

**Massachusetts Department of Public Utilities:
Electric Grid Modernization Working Group Kick-Off Workshop
Wednesday November 14, 2012
Federal Reserve Bank, 600 Atlantic Avenue, Boston, MA 02210**

Workshop Summary

128 people (see attendee list in Appendix C) attended the workshop, which began at 8:30 and ended around 5:00. All of the presentations from the workshop are available on the website at <http://magrid.raabassociates.org/events.asp?type=eid&event=86>

8:30 Welcome and Overview of Day—Facilitator

Dr. Raab, as the facilitator, welcomed attendees and reviewed the day’s agenda.

8:45 MA DPU Electric Grid Modernization Vision and Key Questions--DPU Commissioners

Chairman Berwick welcomed the attendees and discussed the overall goals and objectives for the working group process. Commissioners Cash and Westbrook then reviewed the scope of the DPU’s inquiry as laid out in their notice of inquiry (NOI). This was followed by some Q&A (see Appendix B).

9:15 Utility Grid Modernization Activities & Plans—Grid-Facing and Customer-Facing

- National Grid—*Cheri Warren, VP Asset Management*
- NSTAR—*Larry Gelbien, VP of Engineering*
- WMECO—*Jennifer Schilling, Director of Asset Management*
- Unitil—*Tom Meissner, Senior VP and COO*

Each of the utilities presented both their company’s grid-and customer-facing activities and their plans, including their smart grid pilots. Once all the presentations were complete, there was extensive Q&A with the attendees. (See website for utility presentations and Appendix B for Q&A).

10:45 Break

11:00 Status of Grid Modernization Efforts in U.S.

- Grid-Facing Developments—*Byron Flynn, GE Digital Energy*
- Customer-Facing Developments—*Phil Hanser & Sanem Sergici, Brattle Group*

GE presented a taxonomy for grid-facing technology and opportunities, as well as some developments in other U.S. states. Brattle presented a taxonomy of time-based rates as well as the price differential (peak to off-peak) and response of over 75 pilots, as well as an update on significant time based rate and AMI activity, both in the U.S. and internationally. Finally, Brattle presented an illustrative analysis it has done of potential MA benefits from implementing time-based rates—showing over \$1 billion in net benefits. Following each presentation there were clarifying questions, and then questions for all three of the presenters together. (See website for presentations and Appendix B for the Q&A.)

12:30 Lunch (On Own—Federal Reserve Cafeteria/Food Trucks/South Station)

1:30 **Participant/Stakeholder Discussion: Grid Modernization Vision & Key Challenges**

Following lunch attendees met in 12 small groups with a facilitator from the DPU or Synapse to discuss the opportunities/benefits and challenges/barriers related to grid mod. After brainstorming a range of opportunities/benefits and challenges/barriers, each group reached an agreement on their top 2-4 in each category, and reported this back to full group of attendees. Except for the facilitators and utilities who were assigned to each group, everyone else was randomly assigned. To see the list of each of the 12 groups recommendations see Appendix A. The 3 most mentioned opportunities/benefits across the 12 groups were:

- 1) Enhanced reliability
- 2) Increased opportunity for distributed generation and other new technology to enable greater customer control of their electricity
- 3) Develop a better regulatory framework to foster grid modernization planning and investment

The three most mentioned concerns/barriers across the 12 groups were:

- 1) Potential costs of grid modernization technologies, policies, & programs
- 2) Cost-effectiveness of grid modernization technologies, policies, & programs
- 3) Incentives and cost recovery for utilities related to grid modernization investments

3:45 **Working Group Goals, Structure and Process**—Facilitation/Consulting Team

Dr. Raab and Tim Woolf (Synapse) reviewed the proposed design of the working group process including the structure, scope, timeline/meeting dates, and membership. Attendees then asked questions and provided comments. (See Appendix B for Q&A and comments). Additional comments on the proposed working group can be submitted to raab@raabassociates.org thru November 26th. The DPU will announce the members of the Steering Committee and Customer-

and Grid-Facing Subcommittees ahead of the first Steering Committee meeting on December 17th.

4:40 **Closing Remarks**—DPU Commissioners

The DPU reviewed the accomplishments of the day and thanked everyone for coming.

APPENDIX A:
MA ELECTRIC GRID MODERNIZATION WORKSHOP
BREAK-OUT GROUP RESULTS

PART 1: TOP 2-4 OPPORTUNITIES/BENEFITS BY GROUP

Group #1:

- Develop a hybrid distribution network with DG backed up by central generation
- Alignment of regulations and tariffs with policy goals

Group #2:

- Increased reliability and grid resiliency;
- Efficiencies gained through Time Varying Rates/Dynamic Pricing;
- Integration of Distributed Resources;
- Copious data available to shape customer experience and grid resiliency

Group#3:

- Meet/improve customers' evolving expectations on reliability & safety
- Regulatory clarity re: Department's specific goals, objectives, expectations
- Increased reliability & reduced outages

Group #4:

- Increased Information for Customers and Utilities
- Optimize the grid for climate change goals
- Increase resilience and reliability of the grid

Group#5:

- Reliability benefits
- Develop regulatory framework to allow utilities to develop a business plan for Grid modernization
- Utility cost savings

Group#6

- Reducing transmission and distribution costs (i.e., addressing system capacity with non-transmission alternatives).
- Opportunity for sweeping regulatory reform (i.e., creative ways to set incentives, performance metrics, achieve policy goals, drive innovation; example is RIIO in UK)
- Increased customer satisfaction

Group#7

- Grid resiliency
- Reduced outage duration.
- Ability to adopt new technologies

Group#8

- Reliability
- Customer Control/Economic Efficiency (price signals)
- Improving Integration (DG) network

Group#9

- Establish cost effectiveness framework, identifying initial cost effective steps
- More flexible, resilient, and reliable grid
- Develop comprehensive roadmap and image for a grid of the future

Group#10

- Forward looking regulations that are sustainable and provide certainty
- Enable customer control and choice
- Flexibility to accommodate new technology and multi flow power for customer benefit

Group#11

- Increasing Reliability/energy efficiency
- Lower relative costs for ratepayers via economic efficiency
- Develop framework among regulators/utilities/developers to allow greater innovation, e.g. greater penetration of DG, renewable

Group#12

- Reliability
- Opportunities for distributed technologies (e.g. EE, DG, DR)
- Improve relationship between customer & distribution company

PART 2: TOP 2-4 CHALLENGES/BARRIERS BY GROUP

Group #1:

- Minimize costs while maximizing benefits
- Ensure persistent customer participation in demand response
- Equitable balance of costs and benefits

Group #2:

- Complexity (Technical, Regulatory, etc) ex. Who pays? Impact on Retail and WS markets
- Quantifying benefits and Cost-Benefit Analysis
- Aligning stake holder interests ex. Business model acceptable for utilities

Group#3

- Costs vs. Value
- Current regulatory procedures and ratemaking principles
- Political will

Group#4

- Define and prioritize the goals and evaluate the benefits
- Pace of technological change
- Cost Recovery issues

Group#5

- Expand cost/benefit thinking & evaluation
- Aligning regulatory constructs with utility business models
- Resistance to change on all sides

Group#6

- Getting incentives right for utilities
- Customers' perception of value vs. Costs
- Understanding benefits, also seeing the costs of alternatives or options

Group#7

- Aging grid – competition for capital.
- Pace of technologies versus pace of utilities and regulators.
- Proper financial incentive for utility investments

Group#8

- Affordability
- Measuring Cost effectiveness/documenting factual record
- Reconciling Competitive & Monopoly Interests under existing regulatory framework

Group#9

- Benefits received by different parties, and difficult to monetize
- No regulatory incentive for innovation
- Cost recovery issues and resulting ratepayer impacts

Group#10

- What does the long term picture look like relative to short term costs?
- Customer education and engagement
- Bill impacts and customer value impacts

Group#11

- Quantifying & Allocating Benefits/Costs
- Cybersecurity/Privacy risks
- Lack of coordination among stakeholders and technology industry

Group#12

- Customer education
- Maximize EE and DG
- Integration of participants
 - a) Align interests for all participants (including cost recovery for the distribution companies)
 - b) Coordination of all participants

Appendix B: Questions (Q), Responses, and Comments (C) During Workshop

8:45 MA DPU Grid Mod Vision and Key Questions

- Q: In NARUC what is big picture on success or failure of time of use rates. Many benefits are available from peak shaving, any examples of success for TOU rates in other states that you get excited about?
 - OK has made a huge amount a progress in this regard. Maine is conducting a proceeding on TOU rates, as well as VT.
 - Brattle Group presentation will address this question. In general, research shows positive impacts from TOU rates. Clear from other jurisdictions that how rates are designed influence results and participation, thus will learn from other jurisdictions that have already moved on this.
- Q: Customer-facing and grid-facing split must be addressed, as there are many overlaps.
 - Our plan is to look at both grid-facing and customer-facing separate and together, as we agree they must be addressed together as there are significant overlaps.
- Q: RIO, regulatory scheme in UK is of great interest as it lets network companies (distribution companies) decide what right measures and metrics will be. Treating utilities as adults, instead of micromanaging them. Do not want to mandate technologies on utilities.
 - We don't plan to micro manage utilities and appreciate comments. Performance or technology standards that avoid technology dead ends will be part of our discussion moving forward.
- Q: To what extent do you see an opportunity to add customer-facing technologies but also update grid technology, improve storm resilience, and address climate change adaptation?
 - Grid-facing hardening, infrastructure changes and opportunities are a major driver behind this. Reliability is one key reason we are undertaking this effort.

9:15 Utility Grid Mod Activities & Plans

- Q: What sensors do in terms of outage detection, versus AMI. Are they substitutable or not? Does AMI provide more granular data than sensors?
 - NSTAR: sensors are eyes and ears of distribution systems. Sense current and voltage, can tell damage location during storms as well as monitor system operation on blue sky days. Gives operation info as they reroute power during outages so as not to overload circuits.
 - AMI pilot is more based on pricing pilot, but looking at info coming back during storms and do currently get that information, but in infancy
 - Unutil: data not always consistent. Sensors provide additional data than AMI, while AMI just provides binary information whether meter is in or out of service.
- Q: How identify and quantify benefits of investments?

- Unutil: Engineering folks have made a lot of effort identifying economic benefits. Questions who pays for technology versus who benefits. For batt storage, will only accrue storage if coupled with TOU pricing whereas no mechanism for benefit in flat rates. Will need to see rate design change and clarify who pays versus who benefits to see technology adaptation
 - NGRID; Can look at lots of metrics to evaluate benefits, new opportunities to look at benefits based on if it's dispatchable or not
- Q: Worried about communicating infrastructure given that we currently can read data currently using existing internet technology. Why should we spend money developing stuff until we know what we're looking for? If invest only in peak, off peak, or critical peak today we may miss it. Be careful while experimenting, so don't invest in obsolete technology. If major network needed, why should be invest?
 - NGRID; pilot are good way to begin to understand benefits. Today AMI meter cost more than AMR benefits and we've realized many meter benefits. Prudent to experiment and understand customer responses. Problems with size of data, need to determine what data is valuable in real-time, which what must be stored
 - WMECo; designed pilot with new communication infrastructure and determined that it was expensive and there are ways to do it at less cost, such as the NSTAR model, and need to continue to pilot technologies and learn from each other
- Q: Cost and reasonableness of undergrounding system? Benefits from voltage optimization?
 - NGRID, underground question comes frequently. In Sandy the underground system is still out and has been out for a long time. Much of this systems put in the 70s, if do have outage takes a long time to find and fix it. Not panacea, but fundamental system design makes sense in older cities that need multi-utility upgrades
 - Voltage optimization still has huge prizes remaining
 - Unutil; more cost effective to trim tree aggressively than underground. Voltage optimization has benefits if let source voltage fluctuate, regulate system voltage down and can get benefits
- Q: Dynamic pricing of NSTAR pilot?
 - Info options, web portal, load control, CPP component, where control thermostat, but if don't shift load pay higher price. See results across board, some shift, while others don't. A large number of customers have opted out (30%). Know AC uses a lot of power and opt out so they can use it. Others find info useful, and participate to reduce bills. Too early to get results. Gone through partial summer, next summer will be full. Anxious to get results.
- Q: Is there room for model where someone other than utility identifies customers that can respond to price and make them available to utilities? Same for peak shaving?

- WMECO; Open to all models but need to understand dynamics. Need to understand which customers are targeted b/c in their model with tariff if offer to one customer must offer to all. See value in this forum to understand benefits
 - NSTAR; in C&I there are firms that aggregate load reduction. In Mass utilities don't produce power, but it happens at the ISO. In residential pilots are looking at load control
 - NGRID: this week 100 MW of demand response was removed from ISO b/c it didn't show up when needed.
- Q: did see cost benefit by modernizing both electric and gas systems, as Until did? Do they see synergies between electric and gas system modernization at the same time?
 - Until: when implemented AMI had limited AMR, so benefits came from operational savings. These are only savings on the gas side. On electric side went with low cost system (\$100 per customer across system). Had a few system requirements including remote configuration. System accomplished what set out and has paid for itself
 - NGRID: benefit on gas side is meter reading change. Hard to do gas AMI without electric b/c meters are not powered. Real opportunity for modernization on both gas and electric, as look at system together there are benefits to customers, but not sure it fits here.
- Q: How are utilities preparing for new grid needs such as EVs, storage, EE, renewable given emphasis on current system
 - NGRID, they do it by collocating planning, strategy, and data analytics folks so have folks working on current grid and utility of the future at the same time.
 - NSTAR: those items are critical and must now prepare for future and NSTAR is. High speed substation fiber optic system and digital communication network, DG working group are all preparing for future, as well as forums like this. Must build utility infrastructure with high tech background for future
- Q: For grid-facing technology that has already been deployed is there cost-benefit analysis that has been conducted and it available for wide-scale deployment for technologies
 - NSTAR – in some cases grid-facing investments come out of capital improvement programs. Spend budget every year. DA, self healing has been part of that, while coupled with DOE grants. Other programs request recovery mechanisms from regulators, such as GCA pilots.
 - If trim a tree, cost some amount of money, but hard to cost justify. But hanging over wire and if falls will cut power. Hard to value the benefits, as benefits only accrue if customer goes out. DA system should only be backup, coupled with aggressive tree trimming
- Q: In process of identifying technologies that want to deploy for self-healing grid, have they done cost benefit analysis

- Until: did full cost benefit analysis when deployed AMI. Verified that savings were realized after they were installed during proceeding. Looked at cost, versus other technologies
- NSTAR- When GCA passed looked at AMI technologies. They are expensive and had trouble cost justifying it. Looked at alternative technologies using customer internet instead. Found low-cost approach, but AMI can be hard to cost justify
- NGRID ; did cost benefit when deployed AMR and is on the record, realized meter reader savings. Easier to justify than AMI. Using pilot to learn what benefit accrue so can conduct cost-benefit analysis in the future.
- Q: Why did Unutil chose three approaches to TOU pricing what were results?
 - Unutil: looking at benefit of enhanced technology versus simple TOU rates. Does technology of different type change response? Did find that technology increased response. Can use that information in cost benefit analysis. Also offered smart thermostat. Provided customers with options to achieve same benefit with automatic participation. TOU with enhanced tech produced greater benefit during both critical peak periods and all times. Still role for smart thermostats
 - NGRID; got different pilot in Mass, that are learning different things. NGRID tried hard to get a representative sample of 15,000 customers. Can help provide picture of many customer groups.
- Q: Included community-scale infrastructure such as thermal storage in identification of customer-facing technologies? Where are technologies most beneficial
 - Until: personally believe thermal energy storage provides most benefit for AC load. Without TOU rates tech is on hold, as people would not be able to benefit from technology
- Q: Why is there not gas DR, given that Unutil has meters. Are we missing opportunities
 - Unutil: Haven't produced DR for gas. Have limited customers on gas AMI. More customers with electric AMI. Just use as automated reader for gas
- Q: On grid size, is grid mod a no brainer in that if get utilities in a room there would be agreement or not? And how think about obsolescence? If have same set of facts would agree
 - Unutil: commonality in vision for grid mod, but each utility would tailor solution to their specific service territories and situation. Such as existence of AMR or not.
 - NGRID – a lot of commonality. Different rates of change between utilities, NSTAR is out in front on DA. They might run into obsolescence. Different ideas of who pays for communications and how look forward, but agree on types of technologies that need upgrading
 - NSTAR – Can't buy old technology anymore. Can't buy mechanical meters or substation relays anymore. The whole industry is moving forward. How fast move forward varies by utility. All moving forward while taking their own circumstances into account.

- Q: Does everyone agree on spacer cables, as mentioned in globe op ed
 - NSTAR – We were early adopter of spacer cables and use them when necessary.
 - NGRID – it's a system. No one panacea. Spacer cables work in some circumstances, 25-30% system. In a field they are susceptible to lightning.

11:00 Status of Grid Mod Efforts in U.S.

A) Grid-Facing Developments (GE)

- Q: Is there a definition for the bulk electric system? Thoughts on what the bulk system in North America is.
 - Bulk system consists of lrg generation – grid facing isn't just bulk electric system – technologies go all the way through consumption
 - Can include micro grid control, storage, etc...lots of pieces
 - Bulk system is 300megawatts and above
- Q: In thinking about how to deal with DG, where does two way power flow fit in? How do you deal with the grid side to accommodate distributed generation?
 - One challenge – if solar is done in concentrated way...transmission solar, how do you get to the main grid?
 - Not a lot of modernization advancements in this space
 - Where there is lots of room for advancement is distribution grid
 - Wind is mostly transmission, but other renewable are on both T&D
 - Economies of scale are also different
 - Most of challenges on distribution side

B) Customer Facing Developments (Brattle)

- Q: 10 years ago there was sense that dynamic pricing had to be mandatory to avoid cherry picking – currently a lot of it is voluntary...has that evolved due to political realities or because we realized we don't need to make mandatory?
 - Partly regulatory, partly reality
 - Some places have mandatory AMI, so opt-out should be offered
 - Paradigm shift – most regulators may have realized that best way is to first educate customers rather than forcing rates onto them...let them decide if rate is appropriate for them – some are easy, but some require big changes in behavior and lifestyle, so customers should decide what is good for them
- Q: Misconnection between declining load factor – increasing peak demand. Could you speak to reduced consumption vs increasing capacity? N-2 criteria requires incremental investments?
 - There are declining load factors for practically everything – increase in AC, etc
 - Energy efficiency has also lowered total consumption – aggregates and creates stronger peakiness

- CBA has been done, wide deployment of AMI has large benefits
- The grid is aging seriously, but costly to replace/update...not just generation, but transmission and distribution too
- To extent that we can reduce demand, we can postpone or eliminate certain investments
- Pricing schemes aim at reducing system needs

C) Questions to GE & Brattle Together

- Q: What percentage of analysis was avoided energy, capacity, etc.
 - 40% capacity, 20% carbon, 30% energy?
- Q: Understanding problem is key, but difficult. Regulatory support – what constitutes it? Does it mean DPU should be understanding problem, and then force companies to do stuff?
 - Big challenge in investing in new tech is recovery – how will LDCs pay for it? Investors, rate base, new mechanisms, etc?
 - Risk of no recover
 - Lower voltage = lower revenues
 - Benefits to doing it from consumer all the time
 - Without regulatory alignment, technologies don't move forward
 - Regulators should take collaborative approach, not just forcing adoption of technology – see how fits in regulatory environment and with public
- Q: Thinking Med to Long term customer adaptation – implicit assumption that customers will respond (turn things off, lower temp), but what are implications of encouraging customers to adopt more EE or generate own electricity – what are longer term implications of customer adaptation to these schemes?
 - There are already market adaptations
 - Appliances are now more programmable and will continue to be
 - Question of adaptation doesn't always mean conscious adaptation
 - Have to ask what the system will look like in the future
 - Regulatory issue in thinking of how to advance and have cooperative system allowing utilities to provide services
 - Incentives will be there through rates, technologies, etc.
 - Customers response rate is more than assumed – customers understand new rates and do respond, but has to be introduced properly and be customer friendly
 - System will eventually be totally different so may need new business models for engaging customers and investing in customer side applications
- Q: Technology versus human behavior. Pilot programs vs full implementation. Do we still need a lot of pilots on regional basis?
 - Pricing and technology are not substitutes but complement each other

- Utilities have been working closer together to learn from one another so everyone doesn't have to pilot same technologies
- It isn't just about piloting tech thought, but also how does that impact your own staff, work force, how it works on your grid, and how your customers respond
- Each system is different so pilots are still relevant, but maybe shift from pilot to phase one (issue of semantics?)
- Q: Mentioned Australia restructured and dynamic pricing for T&D – talk more about arguments for that, and is it something we should be thinking about in MA?
 - They've said there are implications for sizing of T&D
 - Peak needs for distribution often don't coincide with transmission and generation, so can be tricky
- Q: Building digital on top of analog grid?
 - AC is analog
 - Advantage to leveraging DC
 - Portions of grid are digital and portions are analog
 - Lots of our loads are DC loads
 - Some pilots look at DC for home loads
 - There are parts of the system you want in AC and parts in DC for efficiency reasons
 - Will never go to a fully digitized system
- Q: Making dif approaches complimentary – Is there a way to make approaches not clash, avoid double payment, etc?
 - Rules for Demand Response and qualifications – should make rules better monitored and more strict for enrollment
 - Connecting individual customers to main computer or system so ISO can see when they respond (pricing or automated control)
 - Reduction in load is valuable
 - When you add capacity, you add inertia requirements, etc – so load reduction can have more impact than generating more mWh
 - Need to appropriately assess value of demand response
 - Retail and wholesale markets have different policies and can't enroll customers twice
- C: Have info on issue – distribution utilities in MD and others are offering dynamic rate and monetizing value of that bidding peak load reduction into PJM forward capacity market – utility being paid for delivering peak load reduction – and funding is being used to offset costs of new investment in grid and AMI so there is methodology that solves certain problems raised (no question)

3:45 Working Group Goals, Structure, and Process

- C: Suggests having some academic input into the process – perhaps MIT studies, etc
- Q: What did you have in mind for what report might say regarding “education and joint fact finding on grid and customer facing grid mod opportunities” – not sure if evidence is available to be definitive – hard to find definitive facts
 - We’re not expecting at end of process to say “we know what costs and benefits will be for each utility to implement x and y technology”
 - However, we might find ranges of costs based on other utility experiences
 - Nothing utility specific
- Q: Do you anticipate role of members to talk and work during meetings or doing outside work and research?
 - Expecting there will be some homework assignments, people volunteering to pull together information
 - Members have lots of expertise from which we can draw
 - “free consulting” from committee members
- Q: Line between vendor and consultant? Vendor and DG provider or battery provider?
 - No pure lines, open to feedback
 - Want to engage vendors as well as consultants
- Q: Bridge Energy: Not easy to strike balance but good job. This process seems like it will be helpful...question: based on what I’m hearing I’m trying to think through what, when this report is finished, what can we expect next? Is there another iterative step?
 - Ann: no state of nature – asking for report in June 2013 so there is an opportunity to work with stakeholders further to put in place a regulatory framework
 - David: Looking for recommendations on strategy and regulatory options going forward – what tools in our toolbox should we use to keep things going?
 - We want to move forward wisely
- Q: Want opportunities to think about what we would like to see as outcomes – not necessarily technologies per se, but what policy goals we want to accomplish.
 - Ann: we don’t intend to end up with nothing but broad policy statements – there may be areas where that may be true, but our intention is to move the ball forward with regards to implementation
 - We want to be “real” about this, and get things started in MA
- Q: Goals and objectives – seems like they need to be established at the outset of this process, to inform the working groups moving forward – there are a lot of different ideas in this room about what “moving the ball forward” means...what direction? To what end? There should be policy objectives for working groups, some sort of direction. Maybe they are charged with doing that themselves... Is the commission concerned with climate change? Is it about reliability? There is a clear plan of “doing something,” but would like clearer objectives

- NOI was clear about areas of inquiry – page 4 has list of goals
 - Set of goals is pretty clear – what are the tradeoffs required to meet these goals, and what are the right regulatory pathways to reach these goals?
- Q: Struck by heavy emphasis on technology – wondering if there is room in this effort to not just talk about technology but also approaches to the situation. Some of that is implicit in what we heard today. Some things might be operational or deal with attitudes.
 - Ann: agreed – not just about putting technology in place. Education, marketing, operations, and new ways of thinking are all key as well.
 - Not just tech, but behavioral change too (e.g. OPower)
- C: Desirable to find out what's the best structure for doing joint fact finding on continuing basis, not just snap shot map but something that is done continually – same goes for understanding stakeholder perspectives...not just a snap shot now, but a process going forward.

APPENDIX C**Attendance List – DPU Grid Modernization Kick-Off Workshop, November 14, 2012**

First Name	Last Name	Organization
Pentti	Aalto	PJA Energy Systems Design LLC
Paul	Abbott	MA Dept. of Telecommunications & Cable
Barbara	Alexander	MA AGO, Consumer Affairs Consultant
Clint	Allen	Town of Danvers, Electric Division
Edison	Almeida	eCurv
Mike	Altieri	Legal Counsel at DOER
Abigail	Anthony	Environment Northeast
Stephan	August	MA DPU
James	Avery	Brown Rudnick (for Berkshire Gas)
John	Ballam	MA DOER
Sharon	Ballard	MA DPU
Shirley	Barosy	MA DPU – Legal Division
Mike	Berlinski	Beacon Power
Dan	Berwick	Borrego Solar
Ann	Berwick	MA DPU , Chair
Janet	Besser	New England Clean Energy Council
Gerry	Bingham	MA DOER
Alexandra	Blackmore	NGRID
Kevin	Brannelly	MA DPU
Justin	Brant	MA DPU (EPD)
Kristin	Brief	Ambri Inc.
Kerry	Britland	NSTAR
Martha	Broad	MA CEC
Jessica	Buno	MA DPU
Cindy	Carroll	Unitil
David	Cash	MA DPU, Commissioner
Melissa	Chan	Navigant Consulting
Max	Chang	Synapse Energy Economics
Matt	Cinadr	consultant
Shanna	Cleveland	Conservation Law Foundation
Carrie	Cullen-Hitt	Solar Energy Industries Association (SEIA)
Fran	Cummings	SEBANE and NEEC
Ghebre	Daniel	MA DPU, Asst. Dir. EPD
Benjamin	Davis	MA DPU, Director, Electric Power Division
Ben	Dobbs	MA Dept. of Telecommunications & Cable
Hayley	Dunn	ISO-NE
Justin	Eisfeller	Unitil
Gary	Epler	Unitil

Kurtis	Erickson	General Electric Company
Rachel	Evans	MA DOER
Joan	Evans	MA DPU
Brett	Feldman	Constellation
Joe	Fiori	CSG
Byron	Flynn	General Electric Company
Justin	Fong	MA DPU (EPD)
Brandon	Force	Ventyx, an ABB Company
Charles	Fox	Bloom Energy Corporation
Larry	Gelbien	NSTAR
Greg	Geller	EnerNOC
Anna	Grace	MA AGO
Robert	Granger	Ferriter Scobbo & Rodophele (for MEAM)
Jeff	Hall	MA DPU - Rates and Revenue Requirements Division (Rates)
Mark	Hanks	Direct Energy Services, LLC
Sean	Hanley	MA DPU
Phil	Hanser	The Brattle Group
Mike	Henry	Environment Northeast
Arne	Hessenbruch	Boston Denmark Partnerships
Natalie	Hildt	NEEP
Douglas	Horton	NSTAR
John	Howat	National Consumer Law Ctr
Bruce	Husta	Itron, Inc.
Mike	Jacobs	Allied Innovators
Judith	Judson-McQueeney	Customized Energy Solutions
Briana	Kane	Cape Light Compact
Barbara	Kates-Garnick	MA EEA
Josh	Kaushansky	MA DPU
Mike	Kearney	Ambri, Inc.
Mark	Lambert	Unitil
Brendan	Larkin-Connolly	MA DPU
Sam	Levine	Engaged Energy
Carmen	Liron-Espana	MA DOER
Emily	Luksha	MA DPU (Rates)
David	Malkin	General Electric Company
Nicole	Marandino	Standard Solar
Jack	McCall	AMSC
Michael	McCarthy	Ambient Corporation
Jeremy	McDiarmid	Environment Northeast
Thomas	Meissner	Unitil
Galen	Nelson	MA CEC
Jennifer	Nelson	MA DPU (EPD)

David	O'Brien	BRIDGE Energy Group
Caroline	O'Brien	MA DPU
Jerrold	Oppenheim	The Low Income Network
Shashi	Parekh	MA DPU - EPD
Margaret	Patton	Individual Citizen
Nick	Payton	Opower
Charity	Pennock	New England Clean Energy Council
Nathan	Phelps	MA DPU - EPD
Jonathan	Pinto	MA DPU - Rates
Jonathan	Raab	Raab Associates
Amy	Rabinowitz	NGRID
Robert	Rio	Associated Industries of MA
Susan	Rivo	Raab Associates
Lou	Sahlu	MA DOER
Charles	Salamone	Cape Power Systems
Jennifer	Schilling	NU
Jonathan	Schrag	NE Clean Heat and Power Initiative
Erica	Schroeder	Keyes, Fox & Wiedman LLP for IREC
James	Schwartz	Independence Solar
Sanem	Sergici	The Brattle Group
Barbara	Shapiro	MA DPU
Genevieve	Sherman	Clean Energy Solutions, Inc
Allison	Smith	NESCOE
Joseph	Soares	Cape Light Compact
Kevin	Sprague	Unitil
Eric	Stallings	Xtreme Power
Pat	Stanton	CSG
Michael	Stone	My Generation Energy
Brad	Swing	City of Boston, Office of the Mayor
Patrick	Tarmey	MA AGO
Rebecca	Tepper	General Counsel, DPU
Jamie	Tosches	MA AGO
Charles	Underhill	Town of Danvers, Electric Division
Mike	Wallerstein	MA DPU
Lisa	Ward	UTC Power
Kelly	Warner	Applied Energy Group
Cheri	Warren	NGRID
Jolette	Westbrook	MA DPU, Commissioner
Julie	Westwater	MA DPU, Hearing Officer, Legal Division
Jeremy	Wilson	Utilidata, Inc.
Danielle	Winter	Keegin Werlin for NSTAR

Samuel	Wolfe	Viridity Energy
Tim	Woolf	Synapse Energy Economics
David	Wrona	NU
Henry	Yoshimura	ISO-NE
John	Young	MA DPU
Rebecca	Zachas	BCK Law, PC (for Cape Light Compact)
Peter	Zschokke	NGRID