**DOER Low Gas Demand Study**
**Stakeholder Meeting (#3)**
**December 18, 2014**
**Lead Consultant: Dr. Elizabeth A. Stanton, Synapse Energy Economics**
**Facilitator: Dr. Jonathan Raab, Raab Associates, Ltd.**

# Meeting Summary

72 people attended the meeting (See Appendix 1 for list of attendees. Additional people participated by phone. See the Synapse website for the slide deck used in this meeting http://synapse-energy.com/project/massachusetts-low-demand-analysis

## I. **Introduction/Overview**

Acting Commissioner Meg Lusardi, DOER provided opening remarks. Dr. Raab (facilitator) reviewed the agenda, objectives for the day, and groundrules.

## II. Summary of Key Changes to Feasibility Study and Supply Curves

Dr. Stanton and Pat Knight from Synapse, reviewed the key changes to the feasibility study and supply curves. Following the presentation, meeting participants asked the following questions, followed by Synapse's and/or DOER's responses (often in summary form).

*Q: What do you mean by "levelized cost" and how did you compute it?*

A: We are looking at the net costs of these resources so we are looking at both the costs and benefits (or avoided costs). The net benefits are the difference between the benefits and costs. There are some resources that have savings – their benefits are more than their costs—and hence the levelized cost is negative (such as for energy efficiency).

*Q: It looks like you go after "dump gas" in Massachusetts, but some dumps do not produce enough gas.*

A: In the supply curves, the width of each policy is the savings, i.e., what Synapse and DOER expect savings to be in 2015, 2020, and 2030. We are looking at technical and practical feasibility of measures and if there are policies in place for them. For 2015, which is almost here, there are not many measures that can be put in place so we take that into account in the relatively narrow width of the bands.

*Q: As to the heat rate adjustment, do you assume a more efficient gas plant is displaced or a less efficient peaker plant?*

A: The 12 MMBTU/MWh was not a choice (in the last stakeholder slides) it was a placeholder. We haven't changed our assumptions; we are looking at 8.4 MMBtu/MWh for displacement for the annual value. For peak hour, the modeling happens in Market Analytics (which models the economic dispatch of all units in New England) so the unit heat rate gets displaced by the actual unit.

*Q: Regarding the pipeline capacity utilization assumption of 80%, if you overbuild a pipeline, the utililization rate could be lower.*

A: Yes. The calculation is for a representative pipeline and is very simplified and you could have incremental pipe.

*Q: Please elaborate on the changes for biomass thermal and solar.*

A: Since the last time you saw these, the costs and savings decreased. All of the renewable thermals – biomass heat, solar hot water, heat pumps – came from the CARTs study. Everything from the CART study is in the base case because that is existing policy at this point. All of the savings expected from advanced building codes are also in the base case per DOER existing policy.

*Q: Will you be releasing the details associated with the feasibility study?*

A: The detailed tables are in the report. DOER is planning to electronically release all of our detailed spreadsheets.

*Q: For thermal renewable, are you taking into account the alternative energy credits for renewable thermal?*

A: That is incorporated, but DOER wants to verify for certain.

*Q: The avoided costs of carbon in docket 14-86, is that in the base case or low demand?*

A: In our Market Analytics run, there is a RGGI allowance price. In 2020, it goes up and takes on Synapse assumptions of federal carbon prices and those were used in AESC 2013. The carbon prices are embedded in all cases. In terms of feasibility analysis that's different for the energy efficiency measures. We are using docket 14-86 estimate of avoided cost of compliance with GWSA for all other measures we are not.

Q: Please briefly describe the logic when you know that the net benefits are huge and costs are negative, but the bar is not wide. Why not include more of that measure even if it means moving up the cost curve some (as long as still less than your threshold)—e.g., why can't we triple the amount of energy efficiency?

A: In terms of the widths, I will use energy efficiency as an example. The width we are using for the base case, feasibility curve and low demand were determined from DOER based on what is considered technically and practically feasible. Also each of the energy efficiency resources identified already represent a package of measures with different amounts and different net benefits/costs.

Q: *You didn't say that you're only considering what's in blue as the alternative energy supply, did you?*

A: Everything on the list in red or blue are all considered, if they are technically and practically feasible and there are potential savings. Then the economics threshold determines which measures are economically feasible--the blue measures are in the low demand case and red are not.

*Q: Is there an answer coming out of this study in a simple format that says if you do this and that to lower the demand you don't need to add natural gas?*

A: We are not specifically modeling what needs to be done to not have a new pipeline. That was not the analysis scope. We are given specific scenarios of potential futures and our job is examine under those scenarios what does it look like for natural gas usage.

*Q: The energy efficiency numbers increase, curious as to what goes into the definitions of feasibility and practicality? Most studies look at technical or economical potential. Feasible or practical are subjective terms, so how do you define those terms?*

A: DOER's EE team provided input on this; if you look at it for the base case we went up to where the three year plans are – 2.6% of electric sales. In the low demand it is 2.9% of electric sales. It's based on what's in the Clean Energy and Climate Plan.

*Q: Those targets are not being met; I would suggest we are underestimating energy efficiency.*

A: In the low demand and feasibility it's different in 2015 – the goal is 2.6%. For the base case it's held level throughout. For the low demand we went to 2.9%.

*Q: The advanced energy codes, in accordance with the GWSA, are supposed to be updated every 3 years and so is the stretch code. You were a year late last time and you lost all those savings and there's no plan to update the stretch code. If there's no advanced code to reference how could you use it as a baseline?*

*A:* We used the advanced building code as projected in the CECP model in the base case. We use this GWSA CEC modeling. We update the base code every 3 years and the potential for the stretch code. The former stretch code is in place so we felt it was important to include here.

*Q: In the low demand case, to what extent does the CELT capture the energy efficiency? Is in it the base case?*

A: We take all of the energy efficiency out of CELT forecast, we use the non-energy efficiency version and then we recalculate the energy efficiency based on all of the states' energy efficiency plans.

*Q: So, when you talk about costs is it the cost of the person making the decision (e.g., with solar)?*

A: It's the total cost regardless of who pays. In the base case: we have all the solar for SREC program available. For other cases, there is no incremental SREC. There is a net metering task force underway looking at net metering caps as well as solar and something different could come out of that.

*Q: If you're looking at existing technologies currently, Canadian hydro isn't even part of the 3-year program, so why are you rolling in Canadian hydro in your forecasting when you potentially have other retirements in place?*

A: Canadian hydro is not a measure included in the feasibility analysis. We do a sensitivity analysis on Canadian hydro. In terms of retirement, the model is looking at every plant in New England, NY and

parts of Canada, and we have all planned retirements modeled in. We are not inferring future retirement that are not yet announced.

*Q: Are you using winter time production with winter time solar or annual solar?*

A: For the feasibility study it is the annual capacity factor. We have solar in the base case. If incremental resources make it into the low demand case they have follow the expected solar output for every day of the year.

**III. Modeling Results, Synapse Observations, and Key Caveats**

Dr. Liz Stanton and Pat Knight from Synapse, reviewed the modeling results, Synapse observations, and key caveats. Following the presentation, meeting participants asked the following questions, followed by Synapse's and/or DOER's responses (often in summary form).

*Q: Remind us of the gas prices for the 3 price scenarios.*

A: The reference price, the low oil/gas resources gas, and the high oil/gas resources case are all from the DOE/EIA Annual Energy Outlook.

*Q: One graph shows the electric demand jumps significantly in 2020, why?*

*A:* From 2015-2019 we assume the natural gas supply and demand system is out of balance until there are more pipelines in 2020. So there are price spikes in electricity. Market Analytics reacts to gas price spike by pulling everything away from gas so it keeps gas shortages down. In 2020 when more gas capacity is available we assume balance in the gas sector and you don't see extreme spikes and the electric system stops reacting – it does not need to pull away so you see more gas generation in the winter peak hour.

*Q: Is the model for peak hour demand or annual demand?*

A: Results are peak hour demand, but annual emissions and costs.

*Q: ISO took steps like developing the Winter Reliability program, changing market procedures, and pay for performance. Did the study take these into consideration?*

A: Yes on Winter Reliability and Demand Response. But Pay for Performance doesn't kick in until 2018/19 and is not explicitly included.

Q: *Does the model have standard probability of outages or contingencies or all units available to run by economic dispatch? What sensitivities on outages in the peak hour?*

A: Market Analytics includes random outages. We keep outages consistent in all scenarios. But do not model a huge outage (a large scale outage would have to be a sensitivity).

*Q: The price spikes between now and in 2020, were they included in the feasibility analysis? Will data be available that we can see to understand the magnitude of them? If these documents will be released, we need time to review them and comment on them.*

*A:* We discuss price spikes in the report and there's a figure showing their scale. All our major spreadsheets will be released (tomorrow). The price spikes are not in the feasibility analysis, it focuses on annual results. The deadline for comments is Monday, but we are not telling you that you cannot comment after that date.

*Q: Scenario 2 is status quo with low gas prices but you can't get to it without more capacity. Scenario 3 is where we are today. The high gas prices in Scenarios 3 and 7 are realistic for the region w/o additional gas capacity. So the scenarios that seem possible seem to be very expensive for the region.*

A: The difference in scenario price projections (low, reference, high) is the difference in the commodity (Henry Hub) price. Not price spikes that are affected by capacity shortages. The basis differential causes price spikes in all eight scenarios.

*Q: Do none of the scenarios include solar or wind?*

A: The resources in each of the scenarios examined all include it in the Base Case. MA RPS met in all scenarios. For low demand, we have commercial PV in 2030.

*Q: Has anybody looked at how much land in MA (federal and MA owned) that could be available to put solar and wind?*

A: The costs that we are looking at are not distinguished by who pays for them. These are just the total costs. Not aware that we have checked on the lands. This study was done to provide information for policy makers so nothing is a foregone conclusion here.

*Q: The width of the supply curves is the displacement. On Chart 14, for 2020 the width of supply curve is how much gas displacement could be-- approximately 0.1 Bcf of blue. If you added all the red, all alternative measures, that's potentially a .35 Bcf in deficit relief. Is that a fair interpretation?*

A: No, you can't do that because these are annual savings. When we look at how much pipe is added, it's at winter peak so what you are saying doesn't map out. We are looking at the constraint and you can't map the annual to the peak.

*Q: On Slide 29, what are you basing the electric system demand on?*

A: It's not demand, it's the electric system requirement for gas in MA in winter peak.

*Q: So, if demand decreases, will demand for gas decrease?*

A: Yes. And energy efficiency is accounted for.

*Q: But, what about the things individuals are doing besides the state energy efficiency programs to lower demand in peak hour (e.g., efficiency or solar without subsidies)?*

A: What is counted is the things people are doing related to the state energy efficiency programs. What individuals are doing separately from state incentives but that is not counted. The electric demand takes into account the six states energy efficiency programs that are in place. This is in the future so it

could change spurred by public policy and individual actions that people take. The demand for electricity is on a downward path. The chart is on gas requirements, the electric system demand for gas in Massachusetts. We model New England, NY and Canada for what generators run to meet MA demand on economic dispatch. The electric demand forecast from ISO, backs out energy efficiency. They are projections. If you say we use less energy, that's the energy efficiency we are trying to model. That energy efficiency could be smaller or larger.

*Q: But, you haven't added solar or wind?*

A: The current levels of adoption of solar panels are in the base case. Additional adoption of solar beyond SREC II is not in except to the extent that it's less expensive than the economic threshold for the low demand case. Also, keep in mind that we are looking at winter peak hour for natural gas, and peak hour is the winter evening 6 – 7 pm so there is no solar being utilized.

*Q: The slides with net present value: When you release these documents could you put these numbers in perspective to total gas or electric over the time period? Can't figure out what the scale is and how much this really means.*

A: We do it as a delta to the Base Case. There is a reason that we are doing this. If you want to be able to say here is a base and alternative scenario, then you need to know comprehensive analysis of costs. We don't have a good way of saying what are all of the costs. We are looking at just the cost differences--otherwise we would need to do additional analysis.

*Q: To what extent have you included the collateral costs for using fracked gas on the environment that transfer to air and water quality and public health and the destruction and value of personal property taxes?*

A: Not included in this modeling

*Q: There are large leakages of methane in the transmission process; to what extent have you included those leakages?*

A: Not included and no life cycles for any energy resources.

*Q: To the extent that there is somewhere in your study a recognition to methane releases, have you included the fact that methane is much more polluting that CO2?*

A: In our caveats we do have a mention of fracking and effects and lifecycle emissions and leakage of methane.

*Q: None of the scenarios are legal because they do not meet the GWSA.*

A: None of the scenarios comply for these two sectors.

*Q: You base demand on industry data. Did you check these figures against historical weather data?*

A: We did no check on data supplied to us by the utilities or ISO.

*Q: What are the emissions associated with the hydro? Do you assume that existing Canadian facilities have enough capacity to supply 2400 MWs and no new Canadian facilities need to be built?*

A: In the numbers that you see, that generation has zero emissions because that is what it is in Market Analytics. We tested using actual emissions rate for recent historical year but we did not examine how Quebec system emissions may change over time. We looked in detail into new facilities and our conclusion is that the existing plus expected new resources would be sufficient. But not at 100% capacity factor every hour of the year. We can't say for sure what's going to happen in the future, but we are confident that if the lines were built, there would be power to supply them.

*Q: Did you compare the assumptions in the DOER hydro memo to this report?*

A: We did not do that. Transmission cost is the same for both studies. But we have not done a comparison. It would be complicated because many of the assumptions are different.

*Q: On Slide 29, when you have the vaporization line, it's LDC LNG. Are you saying that this supply is available for power generation?*

A: No, the LDC vaporization capacity is only available for LDC loads, not electric generation loads. Only Distrigas LNG is available for generation.

*Q: On Slide 27, Non-Contracted Balancing – you have a column for incremental pipe. Are you modeling incremental pipeline to fill the balancing needed to meet the electric demand?*
A: Yes, that is what we are modeling. It can be added in discrete increments for each scenario and from year to year.

*Q: On Slide 29, you have existing and planned pipeline, how to you define planned?*

A: Planned refers to Algonquin pipeline (AIM) which is currently under construction and will be on line in next couple years.

*Q: Why have we not received from this study a scenario that is not just cost based? We want to see models on how close we can get to demand needed [without new pipeline capacity] if we are cost blind to the measures. Put all of these in, heat pumps, wind, tidal mass, pv's, etc.*

A: We were tasked with doing a study that looked at whether or not we needed any natural gas, taking into account reliability, costs and environment. This table shows the resources and where they fall in terms of the economic threshold. If we had used a different threshold, different resources would be above and below it. The information presented here helps inform policy makers about the potential for alternative technologies.

*Q: On the gas for electric generation, is that accounted for just in New England or places like NY, too?*

A: Considering how NE will supply its electric demand, in that model we consider all the generating resources that are in or import into New England. The gas requirement is for MA only from MA generators.

*Q: You mentioned that there is a study on gas leakages in MA that could affect the gas impact and GHG equation assuming the emissions are MA and MA pipes. IPCC sets that figure at 34:1 for emissions rates. Why are you waiting for a MA study on gas leakage when you have global gas information already?*

A: With the gas leakage study currently underway there is more than one thing that could come from that study. If you patched leaks could it reduce our gas usage/needs? It's based on the extent of those leaks and the potential for patching them. On the emissions side, there is potential to glean emissions from fugitive gas. Furthermore, it's unclear whether the current methodology for the MA GHG inventory includes such emissions.

**IV: Comments from Stakeholder Groups**

Following lunch, participants self-selected into two break-out groups to discuss the modeling results, and prepare some initial comments (plus any additional questions) for Synapse and DOER. One group comprised electricity and gas industry representatives, and the other environmental NGOs and citizen groups. Following each presentation, Synapse and DOER provided some responses.

**Electric/Gas Group Comments**

Three comments:

1) A useful analysis might be testing a contingency of outages from major generators on a design day to address reliability.
2) The LDC demand scenario does not seem to include increasing demand forecasts and expectations of conversions into the future.
3) There should be more information on NPV cost estimates, including cost per year. It's heavily driven by gas price scenarios which policy makers cannot control. What is the real message to policy makers?
4) We had a question regarding the economics of commercial scale pv vs. utility pv.

Synapse and DOER responses:

1) Major outage contingency is not something we tested. It is a caveat and we will make sure we capture it in caveat section.
2) We are capturing demand forecasts. We used the individual LDC DPU filed 5-year gas and supply plans to model 2020 and after that we use one single growth rate for all the LDCs.
3) Tomorrow, DOER will release the spreadsheets with NPV cost estimates and you can see more details. DOER will send an email blast about the spreadsheets. Again, the policy-maker takeaways is information to feed into the conversations on where to go from here.
4) The Commerical scale pv versus utility scale pv: that is a question that we can answer just not at the moment.

**Environmental/Citizens Group Comments**

This has been an interesting exercise and a useful start to stack up resources, but we focused on the caveats that need to be prominently emphasized in the report.

1) The study is limited to Massachusetts. We are looking at a regional problem. There are a number of states not doing energy efficiency to the Massachusetts levels so there may be cost effective alternatives. Each state needs to do this.
2) There has been an oil price plummet, though nobody saw that coming, but we have some concerns that this fact makes some of the findings already obsolete because LNG prices are based on oil prices. The lack of inclusion of LNG facilities to meet need in MA in a couple of years – LNG could come from Canaport and the two offshore sites.
3) All the scenarios are out of compliance with GWSA. Since the avoided cost of compliance is not universally applied, that cost is not reflected. We could be further out of compliance with additional pipe and that means we have to cut emissions elsewhere in other sectors.
4) We felt there was a limitation on some of the alternatives, like energy efficiency and offshore wind. System power from Quebec does not reflect wind in Maine which has a higher capacity factor. If so, the economics would change.
5) We re-emphazize that the caveats should be up front in the report.
6) One key point is the pipeline utilization rate. This is an ideal scenario that is the optimal economic option from a modeling standpoint. But, in the real world, where bigger pipe is put forward, it could change this rate.
7) The most troubling point is that the report does not say that climate change is our most pressing problem facing our generation and the next generations. It only looks at technically and economically feasible measures. That is not good for Massachusetts.
8) This has been a tremendous amount of work and thanks for it, but it creates a cost structure that does not exist in the real world. To reduce this discussion to a simple cost of infrastructure based on existing policy is not accurate. People make decisions on things such as global warming, climate change and base decisions on other factors besides cost. There are studies that say people are willing to pay more for renewable energy. To reduce it to costs of infrastructure, based on existing policy, is not a good effort.
9) Put MWHs in the report and not just gas (Bcf).
10) Would DOER consider a short (2-3 pages) report by the minority opinions as part of your report? While points were summarized, not everyone's views were included and not to do so gives less importance to others opinions.
11) From the last stakeholder meeting to this one, there is a huge difference in the capacity clearing threshold of 20% to 80%. How did you decide that the 80% is the right percentage?

Synapse/DOER Responses:

1) We do have the caveats interspersed throughout the report rather than all upfront. That way they appear near where they apply. But we will take that comment into consideration.
2) The issue about the scenarios out of compliance with GWSA, we understand what you're saying. There's more pressure on the electric sector. Things that are not included in this study that could be helpful are the Clean Energy Standard and the Carbon Tax Study that's coming out as well so there are other things.
3) At the last meeting we had example economic thresholds that we meant to be representative of possible thresholds. It was DOER's decision about which threshold to use for the model. We looked at those numbers and going from one to the other added very little additional resources to the picture. We had to make one choice and that's what we settled on. The utilization factor seemed to be more applicable, which was more in line with the actual utilization of the pipeline.

**V: Next Steps**

Dr. Raab reviewed the next and final steps.

1) Detailed spreadsheets will be posted on the website tomorrow.
2) Your comments are due on Monday by 2 PM so Synapse and DOER can look at them as they finalize the report. We will compile and post all the written comments and post those. If you don't get them in by the deadline, we still welcome you to submit them and we will post them after New Year.
3) We will also post a meeting summary with questions, answers and your comments.
4) The target date for the report release is next Tuesday, December 23rd [Note: Subsequently DOER decided not to release the report on the 23rd to give it more time to respond to comments.]

| In-Person Attendance - December 18, 2014 Low Gas Demand Stakeholder Meeting<br>Atlantic Wharf Building, 290 Congress St. 2nd Floor, Fort Point Room, Boston | | |
|---|---|---|
| **Last Name** | **First Name** | **Organization** |
| Williams | Dorian | A Better Future |
| Clish | Heather | Appalachian Mountain Club |
| Ferro | Joseph | Columbia Gas of MA |
| Britt | Carolyn | Community Investment Associates |
| Milton | Samuel | CSG |
| Shattuck | Peter | Environment Northeast |
| Hartman | Berl | Environmental Entrepreneurs |
| Craft | Josh | Environmental League of Massachusetts |
| Dalton | Joe | GDF Suez |
| Berthiaume | Kenneth | independent |
| Breslow | Marc | independent |
| Buckley | Cathy | independent |
| Carlton-Foss | John | Independent |
| Elan | Ariel | independent |
| Maloney | David | independent |
| Piacentini | Arnold | independent |
| Giamo | Michael | ISO-NE |
| Winkler | Eric | ISO-NE |
| Murphy | Joseph | JPM Consulting |
| Oppenheim | Jerrold | LEAN |
| Bolgen | Nils | MA CEC |
| David | Shakespeare | MA DEP |
| Federspiel | Seth | MA DEP |
| Ferrer | Ashley | MA DPU |
| Howard | Margaret | MA DPU |
| Menino | Mary | MA DPU |
| Chu | Hong-Hanh | MA EOEEA |
| Upal | Hinna | MA EOEEA |
| Teferra | Axum | MAPC |
| Chretien | Larry | Mass Energy |
| Gibbons | Eugenia | Mass Energy |
| Woll | Edward | Massachusetts Sierra Club |
| Dickerson | James | ML Strategies |
| Tuohey | David | MMWEC |
| Lees | Susan | Mothers Out Front |
| Rand | Rob | Nashoba Conservation Trust |
| Terrasi | Paula | Nashoba Conservation Trust |
| Howat | John | National Consumer Law Center |
| Arangio | Elizabeth | National Grid |
| Brennan | Tim | National Grid |
| Hewitt | Amber | National Wildlife Federation |

| | | |
|---|---|---|
| O'Reilly | Jim | NEEP |
| Wallace | Patrick | NEEP |
| D'Antonio | Ben | NESCOE |
| Aller | Larry | Next Step Living |
| Leahy | Stephen | NGA |
| Frenette | Michael | No Fossil Fuel |
| O'Donnell | Mary | No Fossil Fuel |
| Wessel | Rosemary | No Fracked Gas in Mass |
| Daly | James | Northeast Uilities |
| Pope | Douglas | Pope Energy |
| Borowski | Robert | Preti Flaherty |
| Brown | Peter | Preti Flaherty |
| Werlin | Haskell | Solar Design Associates |
| Jeffrey | Peter | SPCC Groton |
| Kristofferson | Cathy | StopNED |
| Nelson | Jennifer | Sussex Economic Advisors |
| Carroll | Cindy | Unitil |
| | | |

| **Synapse** | | |
|---|---|---|
| Knight | Patrick | Synapse |
| Peterson | Paul | Synapse |
| Silvestrini | Leo | Synapse |
| Stanton | Liz | Synapse |

| **MA DOER** | | |
|---|---|---|
| Aminpour | Farhad | MA DOER |
| Evans | Rachel | MA DOER |
| Fimiani | Marissa | MA DOER |
| Lusardi | Meg | MA DOER |
| McBrien | Joanne | MA DOER |
| O'Shea | Aisling | MA DOER |
| DeMetro | Jim | MA DOER Consultant |

| **Raab Associates** | | |
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| Raab | Jonathan | Raab Associates |
| Rivo | Susan | Raab Associates |