated as unsolvable problems in trying to penetrate some parts of the market that just don't fit these traditional finance models. And you do this on a fairly tight budget. How do you do that?

MR. VANAMALI: Discounted legal rates help. (Laughter.)

I'm kidding. You hit on a great point. Scale and complexity are especially acute when you're looking at certain tough-to-access markets, like low-income single-family residences or other smaller affordable multifamily housing space. For us, the solution lies in aggregation and standardization. We're trying to make sure that the efficiency of doing that eliminates the brain damage one does working on these small projects.

On the energy efficiency side, we are launching, in partnership with D.C. PACE, a lending tree type of platform where we're aggregating the pipeline of projects. We occupy a unique position in the District where people come

to us looking for something that will help them reduce their costs. Our efforts are to help reduce the transaction life cycles of both the supply and demand side of finance.

MS. SLEEPER: I do also want to put in a quick plug about something that might be of interest in Virginia. I know that everyone views Virginia as the red-headed stepchild of this region for solar, and it is not everyone's favorite project location.

But there are some changes happening in the state. Just two days ago, the Attorney General's Office, in a brief in one of the proceedings we're in, said that PPAs are legal within APCo territories. So for those of you who engage in PPAs, I'd suggest that you again start looking at Virginia. There are opportunities that are opening up.

MR. HINCKLEY: Thanks to all of our panelists for a great discussion.

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For more information contact Elias Hinckley at ehinckley@sandw.com or 202-775-1210.
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FEDERAL UPDATE

Interview with 38 North Solutions

The market is responding to Congressional extension of the PTC and ITC energy tax credits. Significant developments at the Supreme Court have boosted FERC's demand response while delaying progress on EPA's Clean Power Plan – at least temporarily. The experts at 38 North Solutions discuss the implications and what we can expect from Washington, DC in coming months.



In February the EDGE Newsletter editors spoke with Katherine Hamilton, Principal at 38 North Solutions and a co-host of the Energy Gang podcast, and her colleague Jeff Cramer, also a Principal at 38 North Solutions, to learn about what is happening on the policy front in Washington, DC and key states.

EDGE: The Congressional extension of the investment and production tax credits in December arguably was the most important development for distributed energy in 2015. How are the markets reacting?

MS. HAMILTON: The federal tax credit extensions have given much-needed long-term certainty to investors, so we are seeing markets solidifying in response to the federal action. Fights over policy issues such as renewable energy portfolio standards and net metering are continuing in states, however, and these disputes could introduce additional uncertainty, depending on the issue and state.

EDGE: Are you seeing renewed vitality for demand response programs in the wake of the Court's decision in *EPSCA v. Federal Energy Regulatory Commission*? What are the implications for distributed energy companies?

MS. HAMILTON: FERC Chairman Norman Bay sent a clear signal during the National Association of

Regulatory Utility Commissioners Winter Committee Meetings that FERC will be in implementation mode for Order 745. I think having this ruling behind us will allow FERC to consider other market products that could incentivize distributed resources to participate in wholesale markets in more beneficial ways.

EDGE: News from the Supreme Court has been huge. First, a 6-2 opinion supporting FERC's demand response program, then a 5-4 decision staying EPA's Clean Power Plan, and most

recently the passing of Justice Scalia. Assuming Republicans stick to their position of not considering an Obama nominee, do you expect the Supreme Court debate will elevate the importance of climate and clean energy in the November elections?

MS. HAMILTON: We have not heard much about the Court's impact on the Clean Power Plan in the primary debates, but perhaps once the general election starts we will hear more about climate change as an issue. Both Democratic



candidates have been outspoken about clean energy, but the GOP field has been virtually silent on the topic thus far.

EDGE: Energy storage and hybrid distributed energy solutions are gaining market traction. What are the most important regulatory issues for these technologies in key state utility commission proceedings?

MS. HAMILTON: Key to inclusion of distributed energy innovation from the regulatory perspective are: planning processes (as with Integrated Resource Planning); procurement initiatives (such as the California energy storage goal); and state leadership (as in the Hawaii

100% renewable energy mandate). Legislatures also impact markets with tax credits and accounting structures like net energy metering. States and utilities with continued aging plant closures will be looking for additional clean energy resources to backfill—and they may try creative incentive approaches to spur that development.

EDGE: Integration of data technology into utility distributed energy programs is emerging as a major value driver in utility reform programs in places like New York and California. How are technology companies participating in the transformation of the grid? What are the key policy issues you are seeing?

MS. HAMILTON:Technology companies are in many cases partnering with utilities on grid modernization. Consumers are also important to the entire process, either passively or in a more active way. Allowing consumers to access their own energy data (and then giving third parties permission to use it) is critical to consumer engagement on any level.

EDGE: Thanks to both of you. We will look forward to catching up later in the year on these and other energy policy developments.



REPORT FROM THE STATES

A bevy of state policy and regulatory battles continue to shape the trajectory of distributed generation. Key states are currently debating changes that could threaten deployments, particularly for rooftop residential and commercial installations. Other states are moving ahead with legislation to open up markets. Our friend Robert Rains, an Energy Analyst at Washington Analysis LLC, contributed to the following report:

December's multi-year extension of the 30% Investment Tax Credit (ITC) removed a key uncertainty for the entire U.S. solar sector; however various state level battles will ensure that growth prospects more locally could be mixed throughout this year and 2017.

While certain states will retain generous incentive regimes, including California, others like Nevada are likely headed in the opposite direction, with negative implications

for rooftop installers and inverter providers. Numerous proceedings over net metering are ongoing, and could limit the growth of rooftop firms seeking to establish themselves in new state markets.

Despite the ongoing risks to net metering, we expect more states to join California, New York, and Hawaii and raise their renewable generation mandates, serving as the tide that lifts all utility and commercial scale solar boats.

Furthermore, we expect 2016 will show greater deployments of solar in previously lackluster state markets like Georgia, Mississippi, South Carolina, Texas and Virginia, due to favorable policy changes and the continuing decline in costs that should make this technology attractive to regulated utility firms like Dominion, Duke, and Southern Company. Conversely, markets which were strong in 2015 such as Nevada and North Carolina could see fortunes change due to negative policy changes.

Northeast

Massachusetts



On April 11, Governor Baker signed a new comprehensive solar bill which represented five months of compromise between the House and Senate. The new law lifts the net metering cap for public and private projects by 3 percent. Observers have noted that the raise should help reduce the existing logjam in the market. However, it is believed that this solve will only remain effective until 2017, when the cap is expected to be hit again. While the cap has been increased, the new law also lowers the reimbursement rate by 40 percent from the retail rate for most new projects. This measure was introduced to address utility concerns regarding cost sharing in the rate base. The legislation also directs the Department of Energy Resources to develop the long-anticipated SREC III program. While solar advocates have long expressed concerns over the project congestion which has built up in the absence of clarity on post-SREC II and net metering plans in the state, many are nonetheless dissatisfied with the deal. In particular, many concerns have arisen over the reduction in the value of net metering credits for new projects. In addition, proponents have voiced concerns over the concept of a minimum charge which would imposed by utilities on net metering customers, a concept that has been seen in other states recently. Most concede that the bill is more likely to be a stop-gap than a final solution.

New Hampshire



The Granite State's cap on net metering is likely to increase from 50 MW to 75 MW as the Senate approved an increase earlier this year and the House recently passed HB 1116 on a voice vote. The bill is ultimately expected to pass with amendment, though it is possible that some reduction in incentives could ultimately be paired with the rising cap.

New York



Solar policy in New York will be dominated over the next year by the ongoing Reforming the Energy Vision proceeding. A Public Service Commission comment period on the state's net metering policy closed last December. It is likely that changes will be coming to net metering policy in the Empire State over the next two years as the state seeks to replace net metering with an increased ability to sell to the broader grid at set values. These changes are intended to facilitate greater opportunities for interaction with the grid. Solar advocates see these changes as potentially difficult to implement but nonetheless preferable to initiatives in other states to roll back net metering policies without replacement plans.

Vermont



In recent months, Vermont has implemented several policies to help stimulate solar growth, including broadening the types of systems eligible for sales tax exemptions and an expedited permitting process for small systems. These changes follow the implementation last year of the state's renewable portfolio standard which requires utilities to procure 55% of their electricity from renewables by 2017 and 75% by 2032 and continues Vermont's positive stance toward solar energy.

Southeast

Florida



A measure to support a right to solar, but not to expressly allow third-party ownership in the state was argued before the Florida Supreme Court on March 7, with our base case that this provision will be permitted to be on the ballot for voters November 8. Solar advocates argue that the measure, which is generally supported by utility companies, does nothing more than what is already allowed under Florida law and is intended to both confuse voters and deter change. If they lose before the state courts, supporters of third-party models will likely try again in 2017 to get a competing measure, dubbed "shady solar" by Florida Power & Light, onto the ballot. Despite seemingly favorable conditions for solar deployment, the "Sunshine State" nonetheless remains one of the most difficult for rooftop solar.

North Carolina



A 35% state solar tax credit expired for most projects at the end of 2015, and revival remains unlikely. State law forbids third-party ownership, which has largely kept rooftop firms out of the state, even as solar deployment linked to utility-signed power purchase agreements grew significantly. While a Greensboro church is currently seeking a reinterpretation of state law to allow third party arrangements from the North Carolina Utility Commission, Duke Energy has strenuously objected to the church's "test case" – going so far as to suggest fines against the non-profit group selling panels to the church.

Maryland



The state legislature is likely to pass a bill to raise the state renewable electricity mandate to 25% by 2020 before adjourning in April. Democrats have a veto-proof majority and can move legislation even without support of Republican Governor Larry Hogan. The bill includes other provisions favorable to solar, including the creation of a renewable energy workforce development fund and increasing the solar carve-out requirement.

Mississippi



The Mississippi Public Utilities Commission finalized its latest extensive rulemaking process last December and declined to implement a traditional net metering policy in the state. It did establish a method to compensate and incentivize behind the meter electricity generation, but the program only allows the netting of electricity use to occur on an instantaneous basis. Any electricity exported to the grid will not be used to ‘net’ the customer’s monthly electricity use. Instead it will be credited at the utility’s wholesale avoided cost rate plus an additional premium, which combined is still substantially lower than the full retail rate.

Virginia



While Virginia has not historically offered robust clean energy incentives and programs, and while many hurdles to residential and commercial and industrial development remain, Governor Terry McAuliffe has been more receptive to solar in recent months. In addition to the recent release of an RFI on potential public-private partnerships, the Governor has mandated the use of solar energy at state office buildings. He has also stated a goal to entice solar manufacturers to the state. However, solar developers have yet to gain traction in the state given the lack of availability of third-party ownership models, which likely means that solar ownership will continue to be dominated by Dominion Power in the years to come.

Midwest

Iowa



Iowa’s Wind Energy Coalition, chaired by Governor Terry Branstad, announced in January that it was adding solar energy issues to the Coalition’s portfolio, following a unanimous vote from member governors. The Coalition also announced its new name: Governors’ Wind and Solar Energy Coalition. “We are proud of Iowa’s leadership in wind energy and we are also encouraged by the recent growth in solar energy. The addition of solar to the Coalition’s portfolio represents a commitment to future economic and renewable energy growth, and further diversification of our nation’s energy portfolio,” said Branstad.

Illinois



In 2015, the Illinois legislature introduced H.B. 2607 and companion bill S.B. 1485, which would strengthen the state's current renewable portfolio standard and remove caps on energy efficiency investments. The bills would increase energy efficiency standards from 13% to 20% by 2025 and renewable energy standards from 25% to 35% by 2030. The bills also authorize the Illinois Environmental Protection Agency to establish a program where the agency could sell carbon allowances at an auction and invest the proceeds, primarily in energy efficiency and renewables. Despite a number of legislators signing up as co-sponsors in both chambers, this measure has yet to gain traction and no votes are currently scheduled.

Michigan



Efforts to pare back net metering benefits, contained in S.B. 438, will likely be watered down by House lawmakers in compromise energy legislation that is increasingly unlikely to pass this session as ongoing controversy over Flint's water consumes oxygen in the legislature.

Ohio



Net metering modifications by the Public Utilities Commission (PUC) remain a possibility following an ongoing lawsuit over recognition of these systems by American Electric Power and FirstEnergy. Governor John Kasich (R) has publicly indicated his support for the state's renewable electricity standards, which go back into effect in 2017 unless further modified by the GOP-led legislature, something that looks increasingly likely this year. Still, as part of a recent settlement in exchange for an eight-year power purchasing agreement, AEP is poised to quadruple solar deployments in the Buckeye state by 2021 to 400 MW. Commission approval is favored for AEP this spring.

Wisconsin



In early 2015, the Public Utilities Commission approved new charges imposed by utilities on customers who installed solar. The fee was meant to ensure an allocation of grid maintenance costs was attributed to solar owners, according to utility representatives. Litigation, which was resolved in November, led to the removal of the fee, though proponents were unable to get lower net-metering rates and certain other fees removed. The effort by the utilities in Wisconsin to allocate grid maintenance costs to solar owners is representative of other similar approaches being deployed by utilities across the country.

West

Arizona



The sudden departure of former Arizona Corporation Commission Chairman Susan Bitter Smith complicates Arizona Public Service's efforts to raise monthly fixed fees as part of its next rate case, which we expect to be filed June 1. Last August, the Commission approved on a 3-2 vote the preparation of a cost-benefit study of rooftop solar that was likely to lead to an approval for higher monthly fixed fees. Newly appointed Commissioner Andy Tobin has indicated he will not vote in cases pertaining to SolarCity due to a relative's employment with the firm. His recusal means that the Commission could deadlock at 2-2, denying Arizona Public Service higher fixed fees as part of its rate case. To this point, a \$21/mo. fee for new solar ratepayers is likely to be on the table, but the vote may not occur until June 2017.

California



The state utility commission's decision to largely preserve its current net metering tariff, but add interconnection fees to new solar ratepayers represents a clear positive for the industry with limited implications for other states that are currently reviewing net metering policies. California will likely shift towards default time-of-use retail rates in 2018 and a forthcoming general rate case for Pacific Gas and Electric will dive deeper into demand charges, which may not be adopted by California's utilities until 2019.

Colorado



The Public Utilities Commission recently rejected an agreement reached between Xcel Energy and several solar developers under which Xcel would have obtained energy from solar garden projects owned by the developers to help it meet its obligations under Colorado's renewable portfolio standard. The Commission focused on Xcel's failure to utilize a Commission-approved competitive process when determining the value of renewable energy credits which would have been paid to the developers. This was particularly sensitive given the fact that renewable energy credit values had turned negative last year, leading some to argue that the deal struck by Xcel was not in the interest of ratepayers.

Hawaii



Earlier this year, Hawaiian courts upheld the state utility commission's decision to end its current net metering structure in an October order. Hawaii Electric was authorized to slash net metering incentives from \$0.34 per kilowatt-hour to about \$0.15. While the state now has a 100% renewable electricity standard by 2045, we expect Hawaii Electric, assuming it is successfully acquired by NextEra by mid-2016 or later, to be able to rate base significant amounts of renewables.

Nevada



On December 22, the Nevada Public Utilities Commission approved a series of devastating changes for existing and new net metering customers that were recently reopened to be phased in over 12 years. In addition to roughly tripling Basic Service Charges for solar customers, rooftop generated solar would be purchased by NV Energy at a significant discount. Efforts to roll back the Commission's decision via referendum appear to be gathering momentum and likely to be on the ballot this fall, potentially providing an opportunity for scorned solar firms to return to the state in 2017.

Oregon



Oregon is likely to raise its renewable portfolio standard to 50% by 2040, joining California, Hawaii and New York in having one of the most aggressive renewable mandates in the country. The increase has been publicly supported by two of the major investor-owned utilities in the state (a third utility and consumer-owned power companies will not be impacted by the change) after long-term negotiations.

Utah



Observers believe that the rate case Rocky Mountain Power is likely to file this year will again seek a facilities charge for net metering customers and a reduction in benefits. A cost-benefit study of the net metering program was completed late last year that likely sets the stage for negative changes to the tariff, despite public outrage over the issue.

Global Perspective: COP 21 – Clean Energy after Paris

By Jim Wrathall and Morgan Gerard

The United Nations Framework Convention on Climate Change, Twenty-first Conference of the Parties (COP 21) climate accord reached in Paris was a watershed moment. But in the words of European Union Energy Commissioner Miguel Arias Cañete, “the hard work has only just begun.” The new agreement may bring nations’ strategies on emissions into greater harmony as it allows each country to set its reduction targets. To evaluate progress at the national level, the UN will conduct assessments over incremental years to determine whether nations are fulfilling their decarbonization pledge with a mechanism for adjustment.

United Nations Policy Analyst and Global Strategy Advisor of the Citizens Climate Lobby, Sarabeth Brockley, believes that the climate agreement could be the inflection point that shifts private sector actors across the world to recognize that energy investments in renewables are the planet’s future

while fossil fuels are a riskier financial proposition. The markets may follow Ms. Brockley’s theory, and in the aftermath of the COP 21 agreement solar stocks surged while fossil fuel tumbled.

As Ms. Brockley observed “you notice the presence of the “Google, Facebook and Ben & Jerry’s booths—all being very vocal about the role that they are playing.” As large power purchasers, the support of these companies could provide a catalyst for renewable generation and the diversification of the composition of the U.S. power grid. With the leaders like Apple and Microsoft in play and in some cases opting to leave the grid entirely citing energy security concerns—power providers will certainly begin to take note rather than suffer the pain of losing their prime customers.

While world leaders still need to chart out a clear course of action for meeting the targets of the deal, policymakers

are now looking ahead to COP 22 in Morocco and seeking consensus to put a price on carbon. In September 2015 China made a landmark commitment to start a national program putting a price on greenhouse gas emissions. Depending on the outcome of the November elections, a binding international agreement on a price for carbon may be a tipping point for U.S. action as well.

Microsoft is leading the way and already accounting for the price of carbon internally, which managers observe is both changing internal behaviors and saving the company \$10 million plus annually. Many fossil companies are already pricing carbon, as examples: ExxonMobil is assuming a cost of \$60 per metric ton by 2030; BP currently uses \$40 per metric ton and; Royal Dutch Shell uses a price of \$40 per ton. The 2016 COP meeting in Morocco may be able to leverage these private sector and other analyses in justifying a price on carbon.



Energy industry developers and investors would do well to be ahead of this curve – especially in the face of divestment, which as Ms. Brockley notes is starting to see real momentum. The unknowns surrounding fossil fuels and their continued dominance are mounting and long-term uncertainty may create intolerable project risk. The COP 21 promise of emissions reductions coupled with the threat of a future carbon tax and the divestment trends will tip the scales even further towards a more diversified energy future.

For more information contact Jim Wrathall at jwrathall@sandw.com or 202-775-1206.

ABOUT THE AUTHORS

EDGE Advisory is a publication of the Energy Finance Practice of Sullivan & Worcester LLP. It is edited by Jim Wrathall, Elias Hinckley, and Merrill Kramer. Additional contributing authors include Hayden Baker, Joshua Sturtevant, Van Hilderbrand, Jeffrey Karp, and Morgan Gerard, of Sullivan & Worcester; Katherine Hamilton and Jeffrey Cramer of the energy policy firm 38 North Solutions; Rob Rains of the advisory services firm Washington Analysis LLC; and David Sweet, Executive Director of the World Association for Decentralized Energy.



In addition to heading Sullivan & Worcester's Energy Practice, **Elias Hinckley** has been the leader of the alternative energy practice for one of the world's largest professional services firms as well as the clean energy and cleantech leader for two AmLaw 100 law firms. Elias is a professor of international energy markets and policy at Georgetown University, and a frequent author and speaker on energy related topics. He has served as an advisor to several energy companies as well as an energy focused venture fund and he is a member of the Board of Directors for the Clean Energy Leadership Institute.



Jim Wrathall represents investors, developers and non-governmental organizations in energy finance and acquisition transactions and policy matters. Jim served as Senior Counsel to the U.S. Senate Committee on Environment and Public Works from 2007 through 2011, handling clean energy and climate change legislation and oversight. Jim also has over two decades of experience with AmLaw 20 law firms, including 11 years as a partner at a major Washington, D.C. firm.



Merrill Kramer is Chair of Sullivan & Worcester LLP's, Sustainable Energy Practice. He represents some of the most active and innovative players in the energy industry. Merrill has been ranked as one of the top energy lawyers in the United States by Chambers USA, by Washington, D.C.'s Super Lawyers as one of the top Projects lawyers in Washington, D.C., and by The Legal 500 as a leading derivatives lawyer. He has advised Fortune 200 and other clients on the development and financing of over 70 energy and infrastructure projects representing more than \$20 billion in invested capital.



Jeffrey Karp advises clients in renewable energy and energy efficiency matters, including infrastructure development. He also represents clients in litigating and resolving disputes under a variety of federal and state laws.



Hayden Baker draws upon his combined environmental, energy and corporate expertise to assist clients in mergers and acquisitions, energy and infrastructure projects, securities offerings and financing transactions. His experience spans a variety of energy technologies including wind, solar, natural gas-fired generation, district energy, landfill gas and biofuels.



Joshua Sturtevant represents clients, including early stage companies and funds, in energy project development and project finance transactions, policy and regulatory matters, and corporate development matters.



Van Hilderbrand's practice focuses on energy finance projects, regulatory compliance, environmental, and permitting matters. Van represents a diverse set of clients across energy sectors with project development and project finance transactions.



Morgan Gerard is an Environmental LL.M. Candidate at the Georgetown University Law Center, and a Research Assistant with Sullivan & Worcester LLP where she specializes in energy market analysis.



A co-founder of 38 North Solutions, **Katherine Hamilton** cut her teeth designing electric grids at a utility, performed energy and water efficiency research at a national lab, then used her technology expertise working on clean energy policy and leading trade associations that could move the needle on bioenergy, smart grid, storage, and demand response. She now spends most of her time shaping federal and state energy, environment, and tax policies, as well as engaging in regional energy markets.



Also a co-founder of 38 North Solutions, **Jeff Cramer** has spent the last five years working as a public policy analyst and advocate on behalf of a variety of leading businesses and non profits across the clean energy value chain. Previously, Jeff worked in the finance sector developing expert networks of thought leaders in emerging technologies for institutional investors. He now spends a great deal of time working on state policy for distributed energy technologies.

ABOUT THE EDGE PARTNERS



Sullivan & Worcester is a mid-sized full services law firm with offices in Washington, D.C., New York, Boston, and London. S&W's Energy Finance Practice designs solutions for complex financing challenges, including the integration of new technologies and related financial innovation for the power generation industry, as well as the deployment and commercialization of advanced energy technologies and distributed generation projects.



38 North Solutions is a boutique consulting firm that provides a suite of business strategy and public policy services to innovative businesses and organizations. Based on our firm's expertise and deep experience in clean energy, entrepreneurship, environment, sustainability, technology, and venture capital fields, we help our clients navigate market and policy challenges and opportunities.



EDGE Advisory provides current, actionable updates and intelligence developers and investors in the distributed energy space. Our news and analysis covers markets trends, innovative financing, federal and state policy and regulatory developments, international issues, and predictions for the future.



WADE, the World Alliance for Decentralized Energy, works to accelerate the worldwide development of high efficiency cogeneration, onsite power and decentralized renewable energy systems that deliver substantial economic and environmental benefits. WADE works with chapter organizations around the world, gaining market intelligence and collaborating with local governments and businesses to advance decentralized energy.

For more on the topics discussed in this issue of EDGE Advisory, along with continuing updates and perspectives on market trends and policies, please register for S&W's blog, The Energy Finance Report: www.energyfinancereport.com

