MA DPU Electric Grid Modernization Working Group
Grid-Facing Subcommittee Meeting #1
January 14, 2013
Saltonstall Building (Conference Rooms B&C) 100 Cambridge Street (Boston)
Facilitation/Consulting Team: Dr. Jonathan Raab, Raab Associates, Ltd. and Tim Woolf, Synapse Energy Economics

Meeting Summary

44 people comprised of Subcommittee representatives, alternates, and other interested stakeholders attended the meeting which began at 9 and ended shortly after 5.

Please see the website for the meeting agenda and all the PowerPoint presentations used during the meeting.

Below is a high-level summary of the meeting. Appendix A contains running notes from the meeting (unedited), and Appendix B includes the meeting attendance.

9:00 Overview of Subcommittee Process, Agenda Review and Ground Rules for Subcommittee

Dr. Raab, as the facilitator, welcomed attendees and reviewed the day's agenda. Subcommittee members introduced themselves followed by a discussion by Dr. Raab of the working group process overall (see slides) and how the Grid-Facing Subcommittee work and consensus building is intended to flow up to the Steering Committee for inclusion in the recommendations in the Final Report to the DPU. Dr. Raab reviewed the ground rules (see slides) that were adopted by the Steering Committee on January 9, 2013, on behalf of the entire working group (i.e., Steering Committee, Customer-Facing Subcommittee & Grid-Facing Subcommittee) plus a new proposed groundrule addressing when and how members can submit additional comments to the DPU after the Final Report is filed. Grid-facing subcommittee members were given the opportunity to aski questions and comment on the proposed ground rules, but no changes were recommended.

9:30 Briefing Grid-Facing Options and Opportunities—David Malkin, GE

David Malkin from GE provided a briefing on grid-facing options and opportunities. He began by stating the grid modernization is a process and not an end state, and then explicated taxonomy and approaches extracted from materials from EPRI, DOE, and NEMA. Group participants shared their views on the utility of these approaches and provided opinions on how to pattern from or incorporate them into the group's activities and deliberations in the future.

Mr. Malkin then discussed the DOE Smart Grid Initiative including three projects within Massachusetts. Group members responded with questions regarding the availability and structure of results from these projects. The discussion turned in particular to issues of voltage reduction and the allocation of costs and benefits among stakeholders, and incentives for utilities.

The third and final portion of Malkin's presentation concerned grid modernization activites being undertaken outside the Commonwealth of Massachusetts. The presentation and discussion predominantly focused on initiatives and trends in the states of Texas, Illinois, Michigan and Maryland. Mr. Malkin urged members to review materials from these state proceedings to assist in developing a roadmap for Massachusetts.

Following Mr. Malkin's presentation, the group agreed that it would be helpful to establish a sub- working group to develop a taxonomy specific to Massachusetts using the examples presented (e.g., potentially a hybrid of DOE and NEMA approaches). Mr. Malkin agreed to assist in this effort.

Points of consideration raised during the presentation/discussion:

- Focus not only on modernizing the grid, but also adapting the grid.
- When talk about grid mod, what is the scope? Should it be solely focused on the grid-side, or also customer-side (e.g., DG, back up generation, etc.)
- Do we have the proper incentive systems in place for utilities to act, e.g., to do voltage reduction?
- Maybe not focus on specific technologies, instead look at regulatory structures and incentives
- Look at impacts/costs and benefits for various classes rather than viewing C/B as a homogenous analysis.

10:30 Break

11:00 Successful Grid-Facing Modernization—10-20 Years from Now—(Brief presentations followed by Steering Committee discussion.)

- **Utilities: Jennifer Schilling & Larry Gelbien, NU; Chris Kelly, NGRID**
- **Clean Energy Coalition: Ram Rao, Ambient**

Presentations by representatives from NU, NGRID, and Ambient (see slides) focused on each entity's vision of and activities in pursuit of grid modernization on the grid-facing side. Group participants questioned the speakers on issues of taxonomy definition, technology, and decision-making processes. Questions and discussion gave rise to the following:

- Effective communication may require different solutions based on environment/geography in the various service areas. For instance, rural, urban, and suburban may each require a different approach to modernization efforts.
- Rapid two-way communication and dynamic response are are essential ingredients of grid modernization

- Accomplishing seamless two-way power flow appears to be another hallmark of successful grid modernization
- Outage detection and response information are of high importance to customers.
- Need to develop a strategy to minimize obsolescence and support open standards
- Should the primary focus of the group be on a discussion of technologies, or on the creation of incentive structures? Should the role of the regulator be to foster/incentivize advancement or actually weigh in on certain technologies?
- The purpose/impact/usefulness of microgrids was raised as an issue for discussion.
- Looking at transformers to see if can send extra DG up from distribution system to transmission, and superconducting technologies to back up sub-stations

12:50 Lunch

1:50 Utility Planning and Decision-making on Grid-Facing Investments

- **Utility Presentations:**
  - **NGRID--Chris Kelly**
  - **NU--Larry Gelbien**
  - **Unitil--Kevin Sprague**

Following lunch, NGRID's Chris Kelly, NU's Larry Gelbien, and Unitil's Kevin Sprague each presented on their respective companies' grid-facing planning and decision-making activities (presentations are available on the Grid Modernization website). Each company has a systematic process that is updated annually to identify and evaluate capital projects of both a non-discretionary and discretionary nature. The evaluations take into account costs, risks, and benefits. The analyses focus more on a relative ranking of alternatives, than an absolute benefit/cost or ROI threshold.

Working Group participants questioned the presenters on issues of timing, accounting, and risk and allocation. The Group also discussed procedural matters facing the Grid Modernization process.

Questions under Consideration:

- Does the Subcommittee need more concrete grid-facing goals that are measurable, to make sure heading in the right direction?
- Would larger capital budgets help do upgrades faster and better?
- Do we have enough experience with pilots in Massachusetts and elsewhere to make grid-facing recommendations?

3:15 Break

3:25 Subcommittee View Sharing and Discussion: Grid-Facing Modernization

Taking into account the presentations delivered in preceding sessions, the Subcommittee embarked on discussion regarding the history, current state of, and way forward for grid-modernization related regulatory structures including rate setting.

Tim Woolf provided a brief (recent) history of the ratemaking developments related to capital expenditures across the utilities, and the Subcommittee than discussed the similarities and differences across. The Subcommittee decided that at the next Steering Committee meeting to present in more detail the existing ratemaking requirements across the utilities, and then present the spectrum of ratemaking options related to future grid modernization investments. Numerous Subcommittee members volunteered to assist with this effort.

Questions raised during the discussion:

- How are expenditures for capital investments currently recovered in the existing rate structures? How, exactly, do trackers work? For what purposes are they used?
- Is the current regulatory system a rational way for achieving grid modernization or are significant changes needed?
- How should recovery of grid mod investments be incorporated into a broader regulatory framework?

4:30 Report Back to Steering Committee (what/who)

In addition to organizing presentations on current and potential grid modernization investment related cost recovery to the Steering Committee (described above), Dr. Raab and Mr. Woolf agreed to organize a short briefing on what transpired at the first Grid-Facing Subcommittee.

4:45 Next Meeting Agenda and To Do List

Facilitator recapped the following To Do list before adjourning the meeting:

1) Draft Meeting Summary – Raab with DPU Staff
2) Prepare draft agenda for next Grid-Facing Subcommittee Meeting to present to Steering Committee for input--Raab
3) Post Grid-Facing documents from Subcommittee meeting--Raab
4) NSTAR will provide interim pilot report when available to share with working group
5) Set up working group of Subcommittee to develop a grid modernization framework to report back to next G-F Subcommittee meeting—Raab sets up to include (GE, SEBANE, NU, CLF, NGRID, & AG)
6) Set up working group of Subcommittee to put together presentation on ratemaking options to be presented to Steering Committee—Woolf sets up to include (NECEC, NGRID, NU, AG, & GE)

5:00 Adjourn

Appendix A

Full Notes

9:00 Overview of Subcommittee Process, Agenda Review and Ground Rules for Subcommittee

- Brief overview of ground rules
- Discussed new ground rule in regards to supplemental comments to the DPU

Terminology:

- Everyone is the working group
- Steering committee – ones that are signatories
- ➔ Re-clarify ground rule (wrong word use)?
- Question about red and blue dots on name cards

9:30 Briefing Grid-Facing Options and Opportunities—David Malkin, GE

- **Technologies & taxonomy**
    - Byron Flynn used slide in early December for workshop
    - Conveys that it's not an end goal, it's a process
    - Grid modernization is a spectrum (on one end physical devices and on the other end more capable system (automation systems))
    - Review of charts (hand out)

<u>Approach 1 - EPRI</u>

- Aligning assets to functions
- Shortcomings of this approach
    - A little too involved when look at some technologies – a little too obscure (e.g. loading monitor)
    - More significant comment: no reference to outcomes. What are we trying to accomplish?

<u>Approach 2 – DOE's view</u>

- Which applications are aligned with which benefits
- More useful than EFRI
- Applications may be a bit too narrow

<u>Approach 3 – NEMA (a trade association)</u>

- Focused on grid resiliency

- Has 5 buckets
  - Doesn't just look at the grid/network, it also looks at the resources that sit on the network

Comment: Happy to see this slide. While modernizing grid we also need to adapt the grid. Where are the upgrades going? National Grid UK has done some work. Maybe National Grid US?

Comment: Page 4 – no dot on the 2nd to last line

Q: What do people think…is one taxonomy more helpful? Should we use one in particular to guide our discussion?

R: Approach 3: useful to know what companies are now doing in the state

R: Approach 2: reliability improvements capture a lot. Some improvements might need to be broken down a little bit further

R: From NSTAR standpoint, Approach 3, closer to long term roadmap. Some of it we've done, some of it we haven't.

R: Approach 3, it includes distributed generation aspect. Hybrid of Approach 2 & 3.

R: Do we want to create our own benefits and outcomes? Based off of 2 & 3? We might want this for when we draft the report…

R: Sweet spot btw DG and adaptation, how can we get more bang for our buck…who is making the investments for 3…not just the utilities…if create our own, who is making what type of investment.

R: Careful to stick to a specific method to a technology without having any studies

Q: When talk about grid mod? DG? Back up generation? Other? One could argue that Mass has already done a good job and that this effort could look more at the grid itself. Maybe raise in next steering committee…what's the scope?

R: Talk about customer facing committee. This subcommittee different because looking at cost.

Comment: In general NOI envisions both buckets.

- **DOE Smart Grid Initiative**
  - Goes over programs
    - Comment: Massachusetts lucky – has 3 projects
      - GE - Synchrophaser
      - New England ISO - AMR demonstration
      - Sensors in downtown Boston

- Goal 1: Accelerate deployment
- Goal 2: Measure impact of technologies and to help track capital investment in technologies
- SGIC deployment status
  - 60% spent out
  - DOE should have an updated estimate this month or next month
- Initial results
  - Generally –25% rather than -20%

Q: Is DOE putting $ amounts on these percentages?

R: Yes, DOE has started to apply various estimates to the lost load and to these results. There are some publicized early results. DOE should be releasing a larger report this week on this question.

Q: Has DOE put out a report that shows how much went into these investments?

R: Yes, but don't know whether can take this table and back into the results.

Q: Do any ratings break out commercial and residential?

R: There is one study that breaks it out. Haven't looked at it in a while.

Q: These are preliminary results. When is the meta analysis available?

R: Results are fairly slow coming in. Slide showing spend out shows that it will be some time before wrap up.

R: Most projects were 3 years and then there are 2 years of monitoring. It will be a couple years at least before get results

Comment: Separate impacts and benefits for various classes. Thinking about residential low-income, clearly the cost for an hourly wage than if on salary. We're going to begin having a conversation about benefits and costs rather than a homogenous conversation.

Comment: Want apples to apples comparison

Comment: Another benefit to explore that can't come from VoltVar is that can't retire assets because needs Volt Var generation. Sometimes retire.

Comment: Department of Energy Grant updated – dispatchable, real time volt system, infrastructure is now in place. We balance our circuits.

Q: About voltage: If no voltage reduction is done, costs are paid by everyone on the line? Do we have the proper incentive system to do voltage reduction? Is decoupling enough or is something missing?

Q: Is reduction – line losses or other type?

R: CVR – just reducing delivery – that's to reduce load; Bar – now reducing losses on system

R: Depends on utility structure on who pays.

R: Generation issue – rate payers in that location are keeping the generator online, but it does depend. If upgrade transmission in the larger system, then rate payers system wide pay.

R: Mismatch between who pays and who gets the benefits.

Comment: Need to go beyond decoupling

- **State (and international) activities**
- Go through high level observations
  - There are always exceptions
- If going to consider AMI or trying to enable customer benefits, then look at Michigan MPSC
- Colorado – best practice for privacy
- Texas – great example where legislature and commission worked hand in hand
  - But Texas has a completely different framework
  - In terms of getting meters deployed – some experiences can be carried over

Q: Has lack of action been because of commission or utilities?

R: Both sides, but regulators not as proactive as could be

R: Governor that can put backbone into legislature.

R: Public Service Commission did put out an order – ARRA. They want to see the results from NY. If the governor doesn't create enough political will, the utilities will make a filing.

R: In NY – there's the energy highway and the 2100. What we're talking about is needing support. What is needed to drive things forward? And what political process is needed?

<u>Texas – AMI</u>

- Will be one of the first states to complete its AMI, in his opinion
- Commission giving utilities clear guidance – tying back to Texas state house
- Smart meter Texas – web portal -> best practice

<u>Illinois</u>

- Example of where legislature gets involved
- Metrics - If fall short of targets then are penalized and if exceed, then get a bonus

- This general approach is one that we ought to consider. It integrates. What should be the role of legislature/governor be? Is there a place/room for performance based approach for subsequent grid modernization activity?

Q: Out of 3.2B, what % is AMI?

R: Not sure…I want to say it's 2 billion…will follow up.

Q: How did they come up with targets?

R: The utilities commented on determining what this metric should be. There has to be an understanding of how the system works before setting targets.

Q: Can you explain how IL could be a good example of framework?

R: Framework is good but not specific implementation.

Q: MA legislature wanting a pilot. Do other states have results?

R: There is a robust debate on how many pilots we need before we can make recommendations. Some say we have enough data. Others say results are specific to that service area, not ours. The right approach has to be somewhere in the middle.

R: There are two ends of the spectrum. General versus specific oriented. In both of these camps, we don't have the data available. The data is just preliminary. It's not just waiting about Mass data but using other data.

<u>Maryland</u>

- Governor O'Malley ordered a task force to be put in place
- Comment: we want to not reinvent the wheel

Q: Is there insight on any results on Interaction between smart grid and DG?

R: Haven't seen much from DOE on those capabilities. We'll have to see what comes out

R: In Texas, there are some ERCOT regulations. And CA is looking at that as well.

10:30 Break

11:00 Successful Grid-Facing Modernization—10-20 Years from Now—(Brief presentations followed by Steering Committee discussion.)

- **Utilities: Jennifer Schilling & Larry Gelbien, NU;**

Benefits (slide 4): Enhanced knowledge includes customer knowledge about the nature and duration of outage events.

When benefits accrue to multiple parties, how do you properly incent the different players?

Slide 6: With load management, the ideal is to know how much load is on each piece of equipment.

Slide 7: Power Quality Status – there should be discussion on the quality and granularity of information available about specific customer outages. Distributed Generation and Storage: storage will be important for group discussion, because too much power fed into the grid at any one time can have similar effects to too little fed into the grid. So better storage solutions may help facilitate more distributed generation from solar, etc that can be used at will.

Slide 8: Security is an issue because new implementation can, in fact, make security worse. Even squirrels are a consideration…so are hackers.

Slide 9: Communications solutions may be dependent in large part on environment…rural vs. urban.

Slide 10: Implementation of new technology – the preference may sometimes be to build upon existing and just-implemented tech. Ex: Replacing a new fiber-optic cable system with cellular may not be very appealing.

Slide 11: Question of where some new (and large expense) technologies belong. Ex: superconducting technologies. Do they belong in transmission?

Q: Referring to the earlier NEMA slide, how is NU dealing with hardening?

R: Focused on larger poles and have standardized larger elements for strength. They are doing inspections. Also focusing on vegetation clearances. As they add equipment, they look at how robust it is.

Q: More info on how NU chose its vision of the future…what went into decision-making?

R: They looked at surveys (JD Powers, etc) about what the customer wants…primarily making sure the power stays on and comes back quickly when it goes out. DG plays into this. Automated switches and rerouting drive down outage numbers. DG made sense for them to put into place.

Recent JD Powers studies reveal six different attributes of importance in terms of outages. NU uses surveys, talks to customers, analyzes outages to determine trends, and invest accordingly.

Q: How do you think about technology obsolescence?

R: Sometimes you have to take the risk and make the investment now, not later. Where there is clear benefit, it may be worth the risk. However, looking ahead, you have to analyze where the benefit of a new technology lies and whether it is in adolescence. EX: Before jumping into AMI, they are making sure it is the right option. Question of who should be providing the communications…should it be the utilities with AMI?

- **Chris Kelly, NGRID**

  Customer lifestyles are changing – increasing use and sophistication of technology. On the grid-facing side, two-way communications are becoming increasingly financially feasible.

  When thinking of grid modernization, it's important to think outside the grid as well. For instance, someone at the customer-facing meeting mentioned something like AMI alone may not appear attractive, but when paired with other grid-facing attributes, etc, it starts looking more appealing.

  NGRID is getting ready to train their workforce starting next week for the Worchester pilot.

  Reiteration that communication holds different challenges based on environment (urban / suburban / rural).

  Over the next 5 years, technologies need to be tested, evaluated, and communicated. Over a 5-10 year timeframe, 2-way communications will be more homogenized. Eventually, they want to get to the point where renewable will be plug-and-play with minimal transactions.

  Q: Question: Give an update on where the company stands on replacing transformers in favor of reverse flow capabilities?

  R: Question is if you can use a substation transformer system to facilitate DG? Reverse flow is questionable with new transformers. If the finding is that new transformers can handle reverse flow, that will help incorporate DG.

  Q: Made a much bigger emphasis on bi-directional power flow…would love more detail on this and the company's thoughts behind it.

  R: NGRID feels strongly about bi-directional flow. Doing work with the pilot study area.

  Q: we may need to be thinking about timeline and how to meet policy-derived reduction goals. Retirement of equipment needs to be considered as a timing factor.

  Q: Talk a bit about adaptive protection?

  R: Protection systems may need to be reworked to accommodate DG. It may require tweaking (aka: adaptive).

  Q: For NSTAR and NGRID: Point on static vs. dynamic flow.

  R: NSTAR: Distribution automation system is recognized as a need going forward. At every distribution facility of 1MW or bigger, they have put in real-time elements. The tools are in place, but they are not yet operating the capacitors on a real-time basis, although they will be moving this direction.

R: NGRID: Worchester pilot will have dynamic response.

- **Clean Energy Coalition: Ram Rao, Ambient**

  Modernization of the grid is more appropriate way of discussing a "smart grid." It is an evolving process.

  Demand response may be decreasing in importance as DG becomes more embedded.

  Reiteration that a key need is outage detection / response information. This point is important to consumers.

  Smart platforms that can turn data into information…for example, knowing that if a transformer is out, that means that smaller units downstream are also out.

  Local intelligence can help facilitate DG because it can read circumstances at a granular level instead of needing to aggregate information at a higher level upstream.

  Communications platform can handle different demands: self-healing, detection and monitoring, etc, but there won't be one platform that can handle everything. However, by using a common platform, you can adapt it to specific needs and multiple purposes. Also allows for understanding data and information at a much more granular level. In addition, reconciliation of data and for billing can happen quickly and at a granular level.

  Modernization roadmap is probably quite similar amongst the utilities.

  Technology obsolescence – it is unavoidable to some extent. In order to avoid complete overhaul, it may be better to use an adaptable platform that can support both legacy as well as new and DG systems.

  Q: General comment on the presentations today: A lot have been focused on renewable technologies as defined by policy, but there are other clean technologies to consider…different qualities like constant output vs. variable output.

  Q: Comment: both of the subcommittees and the presentations are focused on technologies, although later we'll talk about decision-making. He's dubious of the ability of the group to deliberate and come up with a specific set of technologies. Perhaps re-shift focus on constructing incentive structures in order to shape action.

  > Facilitator comment: That is the purpose of the discussion at 3pm and future meetings… this meeting is concerned with looking at options that are out there.
  >
  > Response: As long as this is really just background and we're not basing all discussion on technological options.

Q: Microgrids general comment: Each presentation discussed microgrids but presented them differently. Are they ways for customers to be able to ride out an outage event? Or other definition? How does each presenter conceptualize?

R: NGRID: general view…if a customer wants it, the company needs to make it available.

R: NSTAR: any customer can put in generation and continue to run during an event as long as they have storage and the right technology to assure no power will flow back onto the grid…CHP can do this fairly readily, Solar and Wind cannot without storage etc.. Question is how to integrate these systems safely and reliably.

R: Ambient: Definition is basically what allows the customer to keep running during outage.

Q: On the "internet-like" approach of Ambient: is that something that translates to policy, or is it just something to be aware of in the policy arena…does it make sense to utilities?

R: Ambient: In his opinion, regulatory body doesn't have a role in defining or selecting technology, but they can define standards and accommodate and encourage moving towards an open system so variability and change can be accommodated. Can help foster advancement, but not pick and choose tech.

R: NSTAR: He thinks regulators should not be choosing technology. It may be very different from utility to utility. Solutions will look different depending on the existing system. Also, need to be very careful with proprietary elements…open source tech can be plug and play.

Facilitator comment: Sounds like there were a lot of similarities here in the views for the future. Asks group to keep considering if there are differences in vision of where we're heading or if there are specific commonalities.

- **What can Grid look like (how different from today)?**
- **What can it do differently or better than today?**
  - **Self-healing, storm response, improving efficiency of grid, enabling distributed technologies & other opportunities, accommodating two-way energy flow, etc.**

12:50 Lunch

1:50 Utility Planning and Decision-making on Grid-Facing Investments

- **Utility Presentations:**
  - **NGRID--Chris Kelly**
    - Chart – likelihood impact
    - Methodologies - score safety, reliability and environmental impacts
    - Give engineers about 5 methods of likelihood of impact

- Want to get bang for buck based on cost and risk scoring
- Here focus on biggest driver (don't blend score)
- We do incremental changes -> we're conservative
- DPU policies influencing planning and decision making
    - Added decoupling rates
    - Opportunities to add incentives (give and take) on the system
- Brings up Green Communities Act

Q: In what you just showed us, is this done every September through March. Is it for next year? 5 years?

R: It's an annual process. We build out the 1 year and project 5 years.

Q: How did your cost of investments get recovered in rates?

R: Up to 170 million dollars can be recovered per year. With a 1 year regulatory lag, we make a filing and request to recover.

Q: Why 170?

R: 170 is the 5 year average (came out of a case).

Q: Came out of decoupling. Do smart grid type measures and products differ from capital expansion? Does that 170 create a limit on how much investment you make?

R: Want to use best technology that makes economic sense. If new technology, maybe use in pilot. Budget first goes to safety and reliability. If more room in budget, then can spend more.

Q: When use word risk, my sense is environmental and economic risk…how to prioritize which investments to do. Not financial risks to National Grid.

R: The risk matrix is how you operate the project in terms of operational risk. There is a financial risk if they don't approve the cost recovery.

Q: Is there a look at minimum loading?

R: It's the load at risk based on the circuit.

Q: 170 – how does that transfer into c per kWh?

R: Don't have a good answer for that question.

Comment: It's 170 million in service. Remove 20% of that for taxes, etc.

Q: Is national Grid rolling in adaptation?

R: Don't have a lot of detail on measures. Rolling adaptation into asset condition.

Q: Do you do a 5 yr plan?

A: Yes, just started doing that.

C. Considering doing it if over 1 million. If load is less than 20% of resolution. If asset condition issue, then need to get assets off the grid. Needs to be a couple of years out. Need time to market to customers and find out who is going to participate. I.e., in RI, there is very little uptake. What I say is that we need to know how to do it first. We need to make sure that it can perform.

Q: Do you need to have the right mix of programs to meet service quality?

R: Yes, risk there if don't have the right ones done.

R: Think about the conservative approach (small incremental change) vs. smart grid which is game changer (it's 25% of budget). Somewhere in between there has got to be a good solution. How do we get better than where we are today without going through 2 or 3 rate cases?

Q: Would storm policy take priority over smart grid? Look at what's statutorily required?

R: Yes, if it's statutory, then we need to do it.

- **NU--Larry Gelbien**
  - We do have different decoupling mechanisms and different drivers (can get into detail later).
  - Wants to focus on formal guidelines and framework
    - Non discretionary bucket – if something breaks, then we need to fix it
    - These are dollars that we have to spend
  - Reliability
    - For WMECO, for example there are dollars per customer interruption saved
  - Capacity projects
    - Looking at overload and not in an over capacity projects
  - Take away: cost to mitigate versus value. High value and high cost versus low value and low cost. Need to figure out trade-offs.
  - Also struggle with things that aren't as quantifiable.

Q: What's the timeframe for analysis?

R: We do it on an annual basis, and we have a 5 year reliability plan. This funding decision is for one year but look at benefits over a longer time period.

- SQI determines how we rank our circuits.

- CEMI – small pockets of areas
- Acts of Public authority (roads, bridges)
- DG Interconnection – we don't spend our money on this.
- Transmission – standards for transmission are regularly updated so a fair amount of money going into that.
- Initiatives – what else can we integrate?
    - Trip savers – fancy fuse
    - We need to know when the customers are without power
    - Spend a lot of money on 4kV (it's a fine voltage but some of it is old, it's just new equipment).

Q: When deciding what to put in next 1 and 5 year plan, is it a relevant cost year analysis plan (i.e. best number of projects)? Or are there thresholds it has to pass?

R: For non discretionary (SQI, acts of public authority…), we need to spend. We have a formula for load at risk. So loading is a criterion. We see its normal rating. Then, we do baseline certain programs. And then how much work can we reasonably do within a year? We try to do some of this every year and try to keep it the same.

Some things can be ranked and hit the highest value application and some things are compared apples to apples.

- ➔ Non-discretionary – try to rank
- ➔ Discretionary - want apples to apples

Comment: Efficiency can be customer or system. EE programs funded by customers, the benefits should go to those customers.

Q: Where would generators go if they pollute less? EE?

Q: Can talk about current size of budget and whether a larger budget would help do upgrades better?

R: I'm generally pleased with budget and work that we get done. If there is something that we want to get done, then sit down with regulators (CAPSL). So overall, NSTAR is top quarter in country in performance. It's not just money, it's also resources. Need to look at everything (materials, outages, impact of customers). There are also gray areas (battery storage, super conducting tape) that don't fall into the budget process. Overall I think that we're fine. Our organization has been sized to execute the budget as efficiently as possible. If we're thinking of scaling up, then need to think about how to do it the most efficiently as possible.

- **Unitil--Kevin Sprague**
    - The company is decoupled but don't have capital trackers that are successful.

- Budget categories are similar to other companies
- All projects we do have a reliability impact and all projects need to consider this
- We don't have goals – want to develop goals that get us to our future vision.
- Best practice approach developed over years but evolving with time as well
- We've adopted the NETL approach (6 objectives) – see slide, which ultimately help guide us with our plan
- We all have different customers and therefore different needs – need to take that into account
- Distribution planning
    - Put together a 1year and a 5 year budget
    - Can cover large areas and very specific areas
    - Traditional and non-traditional options evaluated with a cost benefit analysis
    - Recommendations are then suggested and go through several layers of management
- System must be designed with enough for peak capacity.
- Non-traditional options:
    - Utility – ice storage systems, small wind turbines
        - Challenges: reliability, insulation, O&M
- OMS&GIS – gives us better data, more notification, and information to share with customers
- Distribution SCADA – moving down to distribution circuits

➔ All of these things need COMMUNICATION. It's something that we're not all experienced with at this point and there's a lot of different options out there that we need to evaluate

➔ Can't lose sight of tree trimming. If trees down, then lose electricity. Conducting some pilots

- Urge this group to set goals (more concrete) that is measurable. Smart grid will change over the next decade. We do not just want to take steps. Want to make sure going in the right direction.

- **How identify, select, and sequence grid-facing improvements?**
- **How do they balance reliability benefits and cost?**
- **How do current DPU policies influence planning and decision-making?**

3:15 Break

3:25 Subcommittee View Sharing and Discussion: Grid-Facing Modernization

- **What are the most important grid-facing improvements needed?**
- **What is the appropriate pace for implementation of grid-facing grid modernization?**

- **What are the most important criteria used to make grid-facing investment choices?**
- **What regulatory policies should the group consider?**

Facilitator input: Each presentation touched on cost recovery, but it's worthwhile to expand upon this point.
Prior to 2005, utilities would recovery new investment costs through new rate cases. However, there have not been rate cases like that in a while. The 2005 NSTAR CPSL case signified a shift.

Comment: If there were distinct programs that weren't already clearly defined in the budget (exogenous) then they could be incorporated into the recovery plan (CPSL). Those programs (from that case, etc) have been reliability programs, although it's not clear if it is a requirement of CPSL.

Facilitator: The CPSL would be a tracker. Essentially a set-aside account to recover the defined expenses each year without having to file a rate case. Other expenses have to be recuperated through rate cases.

Comment: Clarifying the settlement process…they don't exactly set policy.

Facilitator: In 2008, utilities were allowed to apply for decoupled rates. NGRID also asked for a CapEx tracker, which would function similarly to CPSL. The new tracker was for the purpose of replacing old and failing equipment. It was granted based on a historical average over the past several years. Equipment replacement and grid mod capital expenditure could both be undertaken under this tracker (up to $170 million). Over that amount would be dealt with during the next rate case.

Comment: So there is a fair business practices point in that utilities have to prove that they fairly spent the costs.

Comment: Utilities also get ROE on the capital expenditure. Looking at system efficiency here makes sense because there is ROE involved with those actions as well.

Facilitator: Although that incentive is not rate-based

Facilitator: Other utilities applied for a cap ex tracker but were denied. So they can make improvements based on the general rate process but can apply for recovery.

Comment: However, we're based on a target revenue, so occasionally we have to actually refund ratepayers.

Facilitator: So, based upon this knowledge, is the system as it exists rational for achieving grid modernization as we've been discussing?

Comment: Can the utilities and the AG's office get together and present a unified taxonomy to present at the next meeting?

Suggestion: We can bring rates specialists if we know this will be a topic of discussion.

DPU: The essential distinction is 1) having to wait until the next rate case to recover, or 2) with a tracker being assured at the time of expenditure that it will be recovered. Two differences seem to be (1) timing, and (2) risk.

DPU: The CapEx tracker may have been mostly for the replacement of old leaky pipes…there has been an attempt to accelerate their replacement.

Facilitator: Having heard this, it seems a good idea to prepare a presentation for the steering committee.

Response: We'd be happy to work with the utilities to get a presentation together.

Facilitator: That would be great, because we're obviously talking about more than replacement of leaky pipes here.

Comment: We probably want to be focusing on what kind of recovery process makes the most sense based on what we saw in presentation this morning, much like the facilitator mentioned before. More of what has been discussed is PBR (Performance Based Rates)

Facilitator: It would be good to get some kind of presentation on what kinds of options are available that are being tested elsewhere (Great Britain, other states, etc).

Comment: Seems like we've gotten to the point of deciding that a smart grid is the best place to go for rate payers, but it seems like we need to do a bit of CBA.

Comment: The question is how do we make rates most efficient. As things stand, utilities can overspend their budget on grid mod if they want to, but the issue is how to have a process for utilities to come in with ideas. If grid mod becomes pressing, utilities can bring a discussion to the regulators. A way of getting understanding and clarity between the parties on what needs to be done. Rates can be settled as part of the usual process . This might be particularly useful if you're embarking on something novel.

Comment: The utilities all seem to have the same viewpoint. The changes under consideration are tactical; another question is how to begin thinking about and getting movement on game changing ideas?

Comment: We're not just talking about smart grid as the only option, but it's important to discuss current processes and how those can be maneuvered within. She worries about just kicking that discussion up to the steering committee. Once we do decide what the goals are, the ISR program in Rhode Island is really interesting to look at…it requires the utilities to sit down with the office of ratepayer advocacy and come up with a specific plan, goals, and proposed outcomes, before presentation to the PUC there. Something like the ISR program could possibly work here, but it's worth doing some more discussion on cost recovery here in the subcommittee.

Facilitator: Subcommittees can discuss cost recovery, but the issue really does belong with the steering committee. Another question is on whether this kind of regulatory change could be done on a case by case basis or if there needs to be a major process shift. Do we figure out what the target goals are first? Is it a discussion of technologies?

Comment: From the customer perspective, there's a concern that money will be spent on programs that just don't work. That's what pilot programs are for. But another question is why there isn't a

system in place that supports what utilities are presenting as needing to be done? What would be the purpose of changing the regulatory structure?

DPU: It's great to have the regulatory processes out there, but as part of the discussion. We should perhaps talk first about the goals (echoing others). What are we aiming for? And where are the utilities on the spectrum? Ex: NSTAR seems to have made moves without a capital tracker, but they might have a totally different rate structure than other utilities. What regulatory mechanisms have contributed to movement on grid mod thus far? The department has a lot of trackers.

Comment: What happens if we don't do anything? What would a world without a modernized grid look like? Is that even an option? The responsibility to serve load has certain requirements to keep up with technology. Talk of trackers and new regulatory structures seems to assume that this is a brand new thing, whereas modernization seems it might actually be integral to the basic process to begin with.

Comment: Green Communities Act led to pilots, and the idea is that after looking at pilot results decisions would be made about wider scale change.

Comment: Trackers do lead to higher rate costs for customers. Need to make sure grid mod doesn't crowd out other high value propositions for ratepayers.

Comment: Framing grid mod regulation in terms of potty training. Do you force the issue according to a regulated schedule, potentially creating regulatory dependency, or do you allow a mess and the organic learning that comes out of that process? Where is risk placed? Comparison of different regulatory structures from other areas could be useful for thinking about different risk/reward structures.

Comment: Movement has been made, but if you're looking for specific and short-term movement, perhaps there is a need for action. Example of replacing cast iron system in Maine on an accelerated schedule. Definition of specific goals and time frame. There is innovation occurring all the time, but accelerated schedules need program planning.

Comment: States that are really opening up this discussion. Other pilot projects aren't really going anywhere. They seem to be placeholders for transformational change in lieu of starting top down from the regulatory policies. Look at what California is doing.

Facilitator: This is our opportunity over the next six months: to look at what other places are doing and think about what is working and why. Engineers at the utilities aren't necessarily the ones thinking about regulatory policy, so this is only the beginning.

Comment: Three thoughts:

1) Agree that at this point it's useful to think seriously about goals and intended outcomes…otherwise it's premature to think about specific mechanisms.
2) Comment about whether grid mod even needs to be done is a good one, but grid mod is going to occur regardless. The questions are those of scale, scope, and timing, and what proscriptive role the DPU can be playing to shape these elements? This does not mean specifying technologies.
3) back to facilitator's comment on balancing risk and reward. There are two key issues at play...

A) How can regulators encourage greater investment in certain technologies?
B) Innovation. If we want to encourage utilities to take risk and experiment with new technologies, that's a completely different discussion, that's more a performance targets discussion. How do you reward? This could help lift the barrier to innovation that could be seen as part of the regulatory structure.

Comment: Hosted a meeting on Friday of last week to discuss guiding principles. Would like to share it at some point, perhaps with the steering committee. Also started a list of what grid facing improvements are needed. And came up with a list of three proposals to share. Question is how we make use of the time offline? Doesn't want those people who participated on Friday that their time was wasted. It started out as a clean energy group but eventually included many non-utility parties.

4:30 Report Back to Steering Committee (what/who)

Facilitator: We'll take the cost recovery stuff we discussed and bring it to the steering committee, plus summary of other presentations/discussions.

4:45 Next Meeting Agenda and To Do List

Facilitator: Grid modernization maturity levels slide (3) of GE presentation seems a productive framing. Perhaps it will be a good idea to take those few slides and discuss. Create a vision of what this modernization will look like.

Facilitator: Wonders if entities specifically brought engineers today because of the technical focus. This focus may change, so please be ready to include people who can speak to other issues of rates and regulation.

Response: Please give a heads-up if possible that it will be a different focus.

Comment: An offline discussion could really help firm-up the very high-level overview that was given here.

Facilitator: The steering committee will discuss the overall vision, and the aim here is to move one step down and really think about goals specific to grid-facing.

Comment: In the 1980s, 5-6% growth per year was standard…it was boom times. In 1990, the department approved the first energy efficiency programs. Since the institution of these programs, sales growth has hit maybe 1-1.5% per year. These programs created new ways of thinking about using energy amongst customers. If you anticipate 0% growth over the next decade, can you do grid mod in that kind of situation? Small steps or big steps? People may be more comfortable with small incremental steps, but will it get you to where you want to be in ten years?

Response: Disagree with some of the analysis in the above comment based on when specific policies were implemented at the department.

Comment: Likes the idea of synthesizing the presentations seen today from the GE modernization…perhaps add an axis defining our goals? That seems like the next appropriate step. Just wants to make sure we're including clean energy goals.

Comment: Wants to clarify the proposal for next time. Using presentation slides to develop next agenda? Or to develop a presentation to the DPU?

> Facilitator: Perhaps do and offline group to come back with something that could be in the report to help illustrate what a modern grid could look like for Massachusetts.

DPU: Development of a taxonomy for what grid mod would mean for Massachusetts is a good idea. Let's also see where we are and figure out if we (and the utilities) are actually already on track, and if not, what the problem areas are and perhaps where action is required.

> Facilitator: And question where we are behind, why? Is it a benefit issue? Technology issue? Regulatory issue? Incentive issue? Perhaps ask these questions of three big areas? Two way communication? Volt issue?

DPU: As we think about possibility, let's think about the other trackers and their purpose. They are all fairly specific. Could a specific purpose-driven proposal be a good idea?

Comment: Agree with DPU that this should be goal driven. Research needs exist as well. Do we have enough data from existing smart grid pilots? It may be helpful to have a matrix of what technologies those pilots tested. Also, second the comment of exploring cost recovery. Finally, agree that common standards and open architecture in terms of technology. Wants to make sure we're familiar with NIST's work at the federal level and how it applies here.

Comment: Seems like a bunch of goals have been presented…clean energy, energy efficiency, etc. NEMA slide (4 from GE presentation) may be a good one to use to help develop goals.

> Facilitator: Remembering earlier comment about goals vs. outcomes. Perhaps drilling down to what outcomes we'd like.

Comment: Whether we need a tracker to move forward kind of depends on what we're trying to move forward. Consumer communications are really important to him, but it seems to be a part of core business, not something that needs a tracker. Although it depends. The answer is maybe we need a tracker. Communication about outages does not need a tracker, because it is regarding service provision. Communication about storage might need a tracker, because it's not intimately regarding service provision.

Comment: Who should be doing what? By only focusing on DPU regulation, could we be missing come essential actors and actions? 2) Perhaps have a group look at leading states and

laggard states to learn lessons. 3) Perhaps kick up to the steering committee defining the role of the DPU. Perhaps have the DPU comment and make sure the group is staying on track.

Comment: On the point of battery storage, smart grid is not necessarily the goal; it's also about integration of all the new kinds of generation that are being incentivized. It's no longer just a matter of fast communication of outages; it's also to do with expanding to envelop new processes.

Facilitator; Asks for volunteers for a sub-sub-committee meeting. Counts hands. Also says they will try to figure out how to present rate issues. Looking for forward-looking rate making options. Someone volunteers. Great Britain, Ontario, Illinois.

Response: Also would like to know how the other pilots went. They have AMI info.

Response: Navigant has three new reports out. Two of them are grid-facing.

Response: We have an expert who has been helping and would be happy to ask her for a presentation on what's happening in other states.

Response: Also DOE is willing to come down and talk.

DPU: Ahmad at Brattle has an intensive study. Also thank you to everyone for your help and time and expertise.

Facilitator: Is putting an annotated bibliography online this week.

POSSIBLY COME BACK TO:

- GE taxonomy slide and discuss
- Do we have the proper incentive system to do voltage reduction?

OTHER TO DO FOR NEXT TIME/THINGS TO THINK ABOUT:

1) Clarifying DPU ground rule
2) When talk about grid mod? DG? Back up generation? Other? One could argue that Mass has already done a good job and that this effort could look more at the grid itself. Maybe raise in next steering committee…what's the scope?
3) Out of 3.2B, what % is AMI?

5:00 Adjourn

Appendix B

Attendance for Grid-Facing Subcommittee Committee Only - (Alphabetical by Organization)

		Mark an X next to your name		Mark an X next to your name
Organization	**Representative**	**1.14.13**	**Alternate**	**1.14.13**
Allied Innovators	Mike Jacobs		Kristen Brief	
Bloom Energy & UTC	Lisa Ward	X	Charlie Fox	
Cape Light Compact	Joe Soares	X	Rebecca Zachas	
CLF	Shanna Cleveland	X	Seth Kaplan	
Constellation	Daniel Allegretti		Brett Feldman	
Environment Northeast	Mike Henry	X	Abigail Anthony	
GE Energy Management	David Malkin	X	Byron Flynn	
Low Income Network	Jerry Oppenheim		Nancy Brockway	
MA AG	Jamie Tosches	X	Anna Grace	
MA Clean Energy Center	Galen Nelson	X	Martha Broad	
MA DOER	Gerry Bingham	X	John Ballam	
MA DPU (ex officio)	Ben Davis	X	Julie Westwater	X
MA EOEEA	Steven Clarke		Barbara Kates-Garnick	
National Grid	Cheri Warren		Chris Kelly	X
NE Clean Energy Council	Michael McCarthy	X	Zachary Gerson	
NECHPI	Jonathan Schrag	X	Bill Pentland	
NSTAR	~~Amin Jessa~~ (Larry Gelbien)	X	Bill McDonough	X
SEBANE/SEIA	Fran Cummings	X	Carrie Hitt	X
Unitil	Kevin Sprague	X	John Bonazoli	X
WMECO	Dave Wrona	X	Jennifer Schilling	X

Non-Subcommittee Members

First Name	**Last Name**	**Organization**		
Sharon	Ballard	MA DPU		
Janet	Besser	NENEC		
Alexandra	Blackmore	NGRID		
Kerry	Britland	NSTAR		
Ghebre	Daniel	MA DPU		
Gary	Epler	Unitil		
Justin	Fong	MA DPU		
Doug	Horton	NU		
Erin	Kempster	MA DPU		
Carmen	Liron Espana	MA DOER		
Sandy	Merrick	MA AGO		
David	O'Brien	NECEC (Bridge Energy)		
Shashi	Parekh	MA DPU		
Jonathan	Pinto	MA DPU		
Colleen	Quinn	ChargePoint		
Jonathan	Raab	Raab Associates		
Michael	Rigney	Gridco Systems		
Lou	Sahlu	MA DOER		
Morgane	Treanton	MA DPU		
Diana	Warren	EMRPI		
Danielle	Winter	NU (Keegin-Werlin)		
Tim	Woolf	Synapse Energy Economics		
Peter	Zschokke	NGRID		