Demand Response
The Road Ahead

A report from the Evolution of Demand Response Project (EDP)

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I. Executive Summary

Early in 2015, a diverse group of parties formed the Evolution of DR Project (EDP). The participants recognized the potential state of flux in wholesale DR markets due to the U.S. Court of Appeals for the DC Circuit having in the fall of 2014 issued a ruling which vacated Order 745 which had been previously issued by the Federal Energy Regulatory Commission (FERC). Order 745 established a methodology for determining wholesale energy market payments that would be applied to both demand response (DR) and conventional generator-supplied energy. This order was challenged by several entities, who claimed that the methodology was flawed, that the process used by the FERC to arrive at Order 745 was arbitrary and capricious, and that the FERC did not have jurisdiction over DR in wholesale markets because the approach taken by Order 745 interfered with the States' exclusive jurisdiction over retail customers.

As a result of this court action on Order 745, the project participants wanted to discuss whether steps should be taken to make alternative plans for the delivery of DR into wholesale markets. The participants were experts and/or practitioners in the area of demand response, or were those with a key interest in demand response from a stakeholder or policy standpoint.

At around the time that the project began, however, the U.S. Solicitor General appealed the DC Circuit Court decision to the U.S. Supreme Court. The Supreme Court ultimately accepted the case.

Given the uncertain nature of the court proceedings, the group determined that its best effort would be to explore how DR has evolved and should evolve, especially in the context of an electricity system that appears to be moving towards increasing reliance on distributed energy resources (DER) and more dynamic distribution systems. The goal would be to provide useful observations, information and recommendations to policymakers, utilities, third-party providers, and stakeholders regardless of the outcome of the court proceedings.

This *Report* identifies a number of objectives for DR that need to be addressed, why each was chosen, what the challenges in addressing them are, what the expectations are as to what is and will be happening, and the group's recommendations to policymakers, practitioners and stakeholders.

Key Take-Aways

The U.S. electricity system is extremely diverse, with multiple types of utilities accompanied by their own respective jurisdictional regimes, with parts of that system contained in competitive retail markets and others not, and with parts of that system operating in regions with organized wholesale markets and in regions made up of vertically integrated utility systems. Thus, it is difficult, as was clearly evident in the dialogue, to arrive at "one-size-fits-all" types of recommendations and guidelines. But there are some key take-aways from the discussions that the group identified as key to the continued, successful evolution of DR. They include the following:

a) Establishing Price Signals

One form of DR has at its core function customers responding to time-varying price signals, and adjusting their usage of electricity accordingly. While other compensation and incentive methods are important in helping ensure that utilities and ISOs/RTOs have access to this type of resource, without establishment of price signals to customers, DR cannot fulfill its potential. These price signals can be provided to customers in multiple ways via different pricing models and rate designs. Given that the vast majority of residential customers are not exposed to price signals, this important area provides ample room for development.

b) Understanding the Duality of DR

DR throughout its history has very often been viewed as "something different—not quite efficiency, not quite supply." The fact that DR is a load-modifying resource that is sometimes paid as though it were a supply resource is what causes much of the confusion and debate among practitioners, policymakers and stakeholders. The dialogue demonstrated that it must be viewed in the aggregate and that duality is introduced depending on the specific design of a program or market. This understanding should be incorporated in policy development and in the planning and operation of the electricity system in both organized and vertically integrated markets.

c) Understanding and Accepting DR as a DER

The first image that leaps to mind when one says "DER" (Distributed Energy Resource) is likely roof-top solar panels. That is clearly a supply resource, as is a wind installation or combined heat & power (CHP). But DER must be seen as a category that does not only include generation resources. It includes storage, which is not a form of generation but yet acts as a supply resource when it stores energy/electricity to be used later by a building or the electricity system. It also includes DR, which is equivalent to and can act like a generation-type DER. DER policy and deployment that develops in coming years must recognize and incorporate DR.

d) Viewing and Accepting DR as a Form of Energy Efficiency

During much of the time that DR has been part of the electricity mix, it has been viewed by many as "something different" from energy efficiency. Others have viewed it as a demand-side option that was "not as good" as traditional end-use efficiency. It must be understood at this point that DR is simply a different type of energy efficiency—a more dynamic and controllable type but yet still one that has the aim of increasing the efficiency of how a customer uses electricity. The new term intelligent efficiency may begin to serve as a blending agent that integrates traditional efficiency with DR.

Development of demand-side policy and programs, and delivery of demand-side offerings to customers, must view traditional efficiency and DR in a holistic, integrated manner for purposes of program design and delivery.

e) Accepting DR as Equivalent to Generation

At this point, DR has demonstrated that it can serve as a reliable and economic resource for wholesale markets and integrated resource plans. It has demonstrated its ability to mitigate market power that can arise in a generation-only market. Evolving policy and business models may require additional DR models, but these additional models should not be a threshold to the continued use of DR throughout the U.S. in both organized and vertically integrated markets.

f) Deploying and Utilizing Advanced Metering Infrastructure (AMI)

AMI has been and continues to be deployed in the U.S., although some states and utilities still need to move forward on this front. Installation of AMI is only the first step, however. The presence of AMI should be utilized by putting rates and prices in place that allow its time-based measurement capability to be put to use. Time-varying rates and dynamic prices are an important form of DR that is ready to be deployed now that AMI is in place. AMI should also be allowed to enable a broader, more diverse portfolio of offerings of incentive-based DR programs that require interval meters for settlement, measurement and verification (M&V).

g) Understanding the Evolving Need for Coordination of DR/DER between Wholesale Markets and Distribution-Level Markets and Platforms

The electricity system is undergoing rapid change, with much of it seemingly aimed at the creation of a system that is much more disaggregated and reliant on DER. This DER may be operated and dispatched at the distribution system level, using new distribution platforms. There will be an increasing need for coordination and integration of these new distribution-level operations with the existing planning and operation of state-wide and regional markets.

h) Planning for Multiple and Alternative Options for Delivery of DR into Wholesale Markets

While the rise of DER and distribution-level operations may create an entirely new system into which DR will fit, the present system of incorporating DR into wholesale markets should not be eliminated. Policymakers, utilities and stakeholders must be prepared to deploy new options for delivery of DR into those markets in response to any policy changes that affect the existing inclusion of DR.

i) Adjusting Based on the Supreme Court Decision on Order 745

One of the issues under consideration by the Supreme Court is the lower court's finding that the DR covered by Order 745 is state-jurisdictional. If this finding is sustained, then changes will no doubt be required to allow DR to continue participating in wholesale markets. But if DR is considered to be a DER in the context of the rise of distribution-level DER, then new platforms and channels for DR to be delivered to the electricity system will be available. As was found in this project, many of the issues involving DR's role in wholesale and distribution levels can be found across both.

Summary

Demand response is at a crossroads in terms of how it has been developed, compensated and provided to date versus where it can or should go in the future, relative to its role in the future electricity system. The consensus of the EDP Project is that DR has an important role in how that electricity system will be planned and operated, and that DR will allow it to be optimized for cost and operational parameters. Policymakers, ISOs, utilities, practitioners and stakeholders need to understand the issues, challenges and actions that need to be addressed to allow it to play that role.

II. Background

In the spring of 2015, a diverse group of individuals and entities came together to begin a facilitated dialogue focused on demand response. The participants were either experts and/or practitioners in the area of demand response, or they had a key interest in demand response from a stakeholder or policy standpoint. This *Report* is the product of their work during 2015, both from an output and throughput standpoint. It is not a conventional report but instead an attempt to convey the thoughts of the group as they went about their work, as well as what observations, conclusions, and recommendations the group wished to pass on to other parties focused on demand response.

a) Why the Group Formed

In the fall of 2014, the U.S. Court of Appeals for the DC Circuit issued a ruling which vacated Order 745 which had been previously issued by the Federal Energy Regulatory Commission (FERC). Order 745 established a methodology for determining wholesale energy market payments that would be applied to both demand response (DR) and conventional generator-supplied energy. This Order was challenged by several parties, who claimed that the methodology was flawed, that the process used by the FERC to arrive at Order 745 was arbitrary and capricious, and that the FERC did not have jurisdiction over DR in wholesale markets because the approach taken by Order 745 interfered with the States' exclusive jurisdiction over retail customers.

In recognition of the potential state of flux in wholesale DR markets, a group of parties came together to discuss whether steps should be taken to make alternative plans for the delivery of DR into such markets. At around that time, the U.S. Solicitor General appealed the DC Circuit Court decision to the U.S. Supreme Court. The Supreme Court ultimately accepted the case.

Based on the current nature of the court proceedings, the group determined that its best effort would be to explore how DR has evolved and should evolve, especially in the context of an electricity system that appears to be moving towards increasing reliance on distributed energy resources (DER) and more dynamic distribution systems. The thought was that work of this nature would be useful to policymakers, utilities, third-party providers, and stakeholders regardless of the outcome of the court proceedings.

The project started in earnest in the spring of 2015 under the name of the Evolution of DR Project (EDP), with the goal of producing output later in the year that would be useful in the advancement and expansion of DR.

b) Goal of the Project

There was early consensus in the group that a major goal of the project was to contribute to a spread of understanding of DR as a DER, and that this would help foster DR in general, open up new DR policy, business and delivery models, and help DR achieve policy objectives.

Additional goals were:

(i) Allowing participants to engage and learn from other participants, including those with opposing views, so that new thinking, new agreements, and new ideas could flow, putting the group in position to be seen as one whose output to the public domain is seen as new and innovative;

(ii) Laying out the understanding and considerations that policymakers and policy stakeholders must incorporate when making new DR policy; and

(iii) Making recommendations for states on DR policy and recommendations to utilities, ISOs and other parties on DR implementation and operations.

c) The Make-Up of the Group

The express intent from the beginning of EDP was to assemble a group that was not too large in order to be able to debate and "spar" via in-person meetings and conference calls. Parties were sought that would make the group representative of the various policymaking and stakeholder perspectives that were active in the DR arena.

Because of the time and effort required to be a part of the group—in particular the multiple meetings and reviews—not all participants were able to participate in each activity. But all were involved in content review and exchange. Representatives from the following entities participated in the EDP Project:

American Public Power Association (APPA)

Association for Demand Response & Smart Grid (ADS)

Baltimore Gas & Electric (BGE)

CPower

DC Public Service Commission

EnergyConnect, Inc. – a Johnson Controls Company

Energy Curtailment Services, an NRG Company

Federal Energy Regulatory Commission (monitoring as allowed under the law)

Illinois Commerce Commission

Illinois Citizens Utility Board

ISO New England

Landis+Gyr

Lawrence Berkeley National Laboratory

Minnesota Public Utilities Commission

New England Conference of Public Utility Commissioners (monitoring)

Pacific Gas & Electric

PJM Interconnection

Public Utilities Commission of Ohio

Regulatory Assistance Project

Southern California Edison

Southern Company

Sustainable FERC, from NRDC

White House OSTP and OMB (monitoring)

d) How the Group Has Operated and Done its Work

EDP was not a project where the objective was to hire experts to do a report, and for the parties sponsoring it and participating in it to await a draft report to review and comment upon. It was instead a progressive and sequential discussion among the participants that produced the content of this *Report*.

EDP was actively facilitated and moderated over several months and a variety of facilitation techniques were used to allow participants to debate and constructively engage with each other on issues and content. Not all participants came to the project with the same positions, ideas, and proposals. In fact, some of the participants were in opposing positions on some issues.

After several meetings and calls, an "output" document began to take shape, and it became the working draft into which further input, comment and content was introduced. That output document eventually became this *Report*.

III. Overview and Guide to this Document

This *Report* is organized primarily around a number of objectives that the group determined would allow DR to continue to play a role as a resource option for the electricity system and an energy management option for electricity users. It allows DR Audiences to:

- Better understand the nature and characteristics of DR and its policy objectives;
- Understand the challenges and barriers that could hold back DR from helping to achieve policy objectives;
- Be exposed to the expectations of an expert group of parties (i.e., EDP participants) regarding how they see attitudes, technology, and/or the markets changing over time, which may impact the evolution of DR; and
- Be provided with recommendations for policymaking and other actions that would help move DR forward in meeting these objectives.

Each objective section begins with a **Background** subsection which provides orientation to the particular area or issue. This is followed by a subsection labeled **Challenges**. The challenges listed represent the result of repeated brainstorming by the EDP participants on issues that must be addressed to advance the use of DR to meet the stated objective. Similarly, the EDP participants contributed their thoughts and ideas to the next subsection labeled **Expectations**, which are considered to be what the group believes will happen that will influence the growth and expansion of DR. Finally, the **Recommendations** subsection lists recommendations for action that will support DR in meeting the objective.

Some of the recommendations are for policymaking, but not all. Keeping with the project's multi-audience focus, some of the recommendations are aimed at utilities, third parties, stakeholders and practitioners.

There is an important understanding that the reader should have in addition to the organization and format of this document. At the very first meeting of EDP, there was a quick consensus that the electricity system and industry was on its way towards becoming much more distributed than it has been in the past. Specifically, Distributed Energy Resources (DER) were rapidly becoming an ever bigger part of the system, including many owned and operated by customers and non-utility entities. The Group more or less came to the first meeting believing that DR was a DER, and that making policy, market design, planning and operational decisions with this concept in mind would be beneficial to the advancement of DR and its use in meeting policy objectives. Thus, throughout the document the reader will see the term DR/DER used to reinforce that concept. More on DR as a DER can be found throughout this document.

In addition to the DER context, there were other aspects of the EDP scope of work that are worth noting.

a) What Was Considered

i. Wholesale and retail

Both wholesale and retail DR were considered and included in the discussion from the beginning. Discussion was not limited to wholesale DR because of the court proceedings noted. The federal court proceedings were obviously noted by the group, but the group conducted its work under present DR policy, both state and federal.

ii. Existing status of DR at wholesale and retail levels

In a similar vein to (i) above, the group tried to do its work from the standpoint of what the existing state of DR, including policy, was at both the retail and wholesale levels, while noting and discussing developments that were happening in real time.

iii. Recent policy developments on DR or policy in process

During the time the group did its work, DR developments were assessed and considered. Developments in California were notable in this regard. The stream of information, documents and other content provided to EDP participants can be found in Appendix C.

iv. Recent policy developments on DER or policy in process

There was much discussion over the course of the project about DER policy and what that would mean for DR. Developments in New York (REV) and California were discussed, but also DER development related to solar and storage and what their impact on DR could be (See Appendix C for resource list).

b) What Was Outside of Consideration

i. Consumer engagement, marketing and communications

At the outset of its work, the group decided not to focus on consumer engagement related to DR programs and products. The group saw this as out of scope given its resources and the expertise of the parties gathered to participate. The stance taken by the group was that these functions represented the adaptation of the policy and business work recommended by EDP.

ii. Complete review of technology

The group did not focus on technology from the standpoint of product or functional differentiation. Technology was taken as a given during most of the discussion. That meant that technology was not seen as a threshold or barrier to DR, and it was assumed that technology developments would foster DR development and expansion.

iii. Complete review and analysis of DER

As noted, a major part of the work of EDP was to discuss DR in the context of DER. That led to extensive discussions particularly among those parties representing ISO and utility operations, which were often generic with respect to DER.

However, the focus of the group's work was DR, and there was no separate and distinct focus on other DER such as storage, solar, microgrids, etc.

IV. The Evolution of DR and the New Context of DER

Demand response is not a new part of the electricity system, albeit the term itself did not come into use until the early 2000s. This section is not intended to provide an in-depth history and background relative to demand response. It is assumed, however, that this document will be used by parties that may or may not be familiar with demand response. Those not familiar with it may benefit from the following.

a) Early Demand Response: Pre-1980

At the dawn of the electric power industry, contentious debates arose about the merits of pricing the new commodity differentially. However, there was no inexpensive way to meter usage commensurate with such rate designs so all customers were billed on an accumulated usage basis.

It was not until the 50s and 60s that utilities began to consider the merits of getting customers to alter their electricity usage in order to help meet and manage the rate increases that were introduced. Given technology limits and cost considerations in metering and billing capabilities, utilities instead turned to incentive-based load curtailment or "interruptible" programs. These were based on the available technology at the time, and ranged from manual to limited automation in how they implemented the temporary disconnect of the customer. Utilities first started offering these programs to their largest commercial and industrial customers, then subsequently designed programs for smaller customers.

b) Early Demand Response: 1980-2000

"Demand response" is a term that began to be used in the 2000s. But demand response as a function or programmatic option for utilities and customers began prior to that.

For example, utilities began to create "load management" programs for smaller customers in the early 1980s. These involved installation of controls on the devices (primarily pool pumps, hot water heaters, and A/C units) of these customers in what became known as "Direct Load Control" programs. These programs allowed a utility to send a radio signal to these devices that would turn them off for a period of time during peak periods of demand when the reliability of the system might be threatened. These programs became known as "curtailment" programs, and customers received non-variable compensation for allowing their devices to be controlled by their utility under specific terms and circumstances. Hundreds of thousands of customers enrolled in these programs during the 1980s and 90s.

The previous paragraph primarily refers to retail level electricity service, but curtailment of customers (with their permission and under contract) began to develop at the wholesale level as well during the 1990s. These programs began simply, with large customers agreeing to be curtailed so many times a year in exchange for compensation.

c) Demand Response: 2000-2010

The creation of Independent System Operators and Regional Transmission Operators (collectively referred to as ISOs) in the early 2000s in many regions of the country created a new platform for demand response, including market-based DR. Programs based on the economics of the electric system began to develop, in addition to curtailment programs.

Demand response, a term that began to be used at this time to refer to such programs, was soon extended to refer to any retail or wholesale program that induced customers to change their consumption in response to price signals or an incentive payment.

Part of this programmatic and market-based growth of DR was due to the direction encased in policy promulgated during this period by the ISOs' jurisdictional regulator, the Federal Energy Regulatory Commission (FERC).

The first ISO DR efforts were emergency curtailment programs, which were similar to the retail interruptible and curtailable programs operated to date, and in some cases incorporated these existing resources. But with technology advances, and direction from the FERC, the ISOs moved beyond emergency programs and began to incorporate DR as a market resource that could compete with supply resources. DR began to be viewed as a dynamic, controllable and dispatchable resource that could help balance supply and demand in a wholesale market.

In terms of customers becoming involved in DR programs, this decade saw the development and rise of third party actors that employed new business models and technologies to aggregate customers into a combined block of MWs that could be delivered to an ISO (or in the case of a non-ISO region, delivered to a utility for meeting the latter's integrated resource needs) as one DR offering that could be "dispatched". The term "negawatt" began to be used to describe a DR block of this type, to indicate that this type of DR was equivalent to a MW that a power plant might provide to the electricity system.

It was also during this decade that some utilities began to plan for and deploy Advanced Metering Infrastructure (AMI) (also referred to as "smart meters") that provided interval measurement and two-way communication capabilities. The deployment of AMI established a platform for time-based pricing and for better interval measurement of other DR programs, but time-based pricing options were for the most part not immediately introduced.

d) Demand Response: 2010 to present day

During this decade, in part due to the development of the ability to dispatch DR at the wholesale level, and compensate it accordingly, attention began to turn to how to enhance retail DR. Two things were the subject of initial focus: time-based measurement and control technology.

Relative to measurement, evolution of DR compensation beyond lump sum payments for curtailment requires the ability to measure usage on a time-basis (i.e., when it is used and when it is not). As for control technology, early-stage DR primarily involved one-way communications technology that would "turn-off" a device, and did not provide other communication, control and measurement abilities.

In the late 2000s, AMIs began to be installed at utilities. These meters were installed for multiple purposes, but one of the functionalities introduced was time-based measurement and two-way communication capabilities that provided a new technology platform for DR. Deployment of AMI has greatly expanded in the 2010s to the point where around 70% of the meters are already smart meters or else part of a scheduled/contracted deployment set to occur in the near future.

At the wholesale level, DR has been expanded through ISO market-based programs, which have led to tens of thousands of MWs of DR being part of the electricity mix. Included in this has been the introduction of DR as an option for meeting ancillary service requirements such as operating reserves and regulation service.

Prior to the 2010s, most parties drew a line of distinction between traditional energy efficiency (EE) and demand response. Traditional efficiency derived from a focus on making devices and equipment use less electricity to deliver the same benefit. This form of efficiency was essentially embedded in those devices, and not subject to any dynamic control, and not to be used in peak load management. Demand response introduced a new type of energy efficiency that was dynamic, controllable and dispatchable.

At the mid-point in the current decade, the line between DR and EE has begun to blur. DR is now recognized as not just being about managing the peak period, but also as something that can be employed throughout the 24-hour cycle. EE has been enhanced through the introduction of "smart technologies" in buildings, in what is now being referred to as "intelligent efficiency".

At the same time, DR has begun to move in the direction of intelligent efficiency by introducing a type of DR called Automated DR (AutoDR or ADR). This refers to, among other things, deploying technology in buildings that can respond to price, information or control signals on an automatic response basis.

The most notable development during this decade, however, is the increased focus on creating an electricity system which has a greater percentage of Distributed Energy Resources (DER) serving and managing customer load. This has been driven in large part by the increased viability and enhanced economics of roof-top solar panels. However, DER are now seen as including more than just that option, and as also encompassing storage, microgrids, electric vehicles (EV)—and EE and DR. While some of these DER are considered to be of the utility-scale variety, the major change in the future utility system from DER is seen as being the large amounts of customer-side DER that are expected.

With this new focus on DER has come a widespread acceptance that the distribution system may need to evolve as a new high-technology platform for management of DER, in a manner similar to the management and dispatch of resources at the wholesale level.

Finally, at mid-point in the 2010s, climate change has risen as a major factor that will impact the planning and operation of the future electricity system. Recently released federal regulations, as well as the possibility of additional policy to address carbon-based emissions, has led to DR being recognized for its abilities to reduce emissions and complementing and supporting the introduction of additional non-emitting resources which may be variable or intermittent in nature.

e) Recent State-Level Developments Impacting DR

Background

The EDP project has since its inception been intended to focus narrowly on DR, including its role as a DER, but yet broadly in terms of the variety of situations where DR is, will, or should be deployed. This broad perspective includes:

(i) Wholesale as well as retail

(ii) Open markets as well as traditional vertically integrated states

(iii) IOUs as well as non-IOUs

The EDP project was not confined in its focus or to certain situations or jurisdictions. But some states were the subject of discussion because of the nature of their real-time work on DR and DER. Two of these, New York and California, represent places where the evolution of DR, and DR as a DER, is being actively addressed in policy proceedings. But these are not the only places of policy activity, particularly with respect to DER, as Massachusetts is another jurisdiction where DR and DER integration is underway.

New York and California were seen by participants as in the lead in trying to examine how DER planning and operations can be developed at the distribution level, including through the creation of new distribution system platforms. New York is addressing this issue via its Reforming the Energy Vision (REV) Proceeding, while California is working to integrate and consolidate the DER, Distribution Planning, DR proceedings it already has underway.

During the course of the project, participants were provided with information as it happened regarding NY and CA and other jurisdictions. Also provided were access to the latest reports, studies, etc. that were produced during the term of the project. Appendix C is the complete list of resources provided to participants.

V. Objectives

Objective 1: Understanding and Addressing the "Duality" of Demand Response

a) Background

There are many examples of things which, when different people look at them, they see different things. This could be said to apply to the current state of DR, in that some view and think about it as a load or demand modifying option, and others see it as a new supply option where "negawatts" serve the same purpose as megawatts in balancing supply and demand on a dynamic basis. The fact is that both parties are right, for DR is a unique feature of the modern electricity system that modifies electricity demand but can also be a supply resource.

b) The Duality of Demand Response

No topic associated with DR took up more time during the EDP project than duality. It was one of the first to be discussed and one of the last to be debated. It was an issue on which the participants could not reach consensus. Therefore, as was the plan at the outset of the project, differing viewpoints and commentary are presented.

Demand Response (DR) modifies the demand for electricity, but can also be used as a supply resource. To serve electrical load, electric generation must be dispatched so that the supply and demand of power is in perfect balance in each moment in real time, while maintaining adequate operating reserves. By changing power consumption levels in response to time-varying prices or other system condition signals over the course of the day, DR modifies the electrical demand served by generators, which allows the responding customers to reduce their overall electric bills and overall energy prices. On the other hand, DR can also be used as an alternative supply resource that can be dispatched along with generating resources to bring supply and demand into balance in a least-cost manner. Thus, there is a duality issue that arises with DR today.

There was substantial discussion of two aspects of duality. One was its intertwinement with visibility. The other was duality and valuation.

Regarding visibility, some participants argued that visibility was primarily, if not entirely, a telemetry issue, and had to do with "seeing" resources on the system for purposes of operations, and therefore visibility was not an issue in the context of duality. The commentary went on to state that lack of visibility has to do with a lack of telemetry, which allows a system operator to "see" how the DR/DER is performing in real time.

Others thought the primary issue was one of visibility affecting the reliable operation of the electric grid, which was not related to the potential dual treatment of DR/DER on both the demand- and supply-sides of the electricity market. They went on to say that visibility had to do with seeing the status of resources and accurately predicting changes in generation and consumption on the system in real time for purposes of maintaining grid reliability, and therefore visibility was not an issue in the context of duality. They further stated that the need to better predict how DR/DER's performance might change over the course of day.

Another comment was that certain policies may exist that limit communications between retail and wholesale system operators such that the wholesale operator has no understanding of what's going on at the distribution level (e.g., is DR separately scheduled/bid, or is it included in the overall schedule by the utility), and distribution operators have no understanding of what's going on at the transmission level.

Another concern expressed was that the most important aspect of duality is its potential for creating inefficient dispatch of resources, which keeps the market from minimizing overall system costs, and thus there is a valuation issue.

Another comment tied visibility and valuation together, saying that a lack of visibility or ability to accurately anticipate the electric consumption or production patterns of these prosumers creates challenges for properly valuing what DR provides, as well for the proper accounting for what DR provides in the planning process.

Another participant offered what was maybe a nuanced but helpful clarification. Visibility *of* DR is not a duality issue, but visibility of DR *as a resource* is such an issue, leading to a necessary focus on valuation within the context of duality. Valuation is the major context for the rest of this section and one that participants agreed was at the heart of the duality issue. There is more on visibility later in the section on Objective 2.

Duality Leading to Valuation Challenges

By changing retail consumption levels, DR affects the retail electric bills paid by participating retail customers. In addition, timely changes in electricity consumption can have system benefits, both at the distribution as well as bulk-power system levels. For example, the amount of total generation procured can be reduced, operations and maintenance budgets on equipment can be lowered by reducing wear-and-tear, and capital investment can be delayed, all resulting in cost savings for all customers.

However, in RTO/ISO Markets, if the same DR is also treated as an alternative supply resource, participating retail customers also receive a payment, or experience an avoided cost for the value provided. If customers in such markets receive the benefit of a bill reduction (from less usage) and, in addition, a payment for the same change in energy consumption, it could enable the customer or the market participant on behalf of the customer to submit a DR bid into the wholesale market that is lower than its true cost, which could displace a lower cost resource that is available in the market. Such a design would not allow the market to achieve its least-cost objective.[1]

On the other hand, a number of benefits that DR provides under such a scenario do not directly flow to the customer, but instead are captured by all electric customers. These externalities associated with DR altering consumption as a resource create challenges. An assessment of value based on a particular customer's financial position when acting as a DR resource may be different than one based on a societal perspective. Which perspective to take has implications for which types of DR to pursue, how much DR to acquire, and how to properly compensate DR for the value it provides.

The fact that the value of lower market prices that flow to all electric customers is not paid to a customer providing DR by reducing load does not constitute an externality. Rather, this outcome reflects a normal operation of a market. The customer's choice to reduce usage in response to market prices simply modifies the demand curve as its intersection with the supply curve yields a lower market price. Externalities are costs that are not included in the formation of price, but instead are real and often borne by society as a whole as opposed to the market participant that imposes the cost.

c) Challenges

» Challenge 1

It can be challenging to define and accurately account for compensation and credit for multiple services in different markets, and/or for a single service/product in a particular market where the potential exists for dual (i.e., demand and supply) compensation mechanisms. For example, regarding the former, could a customer participating in a wholesale market also receive distribution system support or capacity credit? Regarding the latter, what should be done to avoid total compensation that exceeds the marginal value of the product or service being offered? Overcompensation can distort economics by allowing a resource to bid lower than its cost, which results in higher-cost resources being used to meet customers' needs instead of lower cost ones.

1. EDP Participant ISO-NE provided the following example. Take a customer with a flat 10¢/kWh retail rate and a DR/DER that costs 17¢/kWh to utilize. The wholesale market has a locational marginal price (LMP) of 12¢/kWh. Since the LMP is lower than the cost of the DR/DER, it would not be economic to dispatch the DR/DER given the availability of other, lower-cost resources on the wholesale power grid. However, the customer's objective is to maximize its private profit, not to improve the cost-effectiveness of the overall market. To maximize private profit, the customer would bid its DR/DER into the wholesale market at 7¢/kWh. This is because the combination of retail bill savings (priced at 10¢/kWh) plus a wholesale payment of 7¢/kWh is sufficient to offset the 17¢/kWh cost of the DR/DER. At a bid of 7¢/kWh, the DR/DER is dispatched, which improves the customer's private profit by 5¢/kWh (=12¢/kWh LMP payment + 10¢/kWh retail savings - 17¢/kWh DR/DER cost). But the 17¢/kWh DR/DER displaces a less costly 12¢/kWh resource available on the wholesale power grid, which is not cost effective.

» **Challenge 2**
The best way to apply DR/DER, or count it, according to economics and value proposition, including from the standpoint of what is best for customers in a vertically integrated system, must be determined.

» **Challenge 3**
Coordination and cooperative decision-making may be needed among parties (including system operators, utilities, other) on whether a MW is to be designated for valuation as a load modifier or a supply resource.

» **Challenge 4**
Incorrectly compensating DR can distort economics, and cause other lower cost resources to look uneconomic. Undercompensation can prevent a least-cost solution from being deployed.

» **Challenge 5**
Some DR/DER can operate one moment as a load reduction, in that they are supplying the needs of the customer premise, and then the next moment be a supply resource which injects electricity into the grid.

» **Challenge 6**
RTOs schedule bulk power to serve the end use load. If you have a DSO also doing scheduling at the distribution level, those things must somehow be synced to achieve optimal results.

d) Expectations

» **Expectation 1**
Increased amounts of DR will be deployed into competitive wholesale markets and via retail products and programs.

» **Expectation 2**
New DR markets will be created via incorporation of DER into distribution systems.

e) Recommendations

» **Recommendation 1**
A MW of DR should be looked at as being able to be fully and timely incorporated into market forecasts and planning (i.e., load forecasting, transmission planning and security constrained dispatch) at both the wholesale and distribution levels.

» **Recommendation 2**
Each product or service provided by a DR/DER should receive compensation (as a payment or avoided cost). Multiple sources of compensation for a MW of DR or DER provided payments are acceptable if the same MW is being used to provide distinctly different products or services, as opposed to the same product or service but at different levels.

» **Recommendation 3**
There are costs for the bulk power system and there are costs for resources available at the distribution system. Prices for resources, products and services reflective of marginal costs should determine which resources ought to be used to achieve a least-cost objective.

» **Recommendation 4**
Proper compensation of DR means that total compensation equals the marginal value of the products or services avoided and/or provided by the resource, netted of the purchase. A MW of DR sold must entail the purchase of the same MW by the customer offering the DR.

Objectives 2 - 8: Optimizing DER (including DR as a DER)

Background

To optimally utilize DR/DER, consumption and storage should increase (or distributed energy generation should decrease) when demand is low and supply is abundant and less expensive; conversely, consumption should decrease or storage should be released (or distributed energy generation should increase) when demand is high and supply becomes scarce and more costly.

If DR/DER provide the same product under comparable compensation and performance obligations, then it can be viewed by wholesale market operators as the same to the point where they are indifferent to DR or a generating DER as a resource when providing any particular service. Retail utilities should also begin to incorporate DR and DER into their planning needs, and ultimately, become agnostic as to the resource meeting a particular need or service, when cost-effective.

While customers deploy DR/DER for various reasons that are individual to the customer and the site, these resources will impact the power flows on the grid. An efficient grid will not only take these impacts into account in operating and planning the grid, but will also encourage the resource owners to use them in a manner that optimizes their value to the site and to the larger transmission and distribution systems.

This is achieved by having a direct relationship between wholesale and retail prices, sending price signals to customers' resources in a timely manner, and accurately measuring the response of the DER resources to the price signal.

Technology like advanced metering infrastructure (AMI) provides accurate, granular (as to time and location) usage data that software can analyze. This information in turn forms the foundation for software that optimizes the DR/DER according to the customers' valuations.

Objective 2: Optimizing Visibility

a) Background

Both a Distribution System Operator (DSO) and a Regional Wholesale-level Operator (ISOs) want to know what is happening and what is about to happen, so as to reliably and efficiently operate the electric system in real time. They need to know how much load and how much generation will occur in real time at each location on the system, and which of them is going to be a resource, and when they are going to be one or the other. In addition to the operators, the forecasters and planners want to have the best picture they can to be able to adequately perform their functions.

The arrival of Distribution Resource Platforms (DRP) that create a new, dynamic, plug-and-play capability at the distribution level for DR and other DER further complicate the proper valuation of DR. This means that not only could DRP operators not be clear as to how much load or generation a DR with a DER will be placing on the distribution system. but now the ISO may want/need to have more visibility into what the DRP is doing so that it can act accordingly. Understanding the information flows between these two entities will be important to ensure effective operation of the distribution and transmission grids.

b) Challenges

» Challenge 1

Operators of regional systems, distribution systems and distribution platforms need to be able to "see" DR/DER that is put on to the system and taken off it.

» Challenge 2

The amount of knowledge about DR/DER that is needed by grid operators (i.e., awareness that it is out there on the system) as opposed to real-time data monitoring of a DR/DER must be determined.

c) Expectations

» Expectation 1
Increased DER of all types will be deployed at an increasing pace.

» Expectation 2
Distribution systems will take on a new and added role in control and dispatch of DR/DER.

d) Recommendation

ISOs, Utilities, and DR Providers must develop proposals for how to ensure that DR visibility is addressed in the development of DER policy and operational rules, both at the bulk power level and at the distribution level, including with Distributed Energy Resource Management Platforms.

Objective 3: Optimizing Rates

a) Background

DR is based in large part on the concept that not all kWh cost the same to produce or deliver, and therefore, the reduction of kwh produced/used at certain times has a higher value than at other times. This can translate into providing a customer with payments that allow control over its usage at certain times, or into rates/prices that a customer pays that vary based on the time of usage and the costs that can be attributed to usage at that time.

Many take the view that DR should primarily involve a focus on price signals that are incorporated into rates/prices. Use of these rates/prices, however, requires the ability to measure a customer's usage on a time-of-use basis. To do this requires the deployment of interval metering equipment for a specific deployment of such rates/prices or else the deployment of AMI across a utility service territory.

b) Challenges

» Challenge 1
At the residential level, nearly all customers are on retail rates that are fixed and do not vary with time or location. Providers do not communicate to their customers the information necessary to enable them to respond to a price, or for those customers with DER, how to optimally utilize their assets.

» Challenge 2
Rates and prices for electricity, and rates for distribution, are designed to meet a variety of different objectives, including social and policy objectives.

» Challenge 3
Absent price signals that reflect actual grid conditions at the retail level, optimal decision-making by the retail customer is hindered. Absent dynamic price signals, it is challenging to locate and optimize deployment of DR/DER and integrate it with conventional supply resources into a market in locations where the resource can be the most beneficial to the grid.

» Challenge 4
Additional costs related to DR/DER deployment such as interconnection costs may be caused by a specific customer, who may or may not be expected to bear some percentage or all of that cost.

» Challenge 5
The cost of AMI can be high, and for the purposes of a cost-effectiveness analysis, such costs need to be compared to the many different ways that it delivers benefits to the system categories—not just enabling time-varying rates and dynamic pricing, but also creating outage restoration savings and operational efficiencies, and improved customer service.

» **Challenge 6**

Enabling technology has its own cost but yet may lead to savings to customers and the electricity system from time-varying rates/prices.

» **Challenge 7**

Policymakers and many electricity industry companies and stakeholders do not think of DR as a DER.

» **Challenge 8**

Efficiently integrating new technologies such as storage and electric vehicles may require exposure to time-varying rates/prices to reflect the true marginal cost of power in each interval of time. Without such time-varying rates/prices, the customer cannot know when inexpensive electricity should be bought and stored, and when the stored electricity should be utilized to avoid buying expensive electricity.

c) Expectations

» **Expectation 1**

Evidence will continue to mount that an increasing number of customers and customer segments will accept and respond to time-varying rates and dynamic pricing.

» **Expectation 2**

AMI will continue to be deployed where not already installed.

» **Expectation 3**

Proceedings on DER and Distribution Platforms in NY and CA will increase awareness of DR as a DER.

d) Recommendations

» **Recommendation 1**

Retail electricity utilities and other providers should 1) establish convenient, and easily understood time-varying rates (e.g. hourly) and prices that reflect the marginal cost of power in each interval of time; 2) sufficiently educate their customers as to why they may wish to consider choosing such rates and prices; and 3) be allowed to institute time-varying rates and prices as the default option for customers.

» **Recommendation 2**

To the extent possible, given the range of policy goals that might be affected by retail rate structures, rates/prices should be designed to align fixed and variable rate components with fixed and variable cost components, in order to mitigate potential issues regarding cost recovery, cross subsidization of DR/DER customers being subsidized by other customers, and customer rate impacts.

Objective 4: Optimizing Measurement and Verification of Reductions

a) Background

The approach to measurement and verification of demand response depends upon the DR approach taken. If paid like a supply resource, payments are provided based on how a resource actually performed via the settlement process, which compares a customer's interval consumption to an estimate of its baseline consumption. On the other hand, the settlement of DR implemented through some form of dynamic, time-based rate does not require an estimate of a customer's baseline consumption. It only requires the ability to measure the customer's interval consumption. But settlement is not the only reason M&V is important when it comes to DR. It is also important from an operational standpoint as it provides essential information in the aggregate that allow system operators at the wholesale level as well as the distribution level to better understand the dynamic movement of supply and demand resources on and off the system and value that movement relative to the costs to induce it.

b) Challenges

» Challenge 1

While rules, protocols and methodologies exist, the determination of baselines for customers are challenging to develop and the method used can be controversial.

» Challenge 2

Rules for M&V are not always consistent from program/market to program/market.

» Challenge 3

There will increasingly be a need for cross-visibility and sharing of information on DR/DER operations between regional system operators and distribution operators within the regional footprint.

» Challenge 4

Confusion can arise as to the difference between use of telemetry for operations and the use of AMI and M&V protocols for measuring and verifying performance.

c) Expectations

» Expectation 1

AMI will continue to be deployed where not already installed.

» Expectation 2

AMI and other new technologies currently being deployed provide new and more precise data to use in M&V.

» Expectation 3

New load forecasting capabilities will be developed and implemented that will take advantage of additional data that becomes available.

» Expectation 4

Two factors will put increasing focus on the verification of electricity savings: 1) Increased competition among resources bid into wholesale markets, and increased requirements for EE and DR as resources bid, and 2) Regulatory constraints on emissions will require increased scrutiny of reductions that are included in official government compliance plans for such regulations.

» Expectation 5

System operators and planners will increasingly focus on baseline methodologies used to gauge how differences between expected and actual usage could impact system operations and planning from a reliability standpoint.

d) Recommendations

» Recommendation 1

M&V for DR/DER from the supply side should require customer baseline calculations (CBLs) that estimate reasonably accurately what the customer would have otherwise used for settlement purposes associated with incentive-based programs. Utilities should consider implementing dynamic, time-varying rates that communicate grid conditions and guide customer usage, storage, and deployment of other on-site asset decisions. This approach enables customer bill management which mitigates the challenges associated with M&V for DER and the need for computing a CBL.

» Recommendation 2

There should be increased use of granular data available from AMI and other technologies to i) improve M&V tools and procedures and facilitate the implementation of time-varying rates and dynamic prices, and ii) facilitate more accurate wholesale market settlement of load-serving entities based on the actual interval consumption of customers served.

a) Background

At the turn of the century, many compared the electric utility industry to one whose factories had gone decades without the injection of new technology. Chief among the technologies lacking were those in the area of information technology and communication, monitoring, sensing and controls.

This situation has begun to rapidly change, with the high penetration of AMI being one example.

At present, there is a recognition among utilities and policy makers and stakeholders that the goal should be a future utility system where visibility, information and controls should be constantly and continually available such that the operation of the system can be optimized at all times from the standpoints of cost, reliability, resiliency and emissions.

b) Challenges

» Challenge 1

Time-based pricing can be most optimally and effectively deployed on a system when AMI is present.

» Challenge 2

Telemetry is required by some ISO/RTOs for some wholesale market product participation by dispatchable DR/DER that participates as a supply resource. The same can be true for vertically integrated utilities. Requirements vary among organized markets.

The need for telemetry depends on a variety of factors including the specific service being delivered (e.g. reliability, capacity, energy, 10 minute reserves, regulation reserves) the resource size, whether the resource is treated as load modifying or supply, whether the data is actionable, and the concentration of DER within a region.

While telemetry makes DR/DER visible to distribution and transmission system operators, costs (while decreasing) can be high for some deployments. The right level of telemetry requires careful consideration.

» Challenge 3

Large amounts of legacy load control devices are reaching the end of their useful life, and they do not offer the functionality of newly available devices. To maintain this DR resource, they will need to be replaced with new technologies that provide greater communications and control capabilities to optimally create and deploy DR resources as DER resources in wholesale and retail markets.

» Challenge 4

The introduction of new information technologies is creating a more open system with more data inputs, flows and exchanges. Commensurate with this is the increased possibility of cybersecurity and privacy issues.

» Challenge 5

Standards to support interoperability, and the integration and use of these new technologies may delay immediate installation and use of advanced technologies and functions.

c) Expectations

» Expectation 1

Automated DR (via Interne of Things, or IoT) will continue to develop, and provide new ways to control of load and thus lead to new opportunities for optimization of DR and DER.

» Expectation 2

Microgrid technology will improve and there will be more deployment of microgrids which incorporate DR.

» **Expectation 3**

Storage technology complements DR, and as it improves and costs decrease, its increasing deployment may lead to additional approaches to DR. At the same time, storage may become a competitor with traditional DR approaches.

d) Recommendations

» **Recommendation 1**

Customers, and third parties operating with the customer's permission should have access to their own data (e.g. via Green Button and Green Button Connect) but also the ability to access more timely, and in a direct way, their AMI meter data.

» **Recommendation 2**

Smart inverter functionality, as defined by the 2013 Report of the NERC Task Force on Variable Generation, should be required for market participation by DER, and its interconnection with the distribution grid.

» **Recommendation 3**

Wholesale and retail settlements should be made based on the best available usage data provided by AMI once it is installed. This means that interval usage data recorded and reported by AMI should be used to settle the customer's bill based on time-varying rates and dynamic prices and to settle services provided by the customer to the wholesale market. The wholesale settlement of Load Serving Entities should also use the sum of the actual interval usage of the retail customers being served rather than rate class averages. AMI and IoT should be leveraged to provide an inexpensive source of telemetry data where needed.

» **Recommendation 4**

Interoperability and use of open standards should be a requirement for use of new technologies. Other functionality standards should be considered where appropriate for support of increased introduction of DR and DER.

Objective 6: Optimizing Location

a) Background

The legacy electric utility system is one that for the most part consisted of large centralized generation facilities connected to distribution systems by transmission lines. Integration of renewable energy and other small generators—as well as DR—during the 1980s and 1990s began the evolution that continues today to a more distributed system that is made of many more resources on a regional transmission and/or distribution system. Moreover, there is an expectation that going forward a large percentage of these resources will be operated by the customers owning them both for their own use and for use as a grid resource.

The development and operation of these resources may not necessarily be something that is readily revealed or apparent to those who operate wholesale and retail markets and systems. Yet those operators need to have as much visibility as possible into resources coming on and off the system in order to ensure reliability and otherwise optimize the grid's operation relative to other parameters such as cost and emissions.

b) Challenges

» **Challenge 1**

The need to operate and dispatch DR on a sub-zonal basis will grow over the next 5 to 10 years

» **Challenge 2**

What information about the grid should be made available to DR/DER developers to locate DR/DER in optimal locations, relative to the distribution and/or transmission systems?

» **Challenge 3**

Creating data and making it available in a useable form is challenging but there may also be barriers to acting on that data once available.

» **Challenge 4**

Determination of the value of DR/DER for purposes of determining optimal locations for deployment will require increased focus.

c) Expectation

Without access to grid information, DR/DER developers will continue to locate resources throughout the distribution grid without regard as to where the DR/DER can be most beneficial to the distribution and/or transmission grid operator.

d) Recommendation

DR/DER developers should be allowed access to certain grid information to assist in the optimal siting of DR/DER.

Objective 7: Optimizing Operational Parameters

a) Background

The electricity system has always strived for optimization of operations. Several new developments have created new opportunities but also new challenges for system operations. They include:

(i) Large amounts of non-utility generation resources added to the grid.

(ii) Much of the new generation being subject to intermittent availability.

(iii) Increasing amounts of Distributed Energy Resources (DER) on the system, including on "the other side of the customer's meter"

(iv) Introduction of non-generation resources such as DR and storage.

If pursuit of optimization is understood to be enhanced by having more options to employ in that pursuit, then all of the above are positive. But in order to utilize those options thusly, information about them and the ability to control them is important, if not essential.

b) Challenges

» **Challenge 1**

DR can have different operational characteristics than other DER options, which could require it to be integrated differently than some of those options.

» **Challenge 2**

Vertically integrated utilities and distribution companies will need to be indifferent to which kind of DR/DER comes on to their system, as are regional system operators now when the DR/DER provide the same standard products under comparable compensation and performance obligations. Definitions and criteria regarding "indifference" may be required.

» **Challenge 3**

Both distributors and ISOs/RTOs need to understand the impacts of different kinds of DR/DER on the grid. Acquiring the needed level of understanding will require information sharing and coordination by and among distributors and bulk system operators.

» **Challenge 4**

The variety of services necessary for the operation of the distribution grid is undefined and the values and benefits of DR/DER to the distribution grid are insufficiently identified and defined.

c) Expectations

» **Expectation 1**

Distribution and transmission grid operators will plan for, and develop tools for, a grid whose operations will need to respond to an increasing amount of controlled and uncontrolled DR/DER.

» **Expectation 2**

Distribution grid operators will have to plan for coordination with bulk system operators (and vice versa) as more plug-and-play DR/DER operations are developed at the distribution level.

d) Recommendations

» **Recommendation 1**

Distribution utilities should begin to identify a list of grid services that can be provided by DR/DER, and begin to integrate these services into their operating functions as a solution in order to optimize the grid.

» **Recommendation 2**

Policymakers need to ensure that policies and market rules that affect DR/DER are developed with respect to how wholesale and retail markets will operate in concert.

Objective 8: Using DR/DER to Achieve Long-Term Adequacy

a) Background

DR, in its role as both a load-modifying and supply resource, may not have been seen by system planners in the past as a component of plans focused on long-term adequacy. With the introduction of increased levels of DER, including DR as a DER, these new types of resources will need to be incorporated, particularly for purposes of maintain reliability.

b) Challenges

» **Challenge 1**

If additional DR/DER is not visible or is not relied upon by the planning agent, over-investment in generation and/or T&D may occur and unnecessarily raise costs. However, if expected DR/DER does not show up or does not perform when needed, resource shortages may occur resulting in less reliable service

» **Challenge 2**

The size and penetration of DR/DER in specific locations relative to the constraints of the transmission and distribution system in those locations could affect the reliability of the electric system. For example, if the planner was unaware that an amount of DR/DER was being installed in an export-constrained portion of the electricity system, which exceeded the transfer capability of th transmission and distribution system in that location, the system planner would not be able to recommend transmission or distribution system upgrades to accommodate the increased DR/DER, or to recommend restrictions on the DR/DER being installed in that location to address situations that would cause that portion of the electric system to become unreliable. For import constrained areas, planners who are unaware of an amount of DR/DER being installed in those locations may recommend transmission and distribution system upgrades that turn out to be unnecessary.

» **Challenge 3**

There is a need for new ways/processes for coordination between distribution-level planning and bulk system planning.

c) Expectation

Policymakers will begin to focus more on how the introduction of new DR and DER—at both the wholesale and distribution level—is incorporated into assessments and forecasts of adequacy and reliability.

d) Recommendations

» Recommendation 1

Additional DER must be visible and incorporated into resource planning. The expected DER should have both incentives and penalties to better ensure performance when needed.

Organized Markets: DR/DER should participate in any forward capacity market established by the ISO/RTO to achieve long-term resource adequacy and be subject to the same performance incentives and penalties as all other resources participating in capacity markets. Participating DR/DER should be incorporated into regional long-term resource planning. Data sharing protocols between ISOs/RTOs and any DSOs must be developed to inform both regional and local planning processes.

Vertically Integrated Markets: DR/DER should be incorporated into integrated resource planning (as a supply resource in addition to being a load modifying resource), and incentives and consequences for under-achieving resource goals should be comparable with that applied to bulk-power resources.

» Recommendation 2

DR/DER should be considered as a "non-wires" solution in lieu of expansion or enhancement of a transmission system and/or distribution system or subsection of such system if it can provide comparable service cost-effectively.

Objective 9: Maintain Reliability with Increased DR/DER on Bulk and Distributed Systems

a) Background

Electric systems are operated to maintain reliable service given constraints and contingencies that change in real time. As loads and available supplies in specific locations change over the course of a day, resources are re-dispatched to address actual or potential overloading on T&D pathways or the potential sudden loss of a major resource.

One of the major emerging issues facing electricity planners and operators is not only the increase in DR and other types of DER. It is the fact that electricity consumers and/or owners of DR/DER may decide to inject into or withdraw power from the grid frequently, often, or at least sometimes, making load forecasting less predictable and the resource scheduling process more complex.

Both a Distribution System Operator (DSO) or a Regional Independent System Operator (ISO) need to know what is "happening", what is about to happen, and what can be expected to happen if and when resources are dispatched in order to reliably and efficiently operate the electric system in real time. They need to know how much load and how much generation will occur in real time at each location on the system. This has always been the case. But lack of visibility on the location and real-time status of a DR/DER can introduce a new challenge for maintaining electric system reliability. If DSOs or ISOs do not know where resources are located and what they are doing in real time, then the DSO or ISO can not readily predict the impact of that resource on the system if it is dispatched.

For example, say that a DR resource is needed to reduce load so as to relieve an overloaded circuit. If the customer providing that DR resource was not consuming any energy at that moment, sending a dispatch instruction to that resource to reduce load would have no impact. However, if the DSO or ISO had real-time information on that resource, they would have seen that the DR resource had no capability at that moment. They would then know to do something different to address the overloaded circuit. In addition to the operators, the forecasters and planners want to have the best picture possible they can to be able to adequately perform their functions in planning for what may be not-always-optimal location of future resources.

A further complexity appears to be on the horizon, and that is the arrival of Distribution Resource Platforms (DRPs) that create a new, dynamic "plug-and-play" aspect of the distribution system relative to DR/DER. That means that not only could a DRP operator not be clear as to how a DR/DER is impacting the distribution side of the system, but now the ISO may want/need more visibility into what the DRP is doing so that it can act accordingly. Understanding the information flows between the two entities will be important to ensure adequate and effective planning and operation of the distribution and transmission grids.

b) Challenges

» Challenge 1

DR/DER may not be visible to the transmission or distribution system operator or be subject to dispatch instructions. As DR/DER penetration grows, uncoordinated changes in DR/DER output relative to other resources could make the system less reliable, particularly in constrained areas.

» Challenge 2

DR/DER located in an export-constrained portion of an electric system may not match the transfer capability of the transmission and distribution system in that location, with one potential outcome being an overload of the system absent visibility of such a development by the system operator. The lack of visibility and/or lack of dispatch control over the DER in real time can impact the ability of the system operators to respond to emerging system conditions and could impact electric system reliability in that location.

» Challenge 3

It is unclear how much knowledge of a DR/DER is needed by a distribution and/or bulk power system operator (e.g. simple awareness that it is on the system) as opposed to real-time data monitoring of a DR/DER by grid operators.

» Challenge 4

Some non-DR DER can operate one moment as a load reduction, in that they are supplying the needs of the customer premise, and then the next moment be a supply resource which injects electricity into the grid.

» Challenge 5

RTOs schedule bulk power to serve the end use load. If you have a DSO also doing scheduling at the distribution level, somehow those things have to be synched to achieve optimal power delivery.

» Challenge 6

DR/DER that is included, relied upon, and compensated as an active component of the system through system planning processes should have enhanced visibility to system operators and a commitment to respond in specified conditions.

c) Expectations

» Expectation 1

There will be a rapid increase in understanding that a DR/DER based-system can be more reliable than conventional systems.

» Expectation 2

Policymakers and wires system operators will expand their consideration and implementation of "non-wires" solutions.

» Expectation 3

Early work to date on analytic and valuation tools for assessing the reliability benefits (and costs) of DR/DER will be expanded and improved.

» Expectation 4

Increased DER of all types will be deployed at an increasing pace.

» Expectation 5

Distribution systems will take on a new and added role in control and dispatch of DR/DER.

» **Expectation 6**

The cost of telemetry and will come down and will be deployed at an increasing pace.

» **Expectation 7**

Operators of regional systems, distribution systems and distribution platforms will seek to put in place procedures and rules that enable them to need to have greater visibility of (i.e., "see") DR/DER that is taking load off the grid and/or injecting energy into the grid.

d) Recommendations

» **Recommendation 1**

DR/DER visibility requirements must be developed and incorporated into planning and operations.

» **Recommendation 2**

The DR/DER expected to be put on the system should have both incentives and penalties to better ensure performance when needed.

» **Recommendation 3**

A MW of DR able to provide distribution support should fully and on a timely basis be incorporated into distribution market forecasting and planning. (i.e., load forecasting, distribution planning and security constrained dispatch)

» **Recommendation 4**

AMI should be leveraged to provide a new platform for telemetry as well as M&V. Other telemetry improvements that enhance visibility and support reliability should also be considered.

» **Recommendation 5**

Data sharing and communication protocols between ISOs and DSOs should be developed to ensure reliable operations as more resources are added at both levels of the system.

Objective 10: Improve and Enhance DR Delivery

a) Background

At present, the delivery of demand response via utility or third-party offerings is not well coordinated with other types of DR/DER offerings. For example, utility energy efficiency program efforts are often not highly integrated with DR program opportunities. Opportunities are not co-branded or co-marketed to customers. The same is true of distributed energy services, like rooftop solar PV. Many are touting the benefits of solar PV coupled with energy storage as a comprehensive energy solution. But DR can also play a role, much like storage, in altering the time and magnitude of net electricity demand.

In addition, the development of new technologies (and the Internet of Things) for use by home and building owners has led to a delivery system that for some forms of DER, including DR, circumvents the incumbent utility altogether. For example, homeowners can purchase smart thermostats from big box retailers, which can be used to participate in a utility's "bring-your-own-device" DR program. Larger commercial and industrial customers can invest in broader energy management and control systems from non-utility entities to help manage their electricity bill and/or participate in retail or wholesale DR programs. Aggregators of retail customers can also enroll large numbers of customers in wholesale programs (and in some states, retail programs). By fostering competition in the enabling of DR, it is possible that a larger pool of DR resources may develop and be accessible to both utility and/or third-party DR providers.

b) Challenges

» Challenge 1

Much of the policy, programmatic and delivery infrastructure for energy efficiency does not sufficiently incorporate DR, if at all.

» Challenge 2

Because of the "duality" of DR, it is not readily seen or thought of by many parties as being a DER option in the same vein as other DERs, and thus not considered in the design and development of DER policies, programs and markets.

c) Expectations

» Expectation 1

Traditional providers of energy efficiency products and services will add DR capabilities and features to provide customers with additional options to manage electricity costs and add revenue streams, with the result being that greater amounts of DR capabilities will be available to customers, and therefore greater amounts of potential DR resources for both retail and wholesale markets.

» Expectation 2

The penetration of AMI will create new opportunities for DR products and services, among them an increasing amount of automated demand response. Time-varying rates and dynamic pricing enabled by AMI will also lead to increased opportunities for load-modifying DR.

» Expectation 3

Development of distribution platforms will create new opportunities for DR to be used as a "plug-and-play" DER option.

» Expectation 4

Utilities, competitive suppliers, and DR aggregators, where allowed to co-exist, will compete and partner with each other to provide customer with options for managing their electricity costs. The result will be expansion of the overall DR market and DR penetration.

» Expectation 5

As they have in the case of energy efficiency, third-party providers will play a role in helping utilities to enable their DR offerings.

d) Recommendations

» Recommendation 1

Policy makers and stakeholders must work together to blend DR (and other DER) together with traditional energy efficiency in the development of policy, programs and market structures that allow greater overall benefits to accrue from a coordinated planning and deployment of EE and DR instead of separate and distinct deployments of each.

» Recommendation 2

States and other retail jurisdictions should put time-varying rates and dynamic prices in place.

» Recommendation 3

Policies that encourage aggregation of DR resources by third parties should be adopted.

» Recommendation 4

The development and implementation of distribution-based market systems should explicitly consider DR to be a DER option and encourage new DR business models that fit with these new market platforms.

» Recommendation 5

States should establish new policies for utilities that provide market-based performance and incentive mechanisms that remove barriers to development and expansion of DR. These policies should include level-playing field provisions that allow third-parties and utilities to compete and partner in the development and delivery of DR programs.

a) Background

A lament heard by many companies who try to provide products and services to the utility sector is that, with the preponderance of state-specific jurisdiction (or in the case of municipal/public utilities their respective governing bodies), inconsistencies exist in policies and markets related to the electricity industry. This same sentiment can also be heard expressed by utilities themselves in the case of multi-state companies. This statement is heard often in the case of DR, and is complicated by the fact that in the case of markets administered by ISOs, regional programs and markets exist for DR which can underlay or overlay state DR programs and markets.

This growth of regional markets and regional entities has created a new area for potential inconsistencies (and potential coordination) among and between regional markets, between regions and states and between wholesale and retail planning, markets and operations.

b) Challenges

» Challenge 1

New platform-based distribution markets will require greater coordination and cooperation between regional wholesale entities and state/local distribution entities.

» Challenge 2

DR/DER on the customer side of the meter will make it challenging for both wholesale and retail coordination and dispatch entities to have sufficient visibility on the system to allow optimal coordination and consistency.

» Challenge 3

Potential changes loom relative to regulatory jurisdiction over wholesale DR programs and markets, which can introduce uncertainty into the planning for inclusion of DR in wholesale markets.

» Challenge 4

Even if just wholesale markets and ISOs are considered, differences can exist between regions, that could lead to suboptimal national or regional markets.

c) Expectations

» Expectation 1

Increased DR/DER, driven by technology innovation and penetration, will lead to increased development of distribution-based "plug-and-play" system operations at the retail, distribution level.

» Expectation 2

The rise of distribution-based systems will provide new opportunities for DR to be viewed and used as a DER option.

d) Recommendations

» Recommendation 1

State-level policies on distribution platforms should, as they are developed and implemented, consider how distribution-level DR will be coordinated with regional wholesale DR.

» Recommendation 2

Regional system operators should participate in the proceedings and processes that are and will be underway to develop distribution-based market systems.

Appendix A: Things the Group Struggled with

The EDP project consisted of a very diverse group of individuals, representing a variety of entities (some of whom held opposing views and positions) working together to try to find common ground on challenges, expectations and recommendations related to DR. The diversity of the group meant that not all discussions of all issues and topics went smoothly. Moreover, the fact that DR is in many ways a moving target as it evolves and responds to policy, technology and business/market developments introduced the challenges of describing a still-unfolding resource and made achieving consensus difficult.

The following section is an attempt to describe some of the ways in which the group found its work to be challenging. It is provided in the hope that it will be of benefit to other efforts around the country trying to have similar discussions and deliberations about the future of demand response.

a) Trying to Categorize All Issues by Wholesale Market or Vertically Integrated Utility

It was not an unnatural assumption among participants at the outset of the Dialogue that the DR issues and topics to be discussed could be delineated by their derivation from, or impact on, wholesale market as opposed to vertically integrated utility systems. Another view put forth was that the presence of retail choice was a delineator.

It was determined early in the discussions that such neat bilateral apportionment was easier said than done, as the many different situations and scenarios (see the following section on caveats) hamper that.

But what also came to light is that many of the issues and aspects of DR/DER thought to be different between the two situations may indeed not be that different. This assessment needs to be further explored in any future dialogue work, and a more specific and distinct discussion may be required solely on the vertically integrated model.

b) Death by a Thousand Caveats

Electricity in the U.S. is sometimes referred to as being "balkanized," a reference that there are many different "types" of utilities, many different jurisdictions with authority over them, no strict dividing lines between wholesale and retail jurisdiction, and differences between open and traditional markets being in place—to name a few reasons. This has long led to a challenge in trying to develop things like generic policies, business models, etc.

In the EDP dialogue, a consistent occurrence was for a participant to make a comment such as "that is not how it is done in my state/market" or "that idea/proposal would not work for me because of x, y, or z." This began to be seen as a threat to creation of eventual EDP output, as it was difficult to identify challenges, expectations, recommendations that were not subject to some caveat. Importantly, this is a different aspect of this Dialogue than failure to reach a consensus on some issue/topic. The challenge being described here was not disagreement as much as it was lack of applicability.

c) The Cross-Cutting Nature of Issues/Topics When Trying to Focus on a Given One in a Given Context

When certain terms or topics came up, they created a linkage in a participant's mind to another issue. The linkage may have been a legitimate one, but this threatened to make the dialogue jump around, and required tight facilitation.

d) Need for Definitions

A natural approach to dialogues like this is to want to start by getting everyone "on the same page" to the extent possible and to use definitions to help do that. That was not the approach used with EDP. Debates over definitions did not take place, other than when discussion turned to caveats (see b above). Terms used during the dialogue were considered to be understood sufficiently by the participants to avoid the need to agree on formal definitions.

e) Some Issues/Topics Only are Relevant for Certain Types of DR

Care must be undertaken to avoid generalization to all DR. Also, the same "type" of DR might be talked about very differently if in the context of a load-modifying resource (often consisting of price-based DR) or a supply resource (often consisting of payment-based DR). This points to the "duality" aspect of DR, which is discussed further in this Report. Other examples of different types of DR that can lead to very different lines of discussions are behind-the-meter generation-based DR, pricing-based DR versus payment-based DR, and DR used for energy versus that used for ancillary markets.

f) A DER context

The Dialogue was agreed at the start to be about the "Evolution of DR in a DER Context." Yet there is such interest (and perhaps anxiety) relevant to DER that there were natural off-ramps taken on issues/topics that were related to non-DR DERs, which required the group to get refocused.

It was agreed at the very first meeting of the group that DR was "a DER" and that it was important for all in the electricity industry to understand that and to talk about it in that way. But yet each DER has its own issues, especially when it comes to something like behind-the-meter renewable generation technology, and so care had to be taken to not drill down on any particular type of DER (other than DR) and instead look for generic DER issues that applied to DR and thus were appropriate for group discussion.

g) Operations versus Planning versus Markets

The participants in the Dialogue came from many different parts of the functional spectrum, and that led to many different standpoints, or reference points, coming into play. This was especially the case when discussing an issue/topic that needed to be discussed, described or addressed very differently when looking at it from a planning (and forecasting) perspective as opposed to an operational perspective or a market perspective.

h) Duality

An issue which led to substantial discussion and deliberation was that of how to address and manage the "duality" of DR. This issue stems from the fact that DR is a load-modifying resource that is sometimes paid as though it were a supply resource. A determination that it is one or the other was identified early in the Dialogue as something that created challenges for policies, markets and operations.

i) The Supreme Court Decision on FERC Order 745

At the time that this project/dialogue commenced there was uncertainty regarding both the calculation of payments to DR participating as a supply side resource in wholesale energy markets, and the limits of Federal Energy Regulatory Commission jurisdiction.

Both of these uncertainties stemmed from a DC Circuit court proceeding on whether FERC Order 745 should be vacated. Not only did the Circuit Court find the payment methodology to be arbitrary and capricious, but in the decision vacating the order, the Court found that FERC lacked jurisdiction over demand response.

Final action on FERC Order 745 is now before the Supreme Court, with a decision expected in 2016.

It was easy to arrive at a point in discussions where such discussion was dependent on what the final disposition of FERC Order 745 would be. In most cases, the discussion was continued based on the status quo as to do differently would require debate, guess-work, and discussion as to what the Supreme Court would do. While the EDP Dialogue Project will be over by the time the Supreme Court issues its ruling, EDP participants may re-form a dialogue subsequent to the ruling to discuss its impact on the work of the group already released, to the extent that group participants are not limited by the nature of the court ruling.

j) Policy Preferences vs. Economics and Market Design vs. System Operations

Most of the electricity system is subject to some regulation of its markets. For example, while wholesale-level regional markets exist in some regions, these markets are still highly regulated in terms of market design and the pursuit of economic optimization. The non-regulatory aspect of that market comes in the form of truly competitive bidding by all resources.

This situation can create a challenge in a Dialogue like EDP in that things like subsidies and other policy decisions or initiatives made by individual states may conflict with wholesale market designs based on achieving economic efficiencies, and may conflict with actual real-world system and market operations.

k) Different Views on How Issues/Topics Fit Together

One structural challenge for the participants was a natural one—that different people make different associations among and between different issues and topics. It is quite natural that with a multi-faceted issue like DR, which can suffer from duality confusion, that different people would design different hierarchies and outlines for an output document. In this type of dialogue, the structure of the output was not pre-ordained, and thus considerable discussion on this was required.

l) The Dialogue Itself as an Output of the Project

Facilitated Dialogues can be done with different kinds of goals. For example:

(i) The goal of the Dialogue can be the learning that happens among the discussants, and not to produce any written output of the dialogue at its end which might provide a benefit to non-participants.

(ii) The goal may be output documents that portray and convey the discussion, so that a reader can see how things were discussed and what comments were made, proposals put forth, etc.

(iii) The goal can be creating a new output document that synthesizes, builds on, and extracts from the dialogue new content that has not previously existed.

This EDP Dialogue began with the third goal above, but evolved to include aspects of the first two.

Appendix B: EDP Project Participants

American Public Power Association (APPA)	Jim Cater
Association for Demand Response & Smart Grid (ADS)	Dan Delurey, Jenny Senff
Baltimore Gas & Electric (BGE)	David Bloom
Cpower	Frank Lacey
DC Public Service Commission	Chairwoman Betty Ann Kane
EnergyConnect, Inc. - a Johnson Controls Company	Bruce Campbell
Energy Curtailment Services, an NRG company	Marie Pieniazek, Monica Berry
Federal Energy Regulatory Commission (FERC)	Sandie Waldstein (monitoring as allowed under the law)
Illinois Commerce Commission	Commissioner Ann McCabe
Illinois Citizens Utility Board	David Kolata
ISO New England	Henry Yoshimura
Landis+Gyr	Todd Horsman
Lawrence Berkeley National Laboratory	Peter Cappers
Minnesota Public Utilities Commission	Chris Villarreal
New England Conference of Public Utility Commissioners	Rachel Goldwasser
Pacific Gas & Electric (PG&E)	Brooke Reilly
PJM Interconnection	Susan Covino, Paul Sotkiewicz
Public Utility Commission of Ohio	Commissioner Asim Haque
Regulatory Assistance Project (RAP)	David Littell
Southern California Edison (SCE)	Mike Hoover
Southern Company	Howard Smith
Sustainable FERC, from NRDC	Allison Clements, John Moore
White House Office of Science and Technology Policy	Dipayan Ghosh (monitoring)
White House Office of Management and Budget	Dan Schory (monitoring)

Appendix C: Resources for Participants

This document is a compilation of the recommended reading that was provided to EDP participants during the course of the project. The list is grouped with oldest first, and newest last, and provided in the exact form in which participants received them.

1. **NY REV** – Order Instituting Reform of the Energy Vision (NY REV - April 25, 2014)
   This is what kicked off the REV proceeding.

2. **CAISO** – 21st Century Electric Distribution System Operations (CAISO and Caltech Resnick Institute - May 2014)
   This is a good piece for the understanding of transactive energy as it relates to DER.

3. **Hempling Article** – D.C. Circuit Kills Demand Response Compensation: Now What? (Scott Hempling - June 2014)
   This was published by Hempling, a noted regulatory attorney, soon after the initial court decision and just prior to the 2014 NARUC Summer Conference.

4. **ADS Webinar** – The Effects of 111(d) and Order 745 on DR & Smart Grid (ADS Webinar - July 8, 2014)
   Recording from an ADS webinar on the potential effects of both 745 and 111d.

5. **CPUC** – CPUC Rulemaking - Distribution Resources Plan Proposal (CPUC - August 20, 2014)

6. **PJM** – The Evolution of Demand Response in the PJM Wholesale Market (PJM - October 6, 2014)
   This is the PJM "White Paper" that is often cited or referred to.

7. **CPUC** – CPUC Rulemaking - Enhancing role of DR (CPUC - December 9, 2014)

8. **CPUC** – CPUC Rulemaking - Distribution Resource Planning (CPUC - February 6, 2015)

9. **CPUC** – CPUC Rulemaking - Cost recovery for Demand Response direct participation (CPUC - February 20, 2015)

10. **REV** – Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision Order Adopting Regulatory Policy Framework and Implementation Plan (REV – February 26, 2015)
    This is the first consequential Order in the REV Proceeding.

11. **California** – California's Demand Response 2.0 Creates New Competitive Markets (Greentech Media - March 11, 2015)
    This is a good overview of the CA CPUC Proceedings on DR/DER, the links for which are above.

12. **ISO – New England –** ISO New England Contingency Plan Addressing Potential Loss of FERC Jurisdiction (ISO-NE - April 17, 2015)

13. **AEE Report** – Integrating Renewable Energy into the Electricity Grid
    Earlier this year, the North American Electric Reliability Corp. (NERC) issued an "initial reliability review" in which it identified elements of EPA's proposed Clean Power Plan that could lead to reliability concerns. One of the issues identified by NERC was the challenge of integrating variable renewable resources, such as wind and solar, into the power system at the levels contemplated by the CPP. The Advanced Energy Economy Institute commissioned The Brattle Group to provide an overview of how utilities and grid operators were integrating variable renewable resources while maintaining reliable electric service. In this report, The Brattle Group provides two case studies representing the two types of electricity market structures in the United States—the Electric Reliability Council of Texas (ERCOT), a regional transmission organization (RTO), and Xcel Energy Colorado, a vertically integrated utility—each of which is successfully managing a high and increasing share of power from variable renewables. The Brattle Group found that "ongoing technological progress and ongoing learning about how to manage the operations of the electric system will likely allow the integration not only of the levels of variable renewable capacity now in places like Texas and Colorado but even significantly larger amounts in the future."

14. **EEI e-Book** – The Evolving Electric Power Industry
This book, compiled by IEI and published by EEI, is a collection of essays by electric utility and technology company leaders, policy makers, and other stakeholders focused on three distinct and interrelated areas driving the evolution of the electric power industry today—the Evolving Grid, the Evolving Customer, and Evolving Regulation.

15. **NACAA** – Implementing EPA's Clean Power Plan: A Menu of Options
The National Association of Clean Air Agencies (NACAA) recently published a report entitled Implementing EPA's Clean Power Plan: A Menu of Options. The report identifies a wide range of technologies, programs and policies that agencies might employ to reduce greenhouse gas (GHG) emissions from the power sector as part of a Clean Power Plan (CPP) implementation plan. The Menu begins with 25 detailed chapters, each of which explores various approaches to GHG reduction in the electric sector. Each chapter starts with a profile, that is, a short description of the pros and cons of the approach. Next, the regulatory backdrop, policy underpinnings, implementation experience, and GHG reduction potential associated with the approach are discussed. Each chapter then looks at co-benefits of the approach, including benefits to society and the utility system. Costs and cost-effectiveness are also explored. Finally, the Menu briefly examines a variety of emerging technologies and other important policies that regulators may wish to consider as they make plans to reduce power sector GHG emissions. The report includes chapters on optimizing grid operations and improving demand response policies and programs.

16. **America's Power Plan** – New Regulatory Models
This paper analyzes performance-based ratemaking, showing how it can provide new revenue streams to utilities in a time of changing industry business models. The paper is a new resource for Commissions, utilities, and industry experts. The paper builds on two pieces of work from America's Power Plan, Rethinking Policy to Deliver a Clean Energy Future and Utility and Regulatory Models for the Modern Era. It draws on experience with elements of performance-based ratemaking in action, distilling a top ten list of principles for regulators interested in working with their utilities to design and adopt this kind of program.

17. **Brattle-Oncor** – The Value of Distributed Energy Storage in Texas
This report finds that the deployment of grid-integrated distributed electricity storage in Texas could provide substantial net benefits to the power system in ERCOT and its electricity customers. The report evaluates whether storage could be cost-effectively deployed from the perspectives of retail customers, wholesale electricity market participants, and the combined system or "society as a whole" while maintaining wholesale power prices that continue to support necessary generation investments. The authors show that enabling cost-effective investments in electricity storage will require a regulatory framework that helps investors capture the combined values of storage from the wholesale market, the T&D systems, and customer outage reduction. Thus, the authors recommend a regulatory framework that would involve allowing the transmission and distribution companies to deploy the electricity storage on the distribution system and "auction off" to independent third parties the rights to use the storage facilities for participation in the wholesale market.

18. **New England Electricity Restructuring Roundtable** – Panel on Sustainable Rate Design for a Modern Grid (live streaming available 6/19)
With the expected maturation of the distribution grid to enable two-way power flow that integrates a bevy of distributed energy resources and systems (including PV, storage, demand response, EE, EVs, smart thermostats/appliances, CHP, microgrids, etc.), how will rate designs evolve to be able to 1) fairly compensate distributed resources for the value they provide to the grid; 2) fairly compensate distribution companies for the value that grid services provide customers; and 3) fairly distribute the costs and benefits of a modern grid among all customers? The Net Metering Task Force in Massachusetts released its final report (also on April 30th), which calls for conducting a comprehensive and transparent solar benefit/cost study to determine the value and impact of solar in Massachusetts. Meanwhile, across the country, utilities, stakeholders, and regulators are exploring ways to significantly modify rate-making, including reallocating costs from variable to fixed charges, moving toward time variable rates, having minimum bills, and even introducing demand charges for residential customers. In a modern grid, likely chock-full of distributed energy resources, what will a sustainable rate design look like? To lead off this panel, Richard Sedano, Principal at the Regulatory Assistance Project will discuss RAP's forthcoming study on exactly this topic-customer rate-making for the grid of the future. Brattle Principal Dr. Ahmad Faruqui, well-known in New England for his advocacy of time variable rates, will discuss recent research and work that Brattle has been doing on increasing fixed charges and introducing demand charges for residential and other customers. Shaun Chapman, VP for Policy and Electricity Markets at SolarCity will share his perspective on net metering and potential future rate-making paradigms that can fairly support an active PV industry. In addition to its role as the largest solar provider in the U.S., SolarCity is a close partner with Tesla, which just last week unveiled its new home battery "Powerwall," designed to support and integrate with PV systems. Rounding out the panel, John Howat, Senior Energy Analyst at the National Consumer Law Center, will provide a consumer perspective on the range of proposed rate design alternatives. In addition to advocating for low-income ratepayers for NCLC, John is also the national Coordinator of Consumer Advocates for the Fixed Charge Network.

19. **CAISO** – Expanded Metering and Telemetry Options: Phase 2
The ISO is evaluating additional configuration options for metering and telemetry to reduce barriers for aggregated resource models. It is conducting pilot programs as needed to demonstrate that the alternatives meet ISO and participant needs, and will review and modify ISO requirements if necessary. The initiative may produce Business Practice Manual for Telemetry and Metering updates and potential tariff changes. The Document linked represents outlines all of this in draft status.

20. **51st State Project** – http://sepa51.org
The Solar Electric Power Association (SEPA) recently initiated a project it issued a challenge to interested parties to design a utility regulatory and business scenario for a hypothetical state that was starting with a blank slate, and thus there would be less need to deal with legacy policy and institutional barriers. The project was a competition. Many parties submitted proposals and a jury of experts selected 3 of them as "winners." See them at the above link.

21. **ADS Tool on** DR 2.0: A Future of Customer Response
In 2013, ADS released a tool on *Demand Response 2.0: A Future of Customer Response*. The toolkit identifies and explores the past, present and future of demand response and was intended to educate demand response stakeholders and stimulate discussion among the demand response community. *DR 2.0: A Future of Customer Response was developed to fulfill part of the Implementation Proposal for The National Action Plan on Demand Response*, a report to Congress jointly issued by the U.S. Department of Energy (DOE) and the Federal Energy Regulatory Commission (FERC) in June 2011. The toolkit discusses the factors causing the shift from traditional demand response to DR 2.0, and outlines the major features of DR 2.0. It concludes by providing resources for DR practitioners and policymakers, including an overview of key issues to monitor and a decision-maker checklist.

22. **Bipartisan Policy Center** – Capitalizing on the Evolving Power Sector: Policies for a Modern and Reliable U.S. Electric Grid
This report was referenced by Allison Clements (Sustainable FERC) during the June 17 EDP meeting as both a potential resource and a model for EDP output.

23. **DOE** – Interim report on customer acceptance, retention, and response to time-based rates from the Consumer Behavior Studies
Report by Peter Cappers and LBNL on customer acceptance of time-based rates based on studies of 10 utilities.

24. **SEPA and Black & Veatch White Paper** – Solar and Energy Storage Impacts on Wholesale Power Markets
California utilities are poised to surpass the State legislature's 33% by 2020 Renewable Energy Standard. Find out what California's clean energy policies will mean from pricing, resource mix, and investment perspectives. Black & Veatch recently partnered with SEPA to understand the impacts of solar and storage investments, specifically on southern California (SP15) in the year 2030. Examine how increased solar and other renewable energy on the California grid will have significant benefits in terms of reducing wholesale market clearing prices, reducing imports and reducing power sector carbon emissions.

25. **NY REV** – NY PSC allows utilities to pay customers for DR
The New York PSC recently approved new rules for utilities to offer customers financial payments for DR. The DR programs mirror ones that have already been in place at Con Edison and will take effect initially in high value areas on July 1. The programs are being rolled out fast, so some utilities are only able to offer them to a limited part of their service territory this summer. The utilities are prioritizing areas that offer the greatest benefits at the lowest costs, based on factors including system stress and local distribution constraints for this year. All of the firms will make the DR programs available throughout their entire footprints starting next summer. Customers can take part in the programs individually or through an aggregator. You can read the PSC order here.

26. **LBNL Papers**
Considerations for State Regulators and Policymakers in a Post-FERC Order 745 World

American Recovery and Reinvestment Act of 2009: Experiences from the Consumer Behavior Studies on Engaging Customers

Market and Policy Barriers for Demand Response Providing Ancillary Services in U.S. Markets

Mass Market Demand Response and Variable Generation Integration Issues: A Scoping Study

27. **America's Power Plan** – website and blog
America's Power Plan is a platform for thinking about how to manage the transformation happening in the electric power sector today. The group curates expert information for decision-makers and their staffs, highlighting specific solutions to today's most pressing policy, regulatory, planning, and market design challenges. They collect the latest research on smart energy policies from the leaders in America's power sector transformation. In addition to the blog, linked above, they also produce periodic newsletters (sign up here) on current topics to help policymakers and other stakeholders stay up to date on important questions. Here are some of the most recent blog posts:

Are Policymakers Driving Blind with Yesterday's Cost Numbers?

Do Pay-for-Performance Capacity Markets Deliver the Outcomes We Need?

What can we learn from evolving renewable contracts and grid operations?

Efficiency: Can we accept less stringent oversight if it means better outcomes?

Getting Ready for Distributed Energy Resources

New Opportunities for Utilities

The Value of Demand Response

28. **GE and Analysis Group** – Results-Based Regulation: A Modern Approach to Modernize the Grid
Dave Malkin and Paul Centolella's 2013 paper for further discussion on cost-of-service regulation. Includes recommendations for modernizing the regulatory model.

29. **EPA** – Energy and Environment Guide to Action
EPA has launched an updated *Energy and Environment Guide to Action: State Policies and Best Practices for Advancing Energy Efficiency, Renewable Energy, and Combined Heat and Power*. The resource is part of EPA's State Climate and Energy Program and provides in-depth information about over a dozen policies and programs that states are using to meet their energy, environmental, and economic objectives. Each policy description is based on states' experiences in designing and implementing policies.

30. **UC Berkeley** – Economic Effects of Distributed PV Generation on California's Distribution System
Using data from Pacific Gas & Electric and solar provider SolarCity, researchers from the Energy Institute at Berkeley's Haas School of Business modeled long-term physical and economic impacts of up to 100 percent PV penetration on a subset of PG&E's distribution feeders.

31. **PJM** – Filing to improve the accuracy of measuring and verifying residential DR loads
PJM released a filing 6/23/15 designed to improve the accuracy of measuring and verifying loads of residential DR.

32. **America's Power Plan** – Aligning Power Markets to Deliver Value
In *Power Markets: Aligning Power Markets to Deliver Value*, Mike Hogan of RAP identifies three areas where power markets can adapt to enable an affordable, reliable transition to a power system with a large share of renewable energy. These are a) recognize the value of energy efficiency, b) upgrade grid operations to unlock flexibility in the short-term, and c) upgrade investment incentives to unlock flexibility in the long-term.

33. **Sustainable FERC/Paul Centolella** – Next Generation Demand Response: Responsive Demand through Automation and Variable Pricing
This paper includes a number of specific recommendations for retail regulators and FERC. It also supports the importance of price signals for optimizing the value of DER.

34. **New York DPS** – Staff White Paper on Benefit-Cost Analysis in the Reforming Energy Vision Proceeding
The Framework proposed is intended to address the marginal costs and benefits of DER versus traditional utility investments and expenditures to be proposed in near term Distributed System Implementation Plans (DSIPs) and tariff development. At the same time, other REV initiatives endeavor to reform traditional utility decision-making by modifying ratemaking and utility incentives to grow markets and improve system efficiencies. This Framework, and utility applied BCAs, will also adapt and evolve to reflect new market structures, products, and services as they develop.

35. **New York** – Utility Demonstration Projects
New York IOUs are now comparing themselves to car-service Uber, in terms of using their utility network to benefit both a third party electricity provider, the customer, and the utility itself. Instead of fighting against distributed energy resources, New York's REV proceeding has spurred New York utilities into moving more quickly to reform their business models. New York's IOUs have filed a multitude of demonstration projects with the PSC. Examples include: integrating renewables and storage; developing microgrids; giving consumers more control; virtual clean power plants; flexible interconnection; creating an energy marketplace; and reducing peak energy use.

36. **California PUC** – Distribution Resources Plan Proceeding
On 7/1/15, California utilities released their draft Distribution Resource Plans as required under the California Public Utilities Commission DRP proceeding (14-08-013). This follows the legislation requiring these plans in 2013 under AB 327 and the CPUC developing this guidance in coordination with MTS, bringing us to the release of the draft plans July 1. View the utilities' plans here.

37. **California PUC** – Residential electric rate reform
On 7/3/15, the California PUC passed a major residential electric rate reform plan. Regulators unanimously voted to convert the existing four-tiered rate structure to a two-tiered structure with a 25% cost difference between the two. In addition, they have instituted a "super-user electric surcharge" for residential customers that will charge customers extra if they use more than 400% of the average California resident's monthly electricity consumption.

38. **Michigan PSC** – Orders IOUs to offer time-of-use rates
On 6/30/15, the Michigan Public Service Commission approved revised tariffs for DTE Electric and Consumers Energy, the two state IOUs. In addition to revising production and transmission cost allocations for the two utilities, the PSC also directed the utilities to make time-of-use rates available to customers. The order indicated that TOU rates would allow residential customers to better control electricity usage and costs.

39. **Pacific Northwest Smart Grid Demonstration Project – Final Report**
The Pacific Northwest Smart Grid Demonstration Project (PNW-SGDP), funded by the US DOE under the American Recovery and Reinvestment Act (ARRA) was a five-year regional pilot project that encompassed Idaho, Montana, Oregon, Washington, and Wyoming, and involved nearly 60,000 metered customers. The project researched many key functions of the future smart grid in order to help contain costs, reduce emissions, incorporate more wind power and other renewables, increase grid reliability, and provide greater flexibility for customers. The Project submitted its final results in a Technology Performance Report, to DOE in late June 2015. The project determined that smart meters, automated control of power distribution, and other intelligent energy technologies can improve energy efficiency and possibly reduce power costs, but more research and development is needed. The report includes a summary of key findings, chapters for each of the project's 11 test sites, and results related to conservation and efficiency, reliability, and transactive energy. View the final report: http://lists.nrel.gov/t/130720/281913/122211/0/. View report highlights: http://www.pnwsmartgrid.org/docs/PNW_SGDP_AnnualReport.pdf.

40. **Republican legislators** – Letter to FERC
The Chairs of the Senate Energy and Natural Resources Committee and the House Energy and Commerce Committee sent a letter to FERC on 7/9/15 requesting a review of market rules to protect baseload nuclear and fossil fuel plants. They fear that renewable energy mandates, demand response, and other new regulations and policies will trigger the premature closing of these plants. The legislators requested FERC issue an order directing ISOs and RTOs to demonstrate that clearing prices in energy and capacity markets reflect the cost of supply and promote investment and meaningful price signals. The market rules should also reduce uncertainty and promote transparency.

41. **Analysis Group Report** – The Economic Impacts of the Regional Greenhouse Gas Initiative on Nine Northeast and Mid-Atlantic States
RGGI generated $1.3 billion in net economic benefits across the nine participating states. There were costs to power generators, but most of the billion dollars states collected in allowance proceeds from 2012-2014 went back into the economy in the form of EE programs, renewable projects, and bill payment assistance.

42. **DOE** – Grid Modernization Initiative
This PowerPoint outlines DOE's plans and proposals for a modernized grid.

43. **DOE** – Reorganizing to help utilities modernize the grid
DOE announces new partnership and research opportunities. Enhanced cooperation between electric utilities and the federal Department of Energy is essential to realizing the renewable energy and climate change goals set by the Obama administration, and the DOE is remaking itself to meet those aims. This includes goals to have an impact on advances in transmission-distribution system interoperability and in bringing distributed energy resources (DERs) into the system.

44. **CAISO** – Load Modifying DR Valuation Proposal
The CAISO's proposal on how to value DR resources on the load-modifying side of the supply/demand equation.

45. **Minnesota PUC** – Order prohibiting aggregators from bidding into wholesale markets
The MN PUC order prohibiting ARCs from aggregating and bidding into the MISO market. (this is an old order, but was discussed at the 7/15/15 meeting and thus was put on this list)

46. **AEE** – Integrating Renewable Energy Into the Electricity Grid
Case studies showing how system operators are maintaining reliability.

47. **EPRI** – Capacity and Energy in the Integrated Grid
Informing all stakeholders on the importance of capacity and energy in an integrated grid will be an important step as various jurisdictions consider policy and regulation that reflects the influence of renewable resources, distributed generation, energy storage, and new, more efficient loads. This paper addresses the role of capacity and energy in the Integrated Grid by providing insights from EPRI's research.

48. **New York PSC** – White Paper on Ratemaking and Utility Business Models
This white paper was issued on 7/28 and a notice for public comment was also released. The REV process has revealed that a comprehensive reform of New York's rate making practices must be undertaken for success of the REV vision. Parties must file official comments by October 5.

49. **PJM** – FERC approves PJM capacity performance proposal
On 6/9/15, PJM Interconnection received approval from the Federal Energy Regulatory Commission for its Capacity Performance proposal. With FERC's order, Capacity Performance can be incorporated into the annual capacity auction for the 2018-2019 delivery year. The auction will begin August 10. Capacity Performance will enhance the incentives for capacity resources to be available when needed most, help reduce price spikes during system emergencies and reduce the chance of expensive forced outages. Capacity Performance provides clearly defined obligations for capacity resources and will enhance reliability at a reasonable cost. Read the announcement.

50. **NY REV** – Draft report of the market design and platform technology working groups
This draft report culminates the work of the Market Design and Platform Technology Working Groups (MDPT) in support of the New York State Public Service Commission's (PSC) Reforming the Energy Vision (REV) proceeding. Per the PSC's Track One Order, issued February 26, 2015, the MDPT stakeholder engagement sought to develop recommendations for consideration by the Department of Public Service (DPS) Staff as they develop guidance for New York utility Distributed System Implementation Plans (DSIPs) on near-and mid-term Distributed System Platform (DSP) market design and platform technology issues.

51. **More Then Smart** – A Framework to make the distribution grid more open, efficient, and resilient
This paper is the result of a series of workshops with industry, government and nonprofit leaders focused on helping guide future utility investments and planning for a new distributed generation system. The distributed grid is the final stage in the delivery of electric power linking electricity sub-stations to customers. To date, no state has initiated a comprehensive effort that includes the planning, design-build and operational requirements for large scale integration of DER into state-wide distributed generation systems. This paper provides a framework and guiding principles for how to initiate such a system and can be used to implement California law AB 327 passed in 2013 requiring investor owned utilities to submit a DER plan to the CPUC by July 2015 that identifies their optimal deployment locations.

52. **ISO-NE** – New white paper on renewable energy and capacity markets
On 6/3/15, ISO New England released a draft paper titled "The Importance of a Performance-Based Capacity Market to Ensure Reliability as the Grid Adapts to a Renewable Energy Future," for discussion with stakeholders at the upcoming NECPUC and NEPOOL meetings in June. The paper describes the magnitude of renewable energy coming onto the system and the interaction of related state policies with the region's wholesale electricity markets. The paper concludes that increased dispatch of renewable generation in electricity markets is driving up prices in capacity markets, and says that the shift in revenues would impact energy-market dependent resources.

53. **NY REV** – Order adopting regulatory policy framework and implementation plan
This order was issued and effective 2/26/15, but was not included as a link above.

54. **California PUC** – http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M151/K170/151170306.PDF
This is the Order in the Integrated Demand Side Resource Proceeding that followed an important workshop held in the proceeding.

55. **California PUC** – http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M153/K740/153740896.PDF
This is the Proposed Order from Commissioner Florio in the Integrated Demand Side Resource Proceeding that is to be voted on at an upcoming CPUC Meeting.

56. **NYSPSC** – http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={4F-C5E2AD-CF1C-417E-9BF4-01C3DBCD3667}
This report culminates the work of the Market Design and Platform Technology Working Group (MDPT) in support of the New York State Public Service Commission's (PSC) Reforming the Energy Vision (REV) proceeding. Per the PSC's Track One Order, issued February 26, 2015, the MDPT stakeholder engagement sought to develop recommendations for consideration by the Department of Public Service (DPS) Staff as they develop guidance for New York utility Distributed System Implementation Plans (DSIPs) on near- and mid-term Distributed System Platform (DSP) market design and platform technology issues.

57. **SolarCity** – http://www.solarcity.com/sites/default/files/SolarCity%20White%20Paper%20-%20Integrated%20Distribution%20Planning_final.pdf
A white paper by SolarCity proposes that distribution system operators adopt a distribution loading order similar to California's wholesale loading order as a basis for planning the integration of distributed energy resources, including RT Solar, Storage, EV storage, EE and DR.

58. **Massachusetts: Utilities Submit Grid Modernization Plans to DPU** – http://web1.env.state.ma.us/DPU/FileRoomAPI/api/Attachments/Get/?path=15-120%2fGrid_Mod_Plan_8142015Final.pdf and http://web1.env.state.ma.us/DPU/FileRoomAPI/api/Attachments/Get/?path=15-122%2fInitial_Filing_Petition.pdf
On 8/19/15, National Grid and Eversource Energy submitted their grid modernization proposals to the Massachusetts Department of Public Utilities. Last summer, the DPU directed the state's electric utilities to submit grid modernization plans that will require investments in communications, metering, automation of the distribution system and voltage management. The proposals will allow the DPU, stakeholders and customers to consider the benefits and costs from grid modernization plans with various scale, scope and technology choices.

59. **Report on Economics of Demand Flexibility** – http://www.rmi.org/electricity_demand_flexibility
A new report by the Rocky Mountain Institute, *The Economics of Demand Flexibility*, discusses how the ability for customers to shift electricity use to a later time can have major economic impacts. The report finds that residential demand flexibility can avoid US$9 billion per year of forecast U.S. grid investment costs—more than 10% of total national forecast needs—and avoid another US$4 billion per year in annual energy production and ancillary service costs. In addition, the report states that customers can benefit too by saving between 10% and 40% on their utility bill. Read an article about the report: http://www.washingtonpost.com/news/energy-environment/wp/2015/08/26/theres-a-big-change-coming-to-how-we-use-energy-at-home-and-it-isnt-solar-or-batteries/?wpmm=1&wpisrc=nl_green

60. **Report on Capacity and Energy in an Integrated Grid** – http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=000000003002006692
The Electric Power Research Institute (EPRI) recently published a paper entitled "Capacity and Energy in the Integrated Grid." The paper provides insights from EPRI's research in the following areas: How individual resources may contribute differently to the system's capacity to deliver energy; How changing supply and load characteristics make it necessary to distinctly address both energy and capacity on wholesale and retail levels; The cost of capacity, based on an assessment of cost structures of several U.S. utilities; Emerging trends in wholesale markets and retail rate structures to value capacity and energy as distinct elements of those markets/structures; and Key research to enable DER to provide both capacity and energy.

61. **ERCOT Posts Paper on Distributed Energy Resources**
On 8/20/15, ERCOT staff posted a full version of their Distributed Energy Resources (DER) Whitepaper. And it was discussed at the 8/25/15 meeting of the DREAM TF, or Distributed Resources Energy and Ancillaries Market Task Force. The 55-page paper states that "electric systems and markets worldwide are dealing with dramatic change, and a major focus of the future will be on DERs." Intending to serve as a catalyst for development of new Protocols and other market rules affecting DERs in the ERCOT market, the paper focuses on two goals: (1) "collection of data that ERCOT anticipates it will need, as the Independent System Operator (ISO) for the region, to ensure grid reliability, as DER penetration increases in the grid of the future; and (2) development of a market framework that can better accommodate DERs and enable effective, efficient market participation." The paper makes several recommendations, proposes settlement options, and discusses storage, demand response, new metering configurations, and information exchanges between market participants. Additional materials for the meeting include a list of DER issues and the TF's scope of work.

62. **CPUC Ruling by Commissioner Florio – Providing Guidance for 2017 Demand Response Programs and Activities Proposal Filings** – http://docs.cpuc.ca.gov/SearchRes.aspx?docformat=ALL&docid=154420596
This Ruling provides expectations and guidelines for the contents of demand response program proposals for 2017 bridge funding. Not later than February 1, 2016, Pacific Gas and Electric Company, San Diego Gas & Electric Company, and Southern California Edison Company shall each file a proposal requesting Commission approval for 2017 demand response program and bridge funding authorization in compliance with this Ruling. Parties may then file comments to the proposals not later than March 2, 2016. As stated in Decision 14-12-024, a proposed decision will be issued in spring 2016 to consider bridge funding for 2017 demand response programs.

63. **CPUC Proposal on Backup Generation for DR –** California: CPUC Proposal Would Prohibit Fossil Fuel Backup Generation in DR Programs
A new proposal from the California Public Utility Commission's Energy Division recommends that the Commission prohibit the use of fossil-fueled back-up generation in demand response programs beginning with the 2017 program year. In order to create a record to make a determination on whether to adopt a portion of or the entire Staff Proposal, parties are invited to review the proposal and respond in general and to specific questions. Comments are due no later than October 12, 2015; replies are due no later than October 15, 2015.

64. **CPUC Decision on Integration of Distributed Energy Resources –** California: CPUC Decision on Integration of DERs
On 9/17/15, the California Public Utilities Commission released a decision adopting an expanded scope, a definition, and a goal for the integration of distributed energy resources (DERs). This decision forms the foundation of Rulemaking 14-10-003, "Order Instituting Rulemaking to Create a Consistent Regulatory Framework for the Guidance, Planning, and Evaluation of Integrated Demand Side Resource Program." The decision adopts a goal for the proceeding: "to deploy distributed energy resources that provide optimal customer and grid benefits, while enabling California to reach its climate objectives." The scope of this proceeding will make a determination on how best to source the distributed energy resources needed by the utilities based on the determinations made in R.14-08-013, i.e., value of distributed energy resources. The proceeding will support the development of an end-to-end framework for integrating distributed energy resources, including relevant valuation methodologies and sourcing mechanisms.

65. **Summaries of Massachusetts Grid Modernization Plans –** Massachusetts Grid Modernization Plans
Summaries of the Massachusetts grid modernization plans are posted at the link above.

66. **Report on Rate Design for DERs** – http://nrri.org/download/nrri-15-08-rate-design-for-der/
In many electric utility service territories, rapid growth in distributed generation, especially rooftop solar, is triggering both legislative and regulatory proposals for changes in rate designs. A new paper from NRRI, *Rate Design for DER*, reviews, summarizes, and catalogs over a hundred pending proposals and recently adopted changes, in 43 states and the District of Columbia. The four major types of proposals include, singly or in combinations: (1) higher fixed charges; (2) demand-charges for residential and small commercial customers; (3) higher minimum monthly bills; and (4) changes in the terms and conditions for net metering. Some proposals also include time-differentiated rates, changes in standby charges, tiered- or block-rate structures, and various alternatives to net metering, such as feed-in tariffs, two-way rates, or value-of-solar tariffs, possibly combined with value-of-service rates. Some of the regulatory proposals fall in the context of general rate cases, while others are being heard in single-purpose hearings.

67. **Supreme Court Oral Arguments Given in EPSA Case** – http://www.scotusblog.com/2015/10/argument-analysis-when-an-empty-chair-may-count-the-most/
On 10/14/15, oral arguments were presented to the Supreme Court in the *Federal Energy Regulatory Commission v. Electric Power Supply Association* case. SCOTUS Blog reported that many signs indicate that the Court will split four to four, as Justice Samuel A. Alito, Jr. is abstaining, probably for ethical reasons. The article describes the arguments and the questions asked by the justices. If the Court does cast a four-to-four vote and decides that it is the most that it can do, that result would be announced promptly, perhaps as early as next Monday. View the court transcript: http://www.supremecourt.gov/oral_arguments/argument_transcripts/14-840_qn12.pdf

68. **Distribution Systems in a High Distributed Energy Resources Future: Planning, Market Design, Operation and Oversight** – https://emp.lbl.gov/future-electric-utility-regulation-series
The report offers a practical three-stage framework to guide the evolution of distribution systems with growth in distributed energy resources. The authors provide a structured sequence that regulators and policy makers can use to assess options and develop a preferred distribution system tailored to their jurisdiction, with clear lines of sight to overarching regulatory and public policy objectives. The authors then compare three distribution operational models for the future and discuss the pros and cons of an independent Distribution System Operator (DSO) versus the distribution utility serving as the DSO. The report concludes with considerations and recommendations for policy makers, regulators, utilities and other stakeholders. Register now for a webinar on Friday, Nov. 13th, at 10 a.m. Pacific (1 p.m. Eastern) with highlights from the second report in Berkeley Lab's Future Electric Utility Regulation series.

69. **Comments on NY REV's Track 2 filed** – http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=14-M-0101&submit=Search+by+Case+Number
Initial comments from power sector stakeholders were due 10/26 on the second track of New York's Reforming the Energy Vision proceeding to overhaul utility business models and stimulate the growth of distributed resources. Comments filed with the New York Public Service Commission focused on a white paper issued in July by regulators proposing fundamental changes to utility ratemaking practices and revenue models, including adding market-based earnings into utility ledgers. Reply comments to the just-filed comments on Track 2 of the REV docket are due on November 23.

70. **ISO-NE Asks to Make Changes to Demand Response Program** – http://www.iso-ne.com/static-assets/documents/2015/10/er16-167-000_part_1.pdf and http://www.iso-ne.com/static-assets/documents/2015/10/er16-167-001_part_2.pdf
ISO-New England has asked FERC to allow it to make several changes to its demand response programs. The changes encompass: (i) delaying the full integration of demand response into the wholesale markets by one year; (ii) revising the methodology used to derive Demand Response Baselines; and (iii) modifying the simultaneous auditing requirements of Real-Time Demand Response and Real-Time Emergency Generation Resources. ISO-NE testimony is attached to the end of the "Part 1" document linked above.

71. **Peak Demand Reduction Strategy** – http://info.aee.net/hubfs/PDF/aee-peak-demand-reduction-strategy.pdf?t=1447693376781
Advanced Energy Economy (AEE) engaged Navigant to perform quantitative and qualitative analysis in order to gain an understanding of peak demand reduction standards, their potential benefits, and how such standards should be designed.

72. **FERC Report on Demand Response and Advanced Metering –** http://www.ferc.gov/legal/staff-reports/2015/demand-response.pdf
FERC recently released its Annual FERC Assessment of Demand Response and Advanced Metering. This is a Report issued every year pursuant to Congressional directive established in 2005. It include statistics on technology penetration and DR programs as well as information about trends being observed.

73. **LBNL Issues a Report on "Future Opportunities and Challenges with Using Demand Response as a Resource in Distribution System Operation and Planning Activities** – https://emp.lbl.gov/publications/future-opportunities-and-challenges/?utm_source=newsletter1&utm_medium=email&utm_campaign=Constant%20Contact&utm_source=Cappers-+DR+as+a+Distribution+Resource+announcement&utm_campaign=DR+as+a+Distribution+Resource+Announcement&utm_medium=email

This new product from Lawrence Berkeley Labs looks at things like communication/coordination between Distribution and Wholesale systems and the need for price signals to customers at the distribution level.