May 19, 2017

Debra A. Howland
Public Utilities Commission
21 S. Fwit St., Suite 10 Concord,
N.H. 03301 -2429

Re: <u>IR. 15-296:</u> Electric Distribution Utilities Investigation into Grid Modernization Public Comment

Dear Ms. Howland:

Environmental Defense Fund ("EDF") appreciates the opportunity to comment on the New Hampshire Grid Modernization Working Group Final Report ("Final Report").[1] EDF is a non-profit, non-partisan, non-governmental environmental organization that combines law, policy, science, and economics to find solutions to today's most pressing environmental problems.

EDF has participated in various grid modernization proceedings across the country and is pleased to share our perspective to help advance New Hampshire's grid modernization efforts in a strategic, cost-effective and environmentally sustainable manner. We look forward to further engaging as the New Hampshire Public Utilities Commission ("PUC") considers the next steps and respectfully submit these comments on behalf of our more than 2 million members who support cleaner air and climate security.

EDF commends the Commission for initiating an inquiry into grid modernization and for establishing a formal process to "obtain additional input from interested parties, to create an open dialog on key grid modernization topics, and to reach as much agreement as possible on regulatory opportunities for advancing grid modernization in New Hampshire."[2] EDF would also like to thank the grid modernization working group members and the facilitators for their effort and dedication in developing the Final Report.

[1] New Hampshire Grid Modernization Working Group Final Report, March 20, 2017, submitted in IR 15-296, available at http://www.puc.state.nh.us/Regulatory/Docketbk/2015/15-296/LETTERS-MEMOS-TARIFFS/15-296_2017-03-20_NH_GRID_MOD_GRP_FINAL_RPT.PDF
[2] New Hampshire Public Utilities Commission, "Investigation into Grid Modernization. Order of Notice," Order issued July 30, 2015 in IR 15-296, available at http://www.puc.state.nh.us/Regulatory/Docketbk/2015/15-296/INITIAL%20FILING%20-%20PETITION/15-296%202015-07-30%20ORDER%20OF%20NOTICE.PDF

INTRODUCTION

The need to build a smarter energy infrastructure has never been greater. More than a century after our electricity system took shape we have deepened our reliance on electricity and the system that generates, transmits, and delivers it. Our energy infrastructure relies heavily on the investments of previous generations. In fact, the American Society of Civil Engineers was unambiguous in its 2017 Infrastructure Report Card, assigning the U.S. electricity system a "D+," concluding that without "greater attention to aging equipment, capacity bottlenecks, and increased demand, as well as increasing storm and climate impacts, Americans will likely experience longer and more frequent power interruptions."[3] While New Hampshire's energy infrastructure fared better, earning a "C+" largely due to recent investments in the transmission and distribution systems, there are still various opportunities for improvement particularly in light of the number of power generators slated to retire in the region and the changes underway in today's energy industry.[4]

Climate change impacts only exacerbate the challenges faced by limitations of the aging electric system. As extreme temperature events become more commonplace, the electrical grid may be unable to respond to an increase in the frequency and intensity of peak loads according to a new study published by the Proceedings of the National Academy of Sciences.[5]

In addition, as noted in the 10- year state energy strategy ("10-Year Strategy") developed by the New Hampshire Office of Energy and Planning,[6] a fundamental change is sweeping across the energy industry, overhauling the 20th century tasks the grid once was charged with.[7] Rapid technological advances and cost declines are heralding a more dynamic system that is increasingly distributed and less predictable. At the same time, customer expectations and choices are expanding, new cyber threats are emerging, and environmental objectives are becoming more ambitious while more frequent extreme weather events keep reinforcing the need for resilience.[8]

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[3] American Society of Civil Engineers. 2017 Infrastructure Report Card, available at http://www.infrastructurereportcard.org/cat-item/energy/

[4] American Society of Civil Engineers. 2017 Infrastructure Report Card, Report Card for New Hampshire's Infrastructure available at https://www.infrastructurereportcard.org/wp-content/uploads/2016/10/2017-NH-Report-Card-hq-with-cover.pdf.

[5] Climate change is projected to have severe impacts on the frequency and intensity of peak electricity demand across the United States. Aufhammer et al. Proceedings of the National Academy of Sciences, Vol. 114 no. 8

[6] https://www.nh.gov/oep/energy/programs/documents/energy-strategy.pdf

[7] *See* also MIT Utility of the Future, An MIT Energy Initiative Response to an Industry in Transition, December 2016, available at http://energy.mit.edu/wp-content/uploads/2016/12/Utility-of-the-Future-Full-Report.pdf; Quadrennial Energy Review. Transforming the Nation's Electricity System: Second Installment of the QER, January 2017, available at https://www.energy.gov/epsa/downloads/quadrennial-energy-review-second-installment; Institute for Electric Innovation, Thought Leaders Speak Out: Key Trends Driving Change in the Electric Power Industry, Volume III, December 2016, available at http://www.edisonfoundation.net/iei/publications/Documents/Key_Trends_Driving_Change_Volume_III_FINAL.pdf

[8] According to the second installment of the Quadrennial Energy Review by the Department of Energy, the majority of electric outages in the USA come from weather-related incidents; *see* also Governors' Guide to Modernizing the Electric Power Grid. National Governor's Association 2014, available at https://www.nga.org/files/live/sites/NGA/files/pdf/2014/1403GovernorsGuideModernizingElectricPowerGrid.pdf; Peter H. Larson, Lawrence Berkeley National Laboratory (LBNL) and Stanford University, Christina H. Lacommare and Joseph H. Ito, LBNL, and James L. Sweeney, Stanford University, Assessing changes in the reliability of the

This confluence of trends and pressures demands a planning approach that goes beyond the paradigm of traditional utility planning. Grid modernization as noted in the 10-Year Strategy in this changing environment is playing a growing role in "advancing the resilience and efficiency of electrical grids across the country."[9] Unsurprisingly, investments in transmission and distribution upgrades are reaching unprecedented levels. According to Edison Electric Institute's briefing from earlier this year, investor-owned electric companies have been investing $52.8 billion in the grid's transmission and distribution infrastructure in 2016. These investments are more than double compared to a decade ago.[10] However, the task of bringing our hundred-year old grid up to speed to meet and seize the 21st century challenges and opportunities can't be addressed with the replacement of aging infrastructure or capacity expansion alone. In addition to technological advances, new policy models and regulations are emerging and reshaping the energy landscape and enhancing the way we operate the grid.

With strategic planning, design, and implementation, these new tools can be leveraged to ensure that grid modernization efforts result in net benefits for customers and realize the full potential of a modern grid that is more flexible, clean, efficient, reliable, responsive to diverse customer needs, and protects the environment.

NEW HAMPSHIRE AND GRID MODERNIZATION

New Hampshire can draw from its own rich foundation of progressive energy goals and policies, including the state's Electric Utility Restructuring Statute,[11] the Climate Action Plan,[12] and the renewable portfolio standard ("RPS"),[13] which has helped to advance the generation from renewable energy sources by 25 percent from 2012 to 2014. More recently, the New Hampshire Office of Energy & Planning's 10-Year Strategy has served as a guide for the future of New Hampshire's energy policies and programs and 2016's Energy Efficiency Resource Standard (EERS) promises to unlock more cost-effective energy efficiency potential.[14] In addition, last

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US electric power system, prepared for the US Office of Electricity Delivery and Energy Reliability, National Electricity Delivery Division, US Department of Energy, August 2015, pp. 62-63, available at https://emp.lbl.gov/sites/all/files/lbnl-188741.pdf

[9] New Hampshire Office of Energy & Planning September 2014. New Hampshire 10-Year Strategy at p. 18, available at https://www.nh.gov/oep/energy/programs/documents/energy-strategy.pdf

[10] *See* From Growth to Modernization: The Changing Capital Focus of the US Utility Sector, 2016, available at https://www2.deloitte.com/content/dam/Deloitte/us/Documents/energy-resources/us-er-from-growth-to-modernization.pdf; Edison Electric Institute Wall Street Briefing. Delivering America's Energy Future Electric Power Industry Outlook, February 2017, available at http://www.eei.org/resourcesandmedia/industrydataanalysis/industryfinancialanalysis/Documents/Wall_Street_Briefing.pdf

[11] New Hampshire Statutes, Chapter 374-F, Electric Utility Restructuring, available at http://www.gencourt.state.nh.us/rsa/html/NHTOC/NHTOC-XXXIV-374-F.htm

[12] New Hampshire Department of Environmental Services, THE NEW HAMPSHIRE CLIMATE ACTION PLAN: A PLAN FOR NEW HAMPSHIRE'S ENERGY, ENVIRONMENTAL AND ECONOMIC DEVELOPMENT FUTURE, 1 (2009), available at http://des.nh.gov/organization/divisions/air/tsb/tps/climate/action_plan/nh_climate_action_plan.htm

[13] New Hampshire Department of Environmental Services, available at http://www.puc.state.nh.us/sustainable%20energy/renewable_portfolio_standard_program.htm

[14] Energy Efficiency Resource Standard Settlement Agreement, submitted April 26, 2016 in DE 15-137 https://www.puc.nh.gov/Regulatory/Docketbk/2015/15-137/TRANSCRIPTS-OFFICIAL%20EXHIBITS-CLERKS%20REPORT/15-137_2016-05-02_EXH_1.PDF

year's Executive Order,[15] which builds on the state's successful effort to reduce fossil energy use, builds another robust backdrop for grid modernization efforts. Finally, New Hampshire further benefits from a vibrant stakeholder community, locally and regionally, that has taken an active role in shaping the state's forward-looking energy agenda.

Several states have launched inquiries into how best to upgrade the electric grid. With Illinois, Ohio, D.C., Rhode Island, Hawaii, and Maryland joining the bellwether states California and New York, the mix of states pursuing grid modernization is becoming continually more diverse.[16] EDF recognizes that New Hampshire is presented with unique energy market characteristics and trends that distinguish it from other jurisdictions in which grid modernization initiatives are under way. However, while states and utilities are charting different paths towards a modern grid, there is significant overlap in the drivers of these initiatives across distinct states, *e.g.*, the need to address aging infrastructure, distributed energy resources ("DER") penetration, changes in customer expectations and behavior, extreme weather events, and pressures to reduce overall costs amid flat or declining load growth.

EDF regards this pursuit of grid modernization across diverse geographies and system designs as an opportunity to generate unique and innovative solutions that can aid in advancing a variety of desired policy objectives. We encourage the Commission to pursue a grid modernization strategy that is responsive to the unique characteristics and needs of New Hampshire's electricity market and builds on the foundation laid by the state's energy policies and goals. It is with this objective in mind that we make the following recommendations regarding the process of grid modernization.

RECOMMENDATIONS

As the Commission deliberates next steps, we strongly recommend that the grid modernization goals as laid out in the PUC's Order on Scope and Process[17] ("Scoping Order") be used to guide development of long-range plans and investments made in grid modernization. Strategies

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[15] Governor Margaret Hassan, Executive Order Number 2016-3, 2016, available at https://www.nh.gov/oep/energy/programs/documents/nh-executive-order-2016-03.pdf

[16] In the Matter of the Investigation into Modernizing the Energy Delivery System for Increased Sustainability (MEDSIS), Formal Case No. 1130, available at http://edocket.dcpsc.org/edocket/docketsheets.asp?cbofctype=all&CaseNumber=FC1130&ItemNumber=&orderno=&PartyFiling=&FilingType=&yr_filing=&Keywords=&FromDate=&ToDate=&toggle_text=Full+Text&show_result=Y&hdn_orderNumber=&hdn_chk_whole_search=&hdn_AssesmentType=; Investigation Into the Changing Electric Distribution System Rhode Island, March 18, 2016, Docket 4600, available at http://www.ripuc.org/eventsactions/docket/4600page.html; In the Matter of Transforming Maryland's Electric Distribution Systems to Ensure that Electric Service is Customer-Centered, Affordable, Reliable and Environmentally Sustainable in Maryland, Notice of Public Conference, Public Conference 44, (Maryland PSC Sept. 26, 2016) available at http://www.psc.state.md.us/wpcontent/uploads/PC-44-Notice-Transforming-Marylands-Electric-Distribution-System.pdf; ICC Resolution Regarding Illinois' Consideration of: the Utility of the Future: "NextGrid": Grid Modernization Study, available at https://www.icc.illinois.gov/downloads/public/ICC%20Utility%20of%20the%20Future%20Resolution.pdf; Ohio Public Utilities Commission, PowerForward available at https://www.puco.ohio.gov/industry-information/industry-topics/powerforward/

[17] "Investigation into Grid Modernization. Order on Scope and Process," Order issued April 1, 2016 in IR 15-296, available at: http://www.puc.state.nh.us/Regulatory/Docketbk/2015/15-296/ORDERS/15-296_2016-04-01_ORDER_25877.PDF

developed related do the topics of inquiry as identified in the Scoping Order, *i.e.*, on outcomes and capabilities, grid modernization planning, rate design, advanced metering functionalities, data access, customer engagement, utility cost and recovery should first and foremost be guided by the agreed upon policy goals as summarized in the Final Report:

1. Improve reliability, resiliency and operational efficiency of the grid
2. Reduce generation, transmission and distribution costs
3. Empower customers to use electricity more efficiently and to lower their electricity bills
4. Facilitate the integration of distributed energy resources (DERs)[18]

As detailed further below, establishing these goals as clear threshold requirements, which the state's grid modernization investments – for capital or operational expenditures - are expected to meet, would assist in determining and prioritizing the key functionalities and further enabling technologies for New Hampshire's grid modernization effort. It is therefore paramount that prior to inviting utilities to file GMPs the Commission provide further guidance on what goals and benefits the GMPs should strive to advance, for example in the form of a GMP guidance directive. This guidance should also set the critical components to be reviewed as part of the GMPs, as well as the structure of the benefit costs assessments that would be conducted prior to grid modernization investments being made. As described in section 7 of the Final Report, such guidance should further comprise an open comment process by which stakeholders can offer input on assumptions and expectations for the GMP filings.

A. Outcomes and Capabilities Grid Modernization Planning

While grid modernization drivers often overlap across the country, the degree to which individual drivers like DER penetration and customer preferences affect individual distribution systems and customer bases vary. This is why it is essential to identify and understand what the most pressing energy market pressures and needs in New Hampshire are. Careful analysis should precede rushed responses and specific technology discussions and inform how, which, and when challenges should be pursued. The assessment of New Hampshire's current grid infrastructure and its capabilities as listed in Appendix B of the Final report can serve as the first step to that inquiry.[19]

Some potential foundational areas to address could include:

- Does our existing grid allow us to achieve all of our stated policy objectives?
- Can additional investments allow us to better achieve these policy objectives?
- Provided we have a uniform and agreed upon benefit cost assessment framework, can these incremental investments be made in a cost-effective manner?
- How should these incremental investments be pursued and prioritized in a long-range plan?

[18] Final Report, a page 1.
[19] Final Report, Appendix B, page 34-42, available at: http://www.puc.state.nh.us/Regulatory/Docketbk/2015/15-296/LETTERS-MEMOS-TARIFFS/15-296_2017-03-20_NH_GRID_MOD_GRP_APP_FINAL_RPT.PDF

In addition, while the Final Report does include a matrix on grid modernization outcomes, capabilities, and enablers, the matrix could benefit from an exercise evaluating and linking the provided information with the articulated grid modernization goals.

- Are all the outcomes equally important to addressing energy issues and advancing the state's grid modernization goals?
- Which capabilities need to be implemented now and which are necessary in the long-term?
- Which capabilities contribute to more than one grid modernization objective, *e.g.*, DER integration and customer empowerment?

In order to maximize grid modernization benefits these basic questions need to be thoroughly reviewed before settling on more specific technologies or approaches.

Clarity on the key functions needed to advance the state's policy goals will not only inform and prioritize which technologies and practices are needed to support the desired grid functions, and by extension goals, but it will also enable stakeholders to evaluate whether the respective investment projects laid out in the utilities' grid modernization plans ("GMPs") are in strategic alignment with state objectives.

B. Metrics

It would be in the interest of all stakeholders to collaboratively develop a set of comprehensive metrics closely tied to policy goals that track and assess the progress made on objectives linked to on-going grid modernization investments like advanced metering and communications and Volt/VAR optimization ("VVO"). Given the objectives in the Scoping Order, possible metric categories to report on could include: demand response enablement, customer engagement and awareness, data access and third-party involvement, reduction in outage frequency, reduction in peak load, energy savings, and greenhouse gas emissions reductions to name a few.[20]

Metrics like this also provide the information necessary to course-correct certain aspects of the design and implementation associated with these investments. Having transparent information that indicates whether the grid is for example more resilient, flexible, clean and affordable, enables customers, policy makers, and other stakeholders to have greater confidence in investment plans.[21] For example, in 2016, the Indiana Utility Regulatory Commission ("IURC") approved Duke Energy's seven- year smart grid plans. The case presented a comprehensive review of the smart grid investments proposed by Duke Energy to meet a number of legislative and state policy requirements. Many of the benefits of the smart grid envisioned New Hampshire's Scoping Order were also reflected in this proceeding. After a thorough review of the associated benefits and costs, the IURC approved a variety smart grid capital investments requiring Duke Energy to periodically report on the progress of these investments through metrics including the voltage reductions, energy savings, and greenhouse gas emissions reductions from

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[20] *See* sample metrics proposed by the NYPSC for ConEd's AMI deployment plan. New York Public Service Commission, "ORDER APPROVING ADVANCED METERING INFRASTRUCTURE BUSINESS PLAN SUBJECT TO CONDITIONS," ordered March 17, 2015, Appendix A, available at http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7B8C26CF58-5669-4A16-85BC-7D4AE21BFF8D%7D

[21] Getting the Most from Grid Modernization. American Power Plan. February 2017, Electricity Policy, available at https://www.electricitypolicy.com/images/2017/February/13Feb2017/Aggarwal/Aggarwal22Feb2017.pdf

voltage optimization.[22] The metrics put forth in California,[23] Illinois,[24] and New York[25] can also serve as instructive examples of efforts to monitor and assess the effectiveness of smart grid investments.

B. Rate Design

Good rate design can complement grid modernization investments in the pursuit of state policy goals by facilitating better utilization of grid assets, reducing cross-subsidies between end-consumers, and encouraging the integration of innovative technologies. Significant technological advances are transforming the electric system into a flexible, two-way system. Similar advances that have reduced the cost and increased the value of DERs, present an opportunity to re-think rate design anew.

Choosing the right rate designs to advance broader policy objectives and customer interest are critical but so too are the processes and best practices that help regulators navigate and arrive at these difficult decisions. To this end, the National Association of Regulatory Utility Commissioners ("NARUC") released a manual late last year to guide public utility commissions in the design of electricity rates.[26] In particular, on the topic of rate reforms to better manage increasing levels of DER adoption, the manual underscores that "[s]ince all electric systems are affected by DER increases differently, before a jurisdiction embarks on the journey to implement substantive reforms due to the growth of DER adoption, it should look closely at data, analyses, and studies from its particular service area before any such actions are taken."[27]

EDF recommends that policy objectives guide the assessment of individual rate design elements. To this end, we suggest that a variety of basic questions be addressed first. Is it the objective to designing a rate that better reflects system costs while providing sufficient financial incentives for customers to alter their consumption patterns? Considering the state's grid modernization goals, is reduced consumption every day of the year preferable to just peak load reductions on critical event days? Rather than just assessing what rate designs can be implemented through the existing system infrastructure, alternative rate designs that may optimally help achieve the desired policy objectives through cost-effective incremental investments should also be evaluated. Pilots have been demonstrated to be an important step in determining which rate designs are the best fit for a specific service territory and for allowing a greater understanding of customers' preferences and responsiveness to prices. BG&E, for example, conducted a pilot testing a critical peak rebate

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[22] Indiana Utility Regulatory Commission, Final Order issued on June 29, 2016 in Cause Number 44720, available at https://iurc.portal.in.gov/_entity/sharepointdocumentlocation/af35dbe8-3d83-e611-810e-1458d04f0178/bb9c6bba-fd52-45ad-8e64-a444aef13c39?file=44720%20order%206-29-16.pdf

[23] *See* PACIFIC GAS & ELECTRIC, SMART GRID ANNUAL REPORT – 2015, October 1, 2015 (Link: https://www.pge.com/includes/docs/pdfs/myhome/edusafety/systemworks/electric/smartgridbenefits/AnnualReport2015.pdf; accessed October. 25, 2016)

[24] *See* Commonwealth Edison Company, Smart Grid Advanced Metering Annual Implementation Progress Report, April 1, 2016 (Link: https://www.icc.illinois.gov/downloads/public/2016%20AIPR.pdf; accessed October 28, 2016)

[25] *See* JOINT PROPOSAL, September 19, 2016 (Link: http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7bCB55A140-4C3A-40B8-80E3-FC88B98E5AF8%7d)

[26] EDF together with a large and diverse group of environmental, consumer, and technology advocates – has developed recommendations on good rate design process, which were submitted in response to a draft version of the manual released in the summer of 2016.

[27] The National Association of Regulatory Utility Commissioners, NARUC Manual on Distributed Energy Resources Rate Design and Compensation, November 2016, p. 60, available at http://pubs.naruc.org/pub/19FDF48B-AA57-5160-DBA1-BE2E9C2F7EA0

("CPR") and time of use critical peak pricing and, given the positive results from the pilot, decided to offer CPR to all residential customers with a smart meter.[28]

C. Customer Engagement – Advanced Metering Functionality

As with all potential grid modernization investments, understanding what the cost-effectiveness and the role advanced metering functionalities and AMI can play to advance desired state goals should precede a final determination on whether to move forward or not with these investments. For instance, developing matrix that identifies the key functions the state's future grid must have, and in what order, could facilitate this necessary, investigative step (see Outcomes and Capabilities section above). Once there is clarity on whether the functionalities offered by AMI can contribute to one or more grid modernization objectives, the decision to dismiss or adopt AMI should be rooted in a thorough analysis of benefits streams and costs. Such an analysis would include both quantitative and qualitative AMI benefits. The business case framework on page 11 of the Final Report for grid modernization investments offers a range of qualitative key factors that cannot be readily monetized such as customer equity, environmental impacts, customer and third-party enablement, interactive effects of DERs, and short-term versus long-term impacts.[29]

Over the last few years, various states have concluded that AMI is a foundational technology that can enable a range of desired grid functions.[30] As a recent AMI brief by the Northeast Energy Efficiency Partnership put it, "[d]eploying AMI opens the door for the electric grid to step into the twenty-first century."[31] To provide a specific example, after inviting broad stakeholder feedback on possible alternatives to AMI, the New York Public Commission ("PSC") approved New York's utility Consolidated Edison's ("ConEd") AMI business plan, touting AMI's quantitative and qualitative benefits. The PSC order stated that in addition to customer engagement and emissions reductions, AMI will "contribute to the modernization of the Company's electric system and gas distribution system, creating substantial operating savings and efficiencies as well as increased visibility and control of its system. The quantified benefits [laid out in ConEd's business plan] exceed the costs, and there are substantial unquantified future benefits."[32]

As an environmental organization focused on fostering and creating innovative, equitable, and cost-effective solutions to the most urgent environmental problems, we are particularly interested in maximizing the potential environmental benefits associated with grid modernization investments. Environmental opportunities enabled by AMI include decreased air emissions from reduced truck rolls; decreased air emissions from energy savings through conversation voltage optimization (CVO); decreased air emissions through increased adoption of demand response,

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[28] Environmental Defense Fund, A Primer on Time-Variant Electricity Pricing, 2015, available at https://www.edf.org/sites/default/files/a_primer_on_time-variant_pricing.pdf

[29] Final Report, at p. 11

[30] The North Carolina Clean Energy Technology Center, 50 States of Grid Modernization, available at https://nccleantech.ncsu.edu/the-inaugural-50-states-of-grid-modernization-report-now-available/

[31] Advanced Metering Infrastructure: Utility Trends and Cost-Benefit Analyses in the NEEP Region, February 2017, http://www.neep.org/sites/default/files/resources/Advanced%20Metering%20Infrastructure%20-%20Utility%20Trends%20and%20Cost-Benefit%20Analyses%20in%20the%20NEEP%20Region.pdf.

[32] New York Public Utilities Commission, "Order Approving Advanced Metering Infrastructure Business Plan Subject to Conditions," issued March 17, 2016 in Case 13-E-0030, at page 19, available at http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={8C26CF58-5669-4A16-85BC-7D4AE21BFF8D}

efficiency, and conservation programs; decreased air emissions through enhanced deployment of low-emissions DER to meet system needs; and decreased air emissions through improved integration of intermittent renewable energy resources.

Technology deployment alone, however, cannot guarantee the realization of potential AMI benefits. Comprehensive, forward-looking policies for data access and customer engagement that leverage best practices play an indispensable role in ensuring a favorable AMF benefit-cost ratio for customers. To this end, the New York PSC emphasized that thorough planning and implementation as well as performance metrics were crucial to turning the potential AMI benefits into reality for ratepayers; a challenge that smart grid pioneering states are well aware of. To this end, New York PSC stated that ConEd "must plan for the benefits of AMI, individually and through overall system efficiency and performance, to be available and apparent to customers at the earliest practical time. Customers must be empowered with both knowledge and access to the benefits that can available through AMI deployment. A lesson learned from other jurisdictions is that the failure to deliver clear and apparent customer benefits has been a cause of criticism surrounding a number of AMI deployments."[33]

D. Customer Engagement – Customer Data Access

Providing customers with access to their energy consumption data not only empowers them to lower their utility bills, but data access is also integral to realizing a more efficient and cleaner electricity system that can smoothly integrate new DERs such as wind, electric vehicles and rooftop solar. In addition to these capabilities, data access can spur the development and adoption of innovative technologies, products and services designed to support consumers in managing energy consumption and expenditures (*e.g.*, demand response, energy efficiency, and conservation programs).[34] With New England electricity rates trending higher than anywhere else in the contiguous US, data access can be a key grid modernization element for New Hampshire.

As the electric power system evolves from a one-way grid into a flexible and dynamic network, it is crucial to engage all customers so that we succeed in optimizing the use of smart technology investments. A major lesson from prior state deployments of AMI is that full realization of consumer benefits from efficiency or time-shifting of usage will not occur unless consumers have convenient access to their own energy data.

Pro-active, transparent, and consistent data sharing policies and protocols that define what information should be made available, to whom, when, and how, while safeguarding consumer privacy and security, are crucial to help all customers unlock the value of smart technologies investments. Illinois and New York, for example, have recently made strides in empowering

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[33] New York Public Service Commission, "ORDER APPROVING ADVANCED METERING INFRASTRUCTURE BUSINESS PLAN SUBJECT TO CONDITIONS," ordered March 17, 2015, at p. 35, available at http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7B8C26CF58-5669-4A16-85BC-7D4AE21BFF8D%7D

[34] Most recently the New York Public Service Commission made this point on page 19 in the March 2016 NYPSC Order approving ConEdison's AMI plan stating: "AMI can empower customers to become active in their energy usage by providing them with information to assist in the management of their usage, which will allow them to better manage their electric and gas costs."
http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7B8C26CF58-5669-4A16-85BC-7D4AE21BFF8D%7D

customers with comprehensive AMI data sharing policies.[35] And as the most recent Minnesota e21 Initiative report noted on the information provided by AMI: ”[w]hile not everyone may want, or be able to afford, some of these technologies and services, making them available to people at all income levels would make it both possible and easy for customers to use electricity at the most affordable times and operate their homes or businesses as efficiently as possible.”[36]

Innovative third-party products and services can provide tremendous support to customers navigating this evolving energy landscape by translating the abundance of data into actionable insights and potential dollar savings. It is therefore paramount that customers are able to share meaningful data with third-party service providers of their choosing at no additional charge. Considering third party engagement in tandem with designing comprehensive meter data access policies for customers can prevent unnecessary delays and costs. In this context, the emerging industry standard Green Button Connect My Data (“GBC”) functionality should be considered as a basic service to all customers. GBC is an industry-led technical standard for exchanging energy usage data automatically and was originally championed by the White House under President Obama. GBC has been adopted by utilities in regions with AMI including California, Illinois[37] and will soon be launched by ConEdison in New York. Most recently, Xcel Energy filed a settlement agreement on proposed grid modernization investment in Colorado, enabling Xcel to install 1.5 million smart meters throughout its territory while giving customers the ability to share their energy-use data with any technology provider of their choice via GBC.[38]

E. Customer Engagement – System Data

As the Final Report points out, granular and timely system information can provide a range of benefits that advance a more economically efficient and more environmentally sustainable distribution system that meets customer needs better.

Though there is general agreement that the availability of system data will play an important role for future grid design and operations, the discussion around how and what types of system data should be shared with whom, is arguably just beginning to take shape. Only a few states, notably

[35] The Illinois Commerce Commission is expected to rule on the “Open Data Access Framework” developed by the Citizens’ Utility Board and Environmental Defense Fund in ICC Docket No. 14-0507 and New York required Consolidated Edison to develop a comprehensive data access policy including Green Button Connect for its imminent AMI deployment. ICC Order March 23, 2016 in Docket No. 15-0073, available at https://www.icc.illinois.gov/downloads/public/edocket/424241.pdf; New York Public Service Commission, Order Approving Advanced Metering Infrastructure Business Plan Subject to Conditions March 17, 2016, available at http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7B8C26CF58-5669-4A16-85BC-7D4AE21BFF8D%7D.

[36] 2016 Phase II Report: http://www.betterenergy.org/publications/e21-phase-ii-report. p. 80-1

[37] Exelon subsidiary Commonwealth Edison launched Green Button Connect for its smart meter customers in 2016. ComEd Press Release, May 24, 2016, available at http://www.businesswire.com/news/home/20160524006420/en/ComEd-Customers-Green-Light-Share-Energy-Data

[38] JOINT MOTION TO APPROVE THE UNOPPOSED COMPREHENSIVE SETTLEMENT AGREEMENT AND MODIFY THE SCHEDULE, submitted May 8, 2017, available at https://www.dora.state.co.us/pls/efi/EFI.Mark_Show_Filing?p_key=A_83030&p_fil=G_732220

California and New York, have been pushing for more system data transparency to improve[39] distribution system planning and facilitate strategic DER penetration.[40]

In this context, rather than focusing on the challenges of making more granular distribution system data available, it is particularly important that grid modernization objectives determine desired grid capabilities and outcomes related to system data. In line with our previous recommendations, we suggest that a robust discussion inform what specific grid modernization goals granular system data can advance in New Hampshire.

EDF further recommends that the Commission in collaboration with stakeholders identify state-specific system data needs and use cases needed to plan and operate the future grid. While the Final Report does offer a list of recommended system data types to be shared, we note that the value of certain types of data, similar to the value of DERs, may be subject to geographic variability. The value of data will be impacted by the availability of certain data types and the required system improvements. As the recent paper by the More than Smart non-profit group states, "some areas may explicitly benefit more from the availability of certain kinds of data, and the costs and benefits of data provisioning should be analyzed in light of that variability."

By way of example, the NY PSC concluded system data was crucial to accomplish the goals of the Reforming the Energy Vision ("REV") effort to advance grid modernization arguing that:

> utilities and third-parties must first identify, develop, and integrate the systems and investments required for a truly dynamic and transactive distribution system. As in any market, however, potential investors in DERs or other investments that can enhance the value of the grid require meaningful and timely information on the needs of the system so that they may in turn seek investment opportunities that support customer desires and/or enhance the value of the system.[41]

Consequently, as a first step in April 2016,[42] the NYPSC required utilities to file distribution system implementation plans ("DSIPs") outlining physical systems, processes, data (*e.g.*, historical load levels, reliability performance, and forecasts), and gaps related to the distribution system planning and operations efforts needed to integrate DERs. More recently, the NY PSC requested that the utilities provide improved and additional data including user-friendly maps reveal distribution system needs such that DER opportunities may be identified in beneficial areas. More specifically, the NYC PSC directed utilities to finalize hosting capacity analyses for a significant subset of circuits.[43] In addition, the PSC requested an updated Non-Wires Alternative

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[39] More than Smart. DATA AND THE ELECTRICITY GRID: A ROADMAP FOR USING SYSTEM DATA TO BUILD A PLUG & PLAY GRID, 2016, at p. 6, available at http://morethansmart.org/wp-content/uploads/2016/10/Data-and-the-Electricity-Grid-MTS-System-Data-Paper.pdf
[40] Smart Electric Power Alliance, 51st State Perspectives, December 2016, available at http://www.scottmadden.com/wp-content/uploads/2016/12/SEPA-ScottMadden-51st-State-Report_DER-Integration-CA-NY.pdf
[41] New York Public Service Commission, "ORDER ADOPTING DISTRIBUTED SYSTEM IMPLEMENTATION PLAN GUIDANCE," ordered April 20, 2016 in CASE 14-M-0101 at p. 23-4, available at http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7BB1C7035C-B447-459A-8957-20BF3BDB6D0F%7D
[42] Ibid.
[43] New York Public Service Commission, "ORDER ON DISTRIBUTED SYSTEM IMPLEMENTATION PLAN FILINGS," ordered on March 9, 2017 in Case 14-M-0101 and 16-M-0411, available at

("NWAs") framework that can better assess DER solutions as an alternative to traditional grid infrastructure.

In California, efforts to share system data have been largely driven by the Distribution Resources Plan ("DRP") filings, which were outlined in Rulemaking 14-08-013.[44] Similar to the DSIPs in New York, the purpose of the DRPs was to outline a path toward a "fuller integration of DERs into their distribution system planning, operations, and investment."[45] One of the distinctive elements of California's approach to system data has been the provision of heat maps that integrate circuit-level value, hosting capacity, and capex deferral opportunities.

F. Volt/VAR Optimization

EDF notes that VVO has been an integral component of grid modernization efforts across the country. VVO involves the management of various electric distribution system assets and advanced control technologies to "right-size" voltage levels delivered to electric customers. VVO can be used to reduce overall voltage levels, while ensuring these voltages remain within acceptable standards for electric distribution. Reductions in distribution system voltage have been demonstrated to result in reductions in energy consumption across the electric circuits on which this practice is applied.

In November 2012, the National Association of Regulatory Utility Commissioners ("NARUC"), adopted a resolution encouraging "[s]tate public service commissions to evaluate the energy efficiency and demand reduction opportunities that can be achieved with the deployment of Volt-Var Optimization (VVO) technologies."[46] Remarking on the importance of VVO as a grid modernization component, the NARUC stated that "VVO technology serves as a platform for potential future grid modernization initiatives that can deliver operational visibility, efficiency, and control of the electric distribution grid, improving reliability and customer service for a relatively small incremental investment."[47]

EDF recommends that the GMPs report on the current capabilities for voltage optimization across its system, and outline a pathway to identify the potential for energy savings and carbon reductions that can be achieved with strategic, cost effective additional investments. As noted earlier, the IURC has approved a seven-year deployment of voltage optimization technologies across roughly 50% of Duke Energy Indiana's circuits, where voltage optimization was deemed to be cost effective as a result of a rigorous benefit cost analysis assessment.[48]

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http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={35E255DD-92FF-420B-8363-895892992103}

[44] Assembly Bill No. 327, Public Utilities Code. Available at http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB327

[45] PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA, Rulemaking 14-10-003, available at http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M154/K464/154464227.PDF

[46] National Association of Regulatory Utility Commissioners EL-2/ERE-3. Resolution Supporting the Rapid Deployment of Voltage Optimization Technologies, adopted November 14, 2012, available at http://pubs.naruc.org/pub/53A0D9D5-2354-D714-51C7-09A3F27DACAE

[47] Ibid.

[48] New York Public Service Commission. "ORDER ADOPTING DISTRIBUTED SYSTEM IMPLEMENTATION PLAN GUIDANCE," ordered April 20, 2016 in CASE 14-M-0101 at p. 23-4, available at http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={B1C7035C-B447-459A-8957-20BF3BDB6D0F}

Also, as part of the Reforming the Energy Vision initiative in New York Public Services Commission required utilities to submit plans for grid modernization including near-term and long-term VVO plans.[49] In Illinois, the ICC ordered Exelon subsidiary Commonwealth Edison ("ComEd") to perform a voltage optimization feasibility study.[50] The study found that voltage optimization was cost-effective for viable feeders and that the voltage reduction potential for ComEd was between 3.0% and 3.8%.[51]

CONCLUSION

We commend the hard work of the PUC, Staff and the various stakeholders that helped establish this proactive approach to upgrading and optimizing Washington New Hampshire's energy delivery infrastructure. We hope this support and participation continues throughout this process as New Hampshire charts a grid modernization roadmap for the rest of the nation to follow. EDF appreciates the opportunity to comment on this important step in the Commission's effort to modernize the electric grid for the benefit of electric customers in New Hampshire.

Respectfully Submitted,

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[49] Ibid.

[50] Order of January 28, 2014, Docket No. 13-0495 at 95, available at https://www.icc.illinois.gov/docket/files.aspx?no=13-0495&docId=208605.

[51] Commonwealth Edison Voltage Optimization (VO) Feasibility Study Final Report. 2015 AIPR Attachment A, at A-9, Applied Energy Group, January 2015, available at https://www.icc.illinois.gov/downloads/public/2015%20AIPR%20Appendix%20A.pdf.