Comments from Stakeholders regarding 10.15.14 Low Demand Stakeholder Meeting

Pat Stewart, Hames & Axle Farm, Ashburnham, MA
One thing that is not routinely mentioned in the consideration of energy production in the Commonwealth are the numerous mill ponds that dot the state.

What efforts, if any, are being put into returning these to small scale energy production? Theses could offer small contributions to the "mix," without severely effecting their environs and protect the resources of their surrounding communities.

Pat Stewart, Hames & Axle Farm, Ashburnham, MA
If you are existing resources and pipelines how will that address other answers, such as solar, wind, conservation or hydro-power? It seems from the introduction that this is more about proving Kinder-Morgan's info than about actually looking at needs and solutions.

Jim O'Reilly, Director of Public Policy, Northeast Energy Efficiency Partnerships (NEEP), www.neep.org

Please accept the following comments from NEEP in relation to the initial stakeholder meeting of the Low Demand Scenario Analysis, held Oct. 15 in Boston. Please feel free to contact me directly with any questions.
Thank you for the opportunity to comment on the information presented at the initial stakeholder meeting for the Massachusetts Low Demand Analysis. [1] NEEP is a regional non-profit whose mission is to serve the Northeast and Mid-Atlantic to accelerate energy efficiency in the building sector through public policy, program strategies and education. We are one of six Regional Energy Efficiency Organizations (REEOs) as designated by the U.S. Department of Energy to work collaboratively with it in linking states in our respective regions to DOE guidance and resources.

First off, we very much appreciate the Department's efforts to include a broad group of stakeholders in this effort and its willingness to accept comments as Synapse Energy Economics develops its analysis. As we are sure you will agree, public policy is best formulated when the governed feel that their concerns have been acknowledged. Until now, discussions involving the state's and region's energy infrastructure needs have largely been kept from those same stakeholders, thus resulting in the level of dissatisfaction you have no doubt heard regarding those processes. Our thanks to the Department for acknowledging those oversights and correcting them via this effort.

Overall, we feel that the process as laid out by Synapse will provide a significant range of alternatives for the administration to consider in committing its citizens to any investments in new or expanded energy infrastructure. There are, however, a few key areas of concern that we wish to raise at this juncture:

1. Dr. Stanton indicated in her overview that Synapse is planning, for "all scenarios and sensitivities," to use the carbon price as set through the Regional Greenhouse Gas Initiative (RGGI); to use no

[1] These comments are offered by NEEP staff and do not necessarily represent the view of the NEEP Board of Directors, sponsors, funders or partners.

federal carbon price; and to assume that the RGGI carbon price will remain constant at 2020 forecasted levels (slide 17). To do so will vastly underestimate the societal costs of carbon that make many alternative resources, particularly energy efficiency, so cost-effective and in the best interest of ratepayers.

I might also point out that this is inconsistent with Dr. Stanton's own testimony as an expert witness in on behalf of DOER DPU docket 14-86, regarding guidelines for setting a CO2 price for purposes of evaluating the benefits and costs of energy efficiency programs. In that proceeding, Dr. Stanton testified that "I determine the cost of GWSA compliance for 2020 to be $52 per metric ton of carbon dioxide equivalent (CO2e), $20 per MWh, $0.28 per therm, and $3.8 per MMBtu."

The current price for carbon in the RGGI auctions is deflated based on a number of factors, including banked allowances and other factors related to unique characteristics of the RGGI "market," but in no way should it be used as the proxy price for the purpose of this analysis. It's also far below the societal cost of carbon as calculated by the U.S. EPA for use in various federal rulemakings, including those to set vehicle emission standards or appliance efficiency standards.

We strongly urge the Department to reconsider using the RGGI price for carbon and instead select a price that is more reflective of the true value of alternative, clean energy resources as well as the true cost of continued burning of fossil fuels and the related carbon emissions.

2. The Low Energy Demand Case Scenario that Synapse indicates it plans to model (slide 19) would be designed by making adjustments to the base case for various alternative resources to natural gas pipeline capacity increases. The standard Dr. Stanton indicated they are planning to use for screening these resources is "to the greatest extent that is determined to be simultaneously technically and economically feasible." However, she went on to note that "changes to public policy will be assumed for Massachusetts only and not for the neighboring states." Such a limited interpretation of alternative energy resources would mean that, for example, the energy efficiency resource that a state such as New Hampshire could contribute to the demand reductions being modeled will only be modeled based on current efficiency savings levels. NEEP would suggest that a trove of detailed analysis has been performed to ascertain the technical and economic potential for energy efficiency savings for a state such as New Hampshire, [2] and, rather than suggesting policy changes for that state cannot be included, the analysis should capture in the aggregate all energy efficiency potential that has been identified as both economically and technically attainable for all New England states.

   If current market rules allow for all costs associated with supply-side infrastructure enhancements – poles, wires, pipelines, etc. – to be "socialized" among the ISO-New England states, than all demand-side resources, such as energy efficiency, should be counted on a regional basis as well. And, as gas pipeline capacity increases are being modeled based on certain "policy" commitments of New England states other than Massachusetts – i.e., state siting decisions, environmental impact decisions, etc. – so, too should the demand resources being models, such as energy efficiency.

To not do so would also be inconsistent with the New England governors' stated intent of sharing investments in and commitments to regional energy solutions, including energy efficiency. [3]

3. Synapse has indicated that prices to be used for natural gas are based on EIA data. However, such data will not reflect potential new – and potentially significant – increases in the cost of environmental compliance if new regulations are placed on hydraulic fracturing. Already, at least three states – Illinois, California and Colorado – are in the process of adopting such regulations, which will most certainly increase gas supply costs. NEEP would suggest that the analysis acknowledge such probabilities in establishing the high base-case price for natural gas.

4. Finally, Dr. Stanton has indicated that Synapse will be developing its resource alternatives scenario based on the "potential for minimizing the use of natural gas during a peak winter day." (slide 27). We are unclear, and, thus, ask for clarification, on whether that would mean that the benefits of measures such as energy efficiency will be counted only during those hours of a particular winter day when they are in effect, or if the benefits as having accrued during the entire measure life will be counted and apportioned to that particular peak winter day. As you know, energy efficiency measures deliver demand and energy savings for more than just the day that the measure may be in place, including the economic benefits incurred through demand reduction induced price effects, when customers glean the benefit of lower wholesale market clearing prices resulting from lower energy demand. To not count that broader range of economic benefits would be to significantly undervalue the energy efficiency resource this analysis is intended to model.

Once again, thank you for the opportunity to provide comments on the initial presentations in the Low Demand Scenario Analysis process. We look forward to participating in future sessions.

[1] These comments are offered by NEEP staff and do not necessarily represent the view of the NEEP Board of Directors, sponsors, 2 See:"Increasing Energy Efficiency In New Hampshire," prepared for the Office of Energy and Planning, November, 2013. http://www.nh.gov/oep/resource-library/energy/documents/nh_eers_study2013-11-13.pdf

3 See: http://www.governor.ct.gov/malloy/lib/malloy/2013.12.05_new_england_governors_statement-energy.pdf

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Gerald Weseen, Vice President, U.S. Government Affairs, Clean Power Northeast

Suggestions from Emera Inc. based on discussion at the stakeholder session on Tuesday:

- "Imports" should be viewed as not only hydro – but also a blend of hydro and onshore wind (i.e.: onshore wind from Maine and/or the Maritime provinces balanced by hydro from Newfoundland & Labrador delivered through Atlantic Canada)
- Capacity factor for hydro/onshore wind combination would be 80-90%

Thanks for the opportunity to provide feedback, looking forward to the session on October 30.

Claire Chang, Solar Store of Greenfield- info@solarstoreofgreenfield.com

Would like to suggest that particularly solar PV install capacity rates be more aggressive than the 1600MW by 2020 proposed by the Gov. I would suggest that 1600MW, at the current rate of install, will be completed by 2016 or 2017 at the latest. I would also suggest that solar PV can be higher percentage of the mix. up to 3200MW by 2020 and 6400MW by 2030. The forecasts of solar PV by the ISO NE is based on the state's RPS. and do not represent the current growth rates of solar PV systems installed. There is a distinct slow down of growth in the final DG report from the ISO NE. I would hope that your model allows for different levels of solar PV, wind and EE inputs. We would like to know what levels of each are required to reduce the need for increasing NG to zero. Looking forward to having the model be available to all for evaluation.

Thanks, Claire

Electa Sevier, Mothers Out Front Leadership Team, 617-942-7502

My name is Electa Sevier and I am writing on behalf Mothers Out Front. The science tells us that we must reach a fossil free future quickly if we are to preserve the future of all of our children. Given this, we would like to ask that the Low Demand Scenario include one "future" in the scenarios that you are considering that does not include any additional fossil fuel being used. We understand that you are looking at a 15 year time horizon and that you are considering only what is "technically" and "economically" feasible and we ask that you use an aggressive standard of feasibility. This is a dynamic field and there are new innovations happening all the time that will impact both the technical and the economic aspects of feasibility. We are happy to discuss this further and hope that you will make the modifications needed in your study to make this happen.

Dennis Eklof, Groton, MA, 508-878-9510

After attending the October 15 briefing on the proposed scope of this study I have the following comments and suggestions:

Gas Price Scenarios

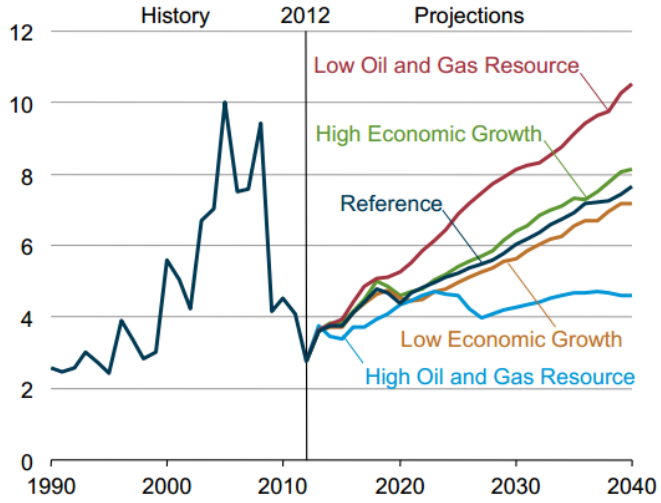
One of the most glaring shortcomings of all of the studies done to date on the need for additional gas supplies for New England is that they all are founded on one assumption: that the Marcellus and related shale gas plays will provide plentiful low-cost gas for decades into the future. None of these studies raise serious questions of escalating gas prices, reduced future availability, depletion from over development of markets for the gas (e.g. LNG exports), etc. Yet, there are serious analysts who think otherwise. You might want to look at

The Popping of the Shale Gas Bubble and
Marcellus Shale: Through A Glass, Darkly and
All Good Things Come to an End: And So Will Cheap Gas from Marcellous

No one knows with certainty what the future of shale gas resources will prove to be, but if the state of Massachusetts is serious about evaluating its energy future, questioning the current conventional wisdom that we have virtually boundless volumes of low-cost gas available to us is certainly an important exercise.

In the presentation on Wednesday the issue of examining price sensitivities was discussed, and the idea of using the high gas price from the most recent US DOE energy outlook was proposed. I think this a wholly inadequate approach. The DOE *Low Oil and Gas Resources* case has Henry Hub prices remaining below $5 per mmbtu through 2019 or 2020. Given resource depletion issues and the advent of tighter regulations on fracking, I think a more aggressive upward price movement should be examined.

Figure MT-41. Annual average Henry Hub spot prices for natural gas in five cases, 1990-2040 (2012 dollars per million Btu)



Basic Modeling Approach

As I understand your modeling approach, you will start with existing forecasts from ISO NE and from the LDCs as a base case. In my opinion, these are already biased toward the high side, but let's ignore that possible bias for now. What was unclear to me was how these forecasts would be adjusted based on the gas price sensitivity, particularly since the underlying price assumptions for the original ISO/LDC forecasts are not always clear or consistent.

Similarly, it was not clear to me on Wednesday how the alternative resource curves would be impacted by the price sensitivity. I posed the question to Dr. Stanton, but the answer was quite vague. As I see the issue, the future price of gas is central to the scenarios, not an afterthought sensitivity.

Why model 2015-16?

This project has evolved due to controversy about building new pipeline infrastructure into New England. Regardless of the outcome of this study, no new infrastructure will be available until 2017 to 2018 at the earliest. In the meantime, New England faces some difficult winter peak seasons. These will have to be dealt with through expanding LNG contracting, extensions of the winter Reliability program, and other short-term means, all of which have nothing to do

with the central issues this study is supposed to address. Why model and analyze 2015 and 2016?

LNG and New England

We all know that the LNG import facilities in New England were built to provide base-load supplies of natural gas when continued declines in US gas availability were projected. Total New England LNG capacity is comprised of import terminals at Everett (0.7 bcfd), and Canaport (0.8 bcfd constrained by M&NP) , as well as buoy-based imports offshore Cape Ann (Neptune - 0.4 bcfd) and offshore Gloucester (Northeast Gateway 0.7 bcfd) that require onboard regasification – a total of up to up to 2.6 bcfd. However with global LNG prices hovering about $9 (Europe) and higher (Asia) very little LNG is being imported despite much high New England prices during peak periods last winter. The problem, of course, is the cost of LNG vs. the cost of pipeline gas when there is free pipeline capacity.

Yet while using LNG capacity to avoid winter shortages and price spikes may cost more for the generators in warm winters, with the proper policy adjustments it could potentially avoid or at least minimize capital expenditures and environmental penalties associates with new gas pipelines.

It is clear we are providing policies to promote more sustainable and less environmentally objectionable energy sources, e.g. the increasing penalties on coal combustion and the alternative energy portfolio standards. Why should using existing LNG import facilities in lieu of building new pipelines be any different? I believe such alternatives need to be considered.

LNG Storage

New England power generators now have a total of about 15 bcf in on-site LNG storage capacity with a daily send out capacity of about 1.5 bcf. This is supplied by a mixture of on-side liquefaction facilities and truck delivery of LNG from Everett. This would seem to be expandable. Given that our winter supply issues are very much of a peak-load nature, expanding these capacities could be a very important element in your resource analysis. It was missing in the discussion on Wednesday.

Market Rules

At least two elements of the power market rules warrant examination: 1) the current structure that limits the ability of power generators to sign up for firm gas capacity contracts, and 2) The current timing between the day-ahead markets for electric power and for natural gas supplies back-up firm power bids into the grid. My understanding is that the power market closes before the gas market is open. This would seem to me to put generators at risk of non-performance, and limit the flexibility of the gas capacity release market. This could have a significant impact on maximizing gas pipeline capacity utilization and thus mitigating short-term gas price spikes.

Geographic Limitation

Your proposal to limit the evaluation of alternative resources to Massachusetts is a serious limitation in the study results. While DOER is not in a position to make policy recommendations outside of Massachusetts, quantifying what alternatives could be available with appropriate policies in other New England states seems to me to be an important part of the study.

New England Gas Infrastructure Related Articles by Dennis Eklof

- *Low Cost Gas Endangers Alternatives*, September 1, 2014, http://www.j-a-n-e.org/ihs/Low Cost Gas Endangers Alternatives.pdf
- *All Good Things Come to an End: And so will cheap gas from Marcellus*, September 2, 2014. Published on Groton Line. http://www.j-a-n-e.org/ihs/An end to cheap gas.pdf
- *Summary and Critique of the Black & Veatch Study*, August, 2014,http://www.j-a-n-e.org/ihs/Black_&_Veatch_Study_Critique.pdf
- *Thirteen Questions a Related to the TGP Pipeline Project*, June 2014, presented at Groton Town Meeting. http://0-fs01.cito.gov.ns.ca.legcat.gov.ns.ca/deposit/b10664245.pdf
- *New England's Energy Future and the Kinder Morgan Project: The Study That Needs to be Done*, September, 2014. http://tinyurl.com/KMEnergyDirectStudy
- *New England Gas Study Proposal Discussion*, September 2014, PowerPoint presentation summarizing the proposed study above and the current status and stakeholders in the project. Presented to the September 8th meeting of the Northeast Municipal Gas Pipeline Coalition. http://tinyurl.com/KMEnergyDirectPresentation
- *Tariff Issue Clarification, July, 2014.* Published on the Groton Line. http://www.j-a-n-e.org/ihs/Tariff Issue Clarification.pdf
- *Pipeline Safety Analysis.* June, 2014. http://www.j-a-n-e.org/ihs/pipeline safety.pdf
- *Natural Gas Markets and "Conventional Wisdom":* Will We Ever Learn?, http://www.j-a-n-e.org/ihs/Conventional%20Wisdom.pdf

About the Author

Dr. W. Dennis Eklof is a resident of Groton, MA and is a member of two committees opposed to the Kinder Morgan pipeline as currently proposed. Now retired, his professional career spanned 45 years in a wide variety of sectors of energy industries. During most of his career he was actively involved consulting with governments, oil and gas producers, oil refiners, power generators, and energy transportation companies with a primary focus on market analysis, infrastructure development, and project economics. During his career he has held senior positions with Data Resources, Inc., McGraw Hill, Inc., Cambridge Energy Research Associates, and Global Insight, Inc. as well as acting as an independent energy consultant since 2003. Dr. Eklof has a PhD in Operations Research and Economics from the Johns Hopkins University.

Climate XChange

Attached are Climate XChange's comments on the DOER study on the low demand scenario for natural gas. Thank you for your consideration, Dan

Dan Gatti,
Executive Director,
Climate XChange,
dgatti@climate-xchange.org,
(617) 797-2125

October 19, 2014

Massachusetts Department of Energy Resources
lowdemandstudy@state.ma.us

Re: Scenarios being run for the Low Demand Analysis

Summary: At least one scenario should include a carbon price on the order of the prices which DOER itself has called for in DPU 14-86

Dear DOER:

We are very pleased that DOER is conducting a "low demand analysis" to evaluate whether new gas pipeline capacity is actually needed to meet winter peak demand for heating and electricity generation use of natural gas; or whether other economically viable alternatives are available.

We wish to comment on one aspect of the modeling plan for the analysis, and to urge that this aspect be changed.

It is our understanding that in both the base case and alternative cases the only carbon price assumed will be the current RGGI price, with no increase (in real terms) in future years. This appears to us to be a highly conservative assumption, which will significantly limit the range of options that fall below the "cost effectiveness" line along a "marginal abatement cost curve" such as the hypothetical one that Synapse showed at the stakeholder meeting on October 15. By doing so, the amount of energy efficiency and alternative sources of supply (particularly low- or zero-carbon energy supplies) that your study shows are less costly than obtaining more natural gas supply will be artificially restricted.

As an organization dedicated to bringing about implementation of a carbon price in Massachusetts, Carbon XChange is of course in favor of including such a price in evaluating future energy alternatives.

However, we find it surprising that DOER has mandated that no carbon price above the existing RGGI price be modeled, when DOER itself has called on the Department of Public Utilities (DPU) to institute such a price in evaluating the benefits and costs of energy efficiency programs, through DPU Proceeding 14-86. In fact, DOER is using the same consulting firm, Synapse, and the same lead consultant, Dr Elizabeth Stanton, to argue that the DPU should use a substantial carbon price in deciding how much spending on energy efficiency is cost effective and therefore should be funded by the state's electric and gas utilities.

On behalf of DOER, Dr. Stanton testified to the DPU that the carbon price utilized should be that price which brings about enough energy efficiency for the state to comply with the legal requirements of the Global Warming Solutions Act of 2008 (GWSA) and the Clean Energy and Climate Plan for 2020 (CECP) –

that the state reduce emissions to 25% below the 1990 level by 2020 and to at least 80% below the 1990 level by 2050, along with interim targets for 2030 and 2040 that the state has not yet set.

Dr. Stanton estimates that in order to achieve compliance with the GWSA and CECP the DPU should use a carbon price of $52 per metric ton of carbon dioxide equivalent for 2020 and a $59 price for 2030.

Utilizing such prices in evaluating the marginal abatement cost curve would certainly cause more efficiency and clean energy resources, some of which would have an impact on reducing winter peak demand, to be cost-effective in comparison to additional gas supplies that require construction of new pipeline capacity. To not use such prices in the Low Demand Analysis appears to contradict the position that DOER has already taken before the DPU.

We urge DOER to modify the design of the present study so that at least one scenario includes carbon prices for fossil fuel energy supplies, including natural gas, on the order of the $52 and $59 prices that DOER is urging the DPU to utilize.

Thank you for considering our comments, and let us again state our thanks to the DOER for conducting the Low Demand Analysis,

Yours truly,

Daniel Gatti, Esq

David Moloney, Progress Software Corp., 14 Oak Park, Bedford, MA

There are thousands of places you can go to read about reasons to take climate goals seriously and about how NG will not get us there.

Here's just a couple credible sources:
http://www.ucsusa.org/climate-risks-overreliance-natural-gas-electricity-2013#.VEVNqRahXoU
http://www.betterfutureproject.org/wp-content/uploads/2014/06/A-Bridge-Too-Far-Final.compressed.pdf

What's MOST IMPORTANT to understand is that an even greater over-reliance on NG infrastructure is going to cripple our long term capacity to get off of it. Math and Physics, not legislators, will decide if our over dependence was a smart tradeoff in compromising our GHG reductions against our lifestyle habits.

A EXCELLENT study of this why overdependence is a very poor choice is this recent conducted research:
http://iopscience.iop.org/1748-9326/9/9/094008

We cannot rely on energy regulators to do this for us. Here is the most recent evidence of that:
http://www.clf.org/blog/clean-energy-climate-change/isos-big-mistake-counting-renewable-energy/

The FERC does not distinguish between "need" and "demand", we can. It will not disapprove TGP CT Expansion, Algonquin AIM, Portland & Altantic Bridge or Access NorthEast just because NED (NorthEast Energy Direct) decides to bring 10 times the capacity demand needed in New England (under worst case high growth scenarios - See National Grid Forecasted design day http://www.northeastgas.org/pdf/e_arangio_natgrid.pdf versus to 2.2 bcf/d proposed for NED.). If there are coal-fired power plants to convert, propane users willing to convert to gas or

transportation fleets will to convert to CNG, the gas will find a buyer. The systemic problems to this over-dependence go far deeper than the demand scenarios to which the FERC responds.

In most of South America and in India and China, customers are willing to pay as much as 11x's the price of gas in the U.S. In Japans, they'll pay 14x's the price. We saw with Winter peak demand how much NG prices can fluctuate. How volatile will the situation get when domestic price are pressured by demand from the highest bidders abroad?

Consider the low demand scenario not just because it is the only way we will come close to meeting our portfolio standards. Do it because we are in a lose-lose scenario for those who think this fuel is cheap, reliable and clean.

Comments of the New Hampshire Public Utilities Commission:
McCluskey, George George.McCluskey@puc.nh.gov

Hydro Imports - New Hampshire has only one comment at this time and it relates to the study assumption of 2400 MW of new hydroelectric imports from Canada to New England. We are concerned about this assumption because it would require the construction of two, or possibly three, transmission lines linking Canadian sources to southern New England load centers. These lines will, in turn, require siting approval from northern New England states. Given the strong citizen opposition to recently proposed electric and gas infrastructure projects in New England, we believe it is unrealistic to presume such a large energy import project without acknowledging the siting difficulties, and suggesting how those difficulties might be overcome. Any introduction of Canadian hydro into our region must overcome this siting hurdle: to presume otherwise is not robust analysis.

Sally Pick, PO Box 303, 25 Union St., Montague, MA 01351

Dear DOER,

Thank you for retaining Synapse to conduct a low demand power scenario to assess our commonwealth's need for power capacity by exploring the opportunities available that avoid expanding our commitment to fossil fuels.

As a member of the Montague Energy Committee, I have followed and engaged in discussion about Massachusett's energy capacity and needs. I am extremely pleased that DOER is exploring this low demand power scenario to see how such a scenario would play out in terms of defining our energy profile now and in the coming years.

I share the view of other committee members and many in Massachusetts who believe that committing to additional natural gas pipelines is not a sustainable long-term path and is counter to the mandated greenhouse gas emission reduction goals of the Massachusetts Clean Energy Plan of 2020. New gas pipelines would commit us to many years of expanded natural gas use in order to address short-term winter price spikes that have come about due to an increase in natural gas for home heating and the concurrent increase in natural gas electric utility plants that draw on gas supplies on the coldest

mornings and evenings of our winters. Adding gas capacity would result in overcapacity during off-peak times which would likely be used for local gas distributors to expand their gas customers and possibly for export, both of which would again increase price and supply pressures and not solve the problems purportedly being addressed with new gas capacity.

Other strategies such as increasing supplies of Liquefied Natural Gas, demand response such as battery backup for large energy users, and market timing can shave our winter peak loads and eliminate the need for new natural gas pipelines. In addition, we should expand our state's existing efficiency and renewable energy programs to further drive down our energy capacity requirements and ensure fair, low-cost energy pricing and energy reliability and resilience.

As you examine a low demand scenario, please explore these and other avenues for meeting our immediate and longer term power needs and carbon emission goals in a manner consistent with Massachusetts's role as a leader in providing creative, diverse, and local solutions to this global climate crisis.

Sincerely,

Sally Pick

Pat Larson – plarson24@hotmail.com (978-575-1226) 173 Athol Road – Orange, MA 01364

As a citizen in Massachusetts, I am happy to hear that Synapse is working with MA DOER and doing an analysis of the Massachusetts Low Demand Scenario concerning what is needed in terms of natural gas and generating capacity for electricity. Hopefully this study will show that no new natural gas pipelines such as the 30-36" pipeline proposed by Kinder Morgan/TGP are needed. Although I am not an energy expert I believe from my reading and involvement over the last several years with North Quabbin Energy, a citizens group (www.northquabbinenergy.org/wordpress), we can decrease or at least keep our energy demand flat in the coming years through conservation and energy efficiency along with renewables. I realize that we cannot meet all our energy needs through renewable energy, but we can step up state programs calling for energy efficiency and energy conservation in both the residential and commercial sector. Going forward this can help us with combating climate change and abiding by the Global Warming Solutions Act (GWSA) in our state. To promote and rely on more fossil fuels will not help us continue on the good track record that Massachusetts has accomplished over the past several years.

ISO-New England's own information points out that Massachusetts has invested approximately $2.3 billion from 2009-2012 in energy efficiency efforts which placed Massachusetts as number one in the country ahead of California in terms of energy efficiency. If the state keeps this as a priority even more progress can be made. ISO-New England estimates that $6.3 billion will be invested in energy efficiency in the state from 2017 to 2023. All these items along with fixing the leaks in old natural gas infrastructure need to be considered in an analysis of the low demand scenario. Also possible market reforms in how electric generating plants buy natural gas to use for generating electricity need to be part of the analysis especially in terms of some of the problems experienced by generating plants during the 10-30 very cold days in Massachusetts.

I hope that the analysis will do a thorough study of how energy efficiency and energy conservation can make a low demand scenario feasible for Massachusetts. Thank you for allowing for comments from the public.

Pat Larson

Kenneth W. Berthiaume, 52 Fryeville Road, Orange, MA

After attending by phone the October 15 briefing on the proposed scope of this study I offer the following:

- Given that the Winter Peak (December 1 through February 28th) is the driving impetus for this study, the peak days can arguably range from 10 days to 27 days per year [1], equating respectively to a 2.6 % to 7.4 % scenario. Therefore, it stands to reason that any additional infrastructure cost must be amortized over these 'peak' days and NOT over the entire year. Further, the number of hours at peak also must be considered as it can range from a 'needle' spike to perhaps 4 hours twice per day equating conservatively to 216 hours per year or approximately 2.5 % of the year (8,760 hours).
  Reference – [1]Black & Veatch, *Phase II* at 6.
- LDC's throughout the New England region have peak-shaving facilities totaling 16BCF in storage. The DistriGas (Everett) LNG terminal has a storage of 3.4 Bcf. This infrastructure can be utilized immediately, particularly the DistriGas facility as this facility has been operating at reduced capacity *(received 60 Bcf/yr in 2013 versus 140 Bcf/yr in 2011)* for the past several years.
  Reference - www.northeastgas.org/pdf/stat**guide**_13.pdf
- Further from a heating perspective, there are two Ultra Low Sulfur Diesel (ULSD) oil reserves in Groton CT and Revere MA at 500,000 barrels (21M gals) each.
  Reference - http://www.eia.gov/state/analysis.cfm?sid=CT
  Reference - http://www.eia.gov/state/analysis.cfm?sid=MA
- Wind curtailment practices due to inadequate infrastructure must be considered as a major issue and top priority for infrastructure change that will enable full use of existing and future renewable energy. Reference - http://www.iso-ne.com/pubs/pubcomm/corr/2013/curtailment_summary_2013.pdf
- Base on monitoring of the ISO-New England web site on energy usage, combined Hydro and Renewables have ranged from 14 % to 18%. If renewables with EE are to comprise 33% of the energy needs by 2020 (Reference below to ISO New England report – page 29), implying close to a 2X increase in renewables, where is the expected reduction to occur given that oil comprises less than 1% daily and coal ranges from 1 to 2 %?
  Reference - http://www.iso-ne.com/aboutiso/fin/annl_reports/2000/2014_reo.pdf
- Will the projected price of NG in 2020 and 2030 as domestic prices approach world market prices due to the planned exports be modeled? (37 LNG export proposals before FERC).
- Non-renewable (fossil) fuels are volatile in price in addition to infrastructure costs whereas renewable (wind, solar, and hydro) fuel costs are currently and will continue into the foreseeable future to be effectively zero leaving initial known infrastructure/construction costs to be considered. Thus enabling stable prices over longer timeframes which will NEVER be achievable with fossil fuels. Both wind and solar resources have been planned, constructed, and placed into service much faster than fossil fuel plants, making any additional reliance on fossil fuels an absolute ***last resort***.

Thank you for this opportunity to participate in this process that impacts our future and our children's futures.

Sincerely,

Kenneth W. Berthiaume

Ariel Elan, Montague MA, Shop_Angel@comcast.net, 413-367-7579

Dear Synapse consultants:

Not knowing whether your comment dealine is today at 5pm or at midnight, I will write in 2 parts, this first being a "laundry list" of proposed measures to be included in the study, if they are not there already. I apologize for not including more source links and more explanation; did not have time.

A general request that applies to all measures:

Quantify the job-creation potential if these numbers are available. At least estimate a range, or make note that jobs will be created, where projectable data are not available.

--Would be even better if we can project the positive jobs/economic impact of manufacturing some of my recommended resources right here in the region, or at least in the U.S.

Turn out the lights wherever and whenever having a light on is not essential:

--all unoccupied spaces**,** including

--storefronts

--businesses & commercial buildings

--public & institutional buildings

--malls, office parks, parking lots

--factories, industrial parks

--streets

AS NEEDED, replace fixed lighting with sensor lighting:

--in a storefront, for example, the light could go on (along with an alarm) if there is physical blow to a window or door, and/or if there is movement inside the interior

--in office buildings, lights can switch on & off as cleaning personnel move around

--meanwhile, as a former professional cleaner, I assure you people in this profession are capable of turning lights on & off as needed while we do our work

Replace all public lighting with LED lights; establish strong incentives for the private sector to do the same.

MAXIMIZE "passive" or "natural" climate control in ALL indoor spaces.

--Except in settings where a different temperature range is essential, indoor spaces should not be air-conditioned below 72 degrees, and should not be heated above 68 to 70 degrees.

--Windows in all types of office buildings, public buildings, factories, etc., should be able to be opened for ventilation.

--Similarly, windows and doors in all public, commercial, and industrial spaces should be fully weathertight, insulated, and lockable to keep out drafts and limit convection heat loss.

--In all such spaces, there should always be the option to use a fan for cooling before resorting to A.C.

--Use zoning and "smart grid" to heat, and cool, interior spaces ONLY when occupied, and the heat or cooling is needed.

FULLY WEATHERIZE = INSULATE & AIR-SEAL = every building & facility of every type in the state, and in the region.

--Conventional insulating retrofits, well done. I am not suggesting the "deep energy retrofit" rebuild for every existing structure, though the projected energy & $$ savings from doing so would be interesting information.
--Design funding & incentive mechanisms to eliminate physical barriers to full insulation (such as knob-and-tube wiring).
--Consider fire-code and electrical-code changes regarding insulating with blown-in cellulose around knob-and-tube wiring, so that its presence can be evaluated on a case-by-case basis by a licensed electrician--a rule change already adopted by some communities and states.

[*...to be continued....*]

Ariel Elan

Robert Rand, Pepperell Conservation Commission, Nashoba Conservation Trust, board member

I have seen the comments by ENE and MA Sierra Club and wanted to add emphasis to one aspect brought up in both of those comments that I feel is important to your study. It is the contribution of a distributed and smart grid to the analysis of the benefits and costs of energy resources and policy to meet the energy needs of Massachusetts and New England.

Although I am a resident of Pepperell, MA, I also have a house in Cape Breton, Nova Scotia, and have spent much of the past three years there as president of Isle Windfield, a small community investor owned company working to create ownership of small wind and solar by local communities. To accomplish that we are working with the Nova Scotia government to improve the grid so that rural customers can take advantage of and afford small scale electricity generation. And we are taking advantage of the feed-in-tariff available in Nova Scotia.

Although both Massachusetts and Nova Scotia are in about the same position in terms of a smart, distributed grid, there is significant value in stabilizing prices, achieving the GWSA targets, and creating greater grid stability when spreading the sources of electricity generation over the population with renewable energy sources.1 Further it is likely that movements toward a distributed grid and inclusion of home and small business solar PV or in some cases wind could significantly reduce the demand for electricity and thus the need for so much natural gas as currently proposed. Clearly there are many other factors to be included in your study, but the effects of improving the the way electricity is generated and distributed should be included in your analysis of a low demand scenario. Creating a smart grid may in fact be cost effective and more timely as opposed to constructing large capacity natural gas pipelines that commit the region to many more years of fossil fuel infrastructure at a critical time of global warming. Including an analysis of the effects of a smart griffon the demand scenario over the next 20 years is essential to any study of what New England needs for energy.

I put a small solar PV system on my house in Cape Breton which has been operable since December of 2012. It is only a 4.5 kW system, 20 panels, but has generated just over 5 MW each year so far. I am sure that many of systems such as mine could make a significant difference. You could probably find more accurate numbers and apply them to a reasonable percentage of the population of New England to see what the effects would be. The policy part certainly will be up to us to convince our governments to move in the right direction. Having the right information will be a tremendous asset.

Thank you very much for considering this comment. I look forward to continuing engagement in the analysis.

Robert Rand

1 A smart, distributed grid:
http://www.brighthub.com/environment/renewable-energy/articles/74984.aspx
http://www.nga.org/files/live/sites/NGA/files/pdf/2014/1403GovernorsGuideModernizingElectricPowerGrid.pdf

---

Peter Shattuck, Director, Market Initiatives, ENE

Subject: Export-driven high gas prices and hydro imports

Hello Farhad,

Nice to meet you today. I'm following up on the two specific points that we discussed, which are among the most import for achieving a good outcome from the study.

First, hydro imports should be evaluated under high gas prices for both the base and low case. In addition to emissions reductions, one of the main attributes of hydro imports would be price certainty, and the best way to evaluate the value of stable prices is to compare to higher gas prices. This approach would help address the risk associated with different investments, a theme that a number of commenters raised today.

Second, in relation to gas prices, EIA did a deep dive on the impact of increasing exports in "Effect of Increased Natural Gas Exports on Domestic Energy Markets". Since the potential impact of exports is an interest of various stakeholders, this dedicated analysis can provide useful information to the study, including power sector prices for gas by region. Of the four scenarios they explore, I would suggest that the rapid increase in exports to a high level is most appropriate. The US exported roughly 1.6bcf in 2013, which is in line with their projection for the rapid expansion, and the high level of export should be utilized as the most appropriate means of addressing risk.

I also provide a link to the illustrative Pipeline Alternatives Assessment that we put together in June.

I will elaborate on these points in detailed comments, but wanted to follow-up expeditiously given the tight timeframe of the study.

Regards,
-Peter

Peter Shattuck ,Director, Market Initiatives, ENE, 101 Tremont Street, Suite 401, Boston, MA 02108
o. 617.742.0054 x 103, c. 857.636.2502, www.env-ne.org

Hi Farhad,
Nice meeting you yesterday.
As a start, I am attaching a memo that TNC and MassAudubon prepared for the GWSA IAC on forest carbon.
I hope to follow up with some additional information.
Please feel free to share this memo with the team and consultants.
Thanks.
--Steve

Steve Long
Director of Government Relations
The Nature Conservancy in Massachusetts
99 Bedford Street, 5th Floor
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Forests in Massachusetts:
Priorities for Mitigation and Adaptation for Climate Change

September 17, 2012

Background

Forests are a defining feature of Massachusetts, with 3.2 million acres of forestland (63% of the state's land area). From the Berkshires to Cape Cod, there are many different types of forests, but all provide important natural and economic values including clean air and water supplies, recreational opportunities, habitat for fish and wildlife, timber and other forest products, and community character that contributes to quality of life and property values. The ecosystem service value of forests is estimated at nearly $3 billion annually[1].

Forests also play critical roles in addressing climate change, both in terms of mitigation (reducing heat-trapping air pollutants) and adaptation to unavoidable climate changes already underway. Forests in Massachusetts:

- Sequester 12% (10.8 million metric tons CO_2e) of the state's annual carbon emissions annually[2];
- Store 85 tons of C on the average acre[3];
- Continue to increase both the rate and mass of carbon storage over time as the forests mature.

Most forests in Massachusetts are in a period of re-growth after intensive clearing historically. The extent of land coverage in forests peaked around 1980, and is now declining again due to conversion to development. Nearly 17 acres per day of forestland were developed between 1999 and 2005[4], and while that rate has slowed recently, it will pick up again if development is not channeled in a smarter and more efficient manner.

Massachusetts Clean Energy and Climate Action Plan

Massachusetts is a leader in recognizing the serious threats climate change presents to humans and the environment upon which we depend. Under the Global Warming Solutions Act, the state has established goals of reducing greenhouse gas emissions (GHG) by 25% by 2020 and 80% by 2050. The Action Plan to achieve the 2020 goal includes several items related to smart growth and sustainable development. Those items are primarily focused on reducing vehicle miles traveled and associated transportation related emissions. **The substantial benefits of protecting forests for their values in both climate change adaptation and mitigation should be highlighted in the Commonwealth's efforts to reduce emissions and to adapt to a climate-changed future.**

Cross-Cutting Benefits of Forestland Conservation:

Mitigation: Protection and enhancement of forested areas through land conservation, smart growth, tree planting in urban and suburban areas, and good forest management practices are necessary for Massachusetts to achieve its climate change mitigation goals.

- Forested land stores and continues to sequester additional carbon, with the capacity to offset even more of Massachusetts' greenhouse gas emissions through additional land protection and well-planned forest management.
- Keeping forest as forest avoids carbon emissions from land use conversion.
- Trees in the right location around buildings and streets reduce heating and cooling costs and urban heat island effects.

Adaptation: Forests and other vegetated areas also play critical roles in climate change adaptation. The role for water resources is particularly vital in light of predictions of increased frequencies of both droughts and intense storms that cause floods, and more precipitation falling as rain than as snow in winter.

- Precipitation infiltrates better into forests than virtually any other land cover, providing recharge to water supplies and rivers, and reducing flood peaks.

---

[1] Mass Audubon, *Losing Ground: At What Cost*, 2003

[2] MassDEP, Final 2006-2008 Massachusetts Greenhouse Gas Emissions Inventory, 2012; emissions figures are for 2008

[3] Avril L. de la Crétaz, et. al. *An Assessment of Forest Resources of Massachusetts*, UMass Department of Natural Resources Conservation and Massachusetts Department of Conservation and Recreation for the U.S. Forest Service, 2010.

[4] Mass Audubon, *Losing Ground: Beyond the Footprint*, 2009

- Forests, naturally vegetated buffers along streams, and bioretention areas in developed settings filter and infiltrate stormwater runoff, reducing erosion, pollution, and flooding.
- As is usually the case, these adaptation benefits also result in some mitigation benefits. The use of natural versus constructed infrastructure reduces the economic and the carbon cost of preparing for storms and of ensuring sufficient quantity and quality of drinking water.

Action Recommendations:

Recognize the role of forests in climate change adaptation and mitigation, both in policies stemming directly from the Global Warming Solutions Act and also in state agency actions across the board. Align policies across agencies, and increase attention on and support for action at the municipal level. New programs should be considered to assist communities, land trusts, and landowners, support cooperative efforts, and incentivize local actions in order to retain trees wherever they occur.

Specific areas recommended for focus include the following:

1. Protect forest blocks, especially those that are large or interconnected, with the most carbon stored and the best ability to be resilient: Recommit to principles of resiliency in forest protection considering size, setting, ecological processes, and biodiversity.
   - Continue state land protection and landowner conservation assistance programs at current or increased levels.

2. Support more compact forms of development and protect Green Infrastructure:
   - Assist municipalities in adopting innovative land use regulations and incentives, e.g. Open Space Design, Mixed-use and Infill/Redevelopment zoning, and Low Impact Development regulations.
   - Revise the MEPA greenhouse gas thresholds to account for greenhouse gas impacts of development projects smaller than 50 acres.

3. Reduce energy usage by maintaining trees around buildings and planting where needed, and by substituting wood for non-renewable materials:
   - Enhance funding for tree planting programs.
   - Support municipal land use regulations and incentives to retain trees on building sites.
   - Promote sustainable and efficient uses of wood for construction, thermal energy, and other appropriate local uses.

4. Explicitly include climate change information in state-funded forest management plans and outreach materials, and consider carbon balance in the type of forest management promoted to private landowners and implemented on public lands.

For more information, contact:

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hricci@massaudubon.org or lschwarz@massaudubon.org

Steve Long
617-532-8367
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Mass Audubon

The Nature Conservancy
Protecting nature. Preserving life.™

Attached please find MassCEC initial comments for the Low Gas Demand Modeling Analysis. I have also attached a referenced conference poster.
Thank you,
Nils Bolgen

Nils Bolgen, Program Director
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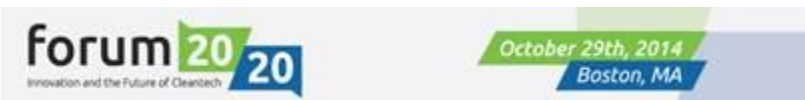
Please join us for Forum 20/20 and Global Cleantech Meetup Week.



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October 20, 2014

By electronic mail to:

Massachusetts Department of Energy Resources Low Gas Demand Modeling Analysis at LowDemandStudy@state.ma.us

Re: MassCEC Comments on Resource Alternatives – Offshore Wind Energy

Dear Sir or Madam,

On behalf of the Massachusetts Clean Energy Center (MassCEC), thank you for the opportunity to provide comments on the modeling process and resource alternatives for the Massachusetts Department of Energy Resources (DOER) Low Gas Demand Modeling Analysis. Presented here are initial comments related to the potential of offshore wind energy as a resource alternative.

Our key points are as follows:

1. Offshore wind energy is the largest potential source of clean energy for the Commonwealth of Massachusetts.
2. Offshore wind energy can be sited in close proximity to electric load centers.
3. Offshore wind energy facilities are expected have capacity factors exceeding 40 percent and their output will correlate well with electric system peaks in both the winter and summer months.
4. Leasing and development planning for two large offshore wind energy areas in federal waters south of Martha's Vineyard Island is at an advanced stage.
5. With respect to development of an alternative resource supply curve, the savings assumptions for offshore wind should reflect offshore wind's low marginal cost and the resulting price suppression benefit that will accrue throughout the region when offshore wind participates in the ISO-NE energy market.

Presented below are general information characterizing the offshore wind industry and additional information in support of the points listed above.

Background – Offshore Wind Industry Status.

Offshore wind energy deployment has grown rapidly in recent years, from just over 200 MW operating in 2006 to over 7,000 MW operating worldwide as of the end of 2013 (with over 1,700 MW installed during 2013). Over half of this generating capacity is operating in waters of the United Kingdom. As of mid-2014 there was an additional 6,600 MW of capacity under construction. (Source – Navigant Consulting[1].)

[1] *Offshore Wind Market and Economic Analysis*, Navigant Consulting, Inc., August 27, 2014.

A key challenge for offshore wind is to reduce costs. The rapid deployment of offshore wind in recent years has been accompanied by an increase in capital costs due in part to a move to deeper waters and more complex sites. Industry and government-sponsored research is focused on cost reduction both in Europe and the United States. The U.S. Department of Energy's forthcoming *Wind Vision* report is expected to be published in late 2014 and will include a roadmap identifying actions for capitalizing on wind's success to-date, addressing remaining gaps (including reducing costs) and capturing the significant public benefits that wind would provide. The *Wind Vision* report is an update of DOE's 2008 *20% Wind Energy by 2030* report which established a credible basis for installation of substantially more wind energy to meet national electricity needs by 2030, including 54 GW of offshore wind capacity.

Massachusetts and Rhode Island/Massachusetts Wind Energy Areas. With its substantial offshore wind resource, supportive clean energy policy, key investments in infrastructure, and advanced planning for offshore wind resource areas, Massachusetts is a national leader in offshore wind energy development.

Since 2009, Massachusetts public agencies have been working with the federal Bureau of Ocean Energy Management (BOEM) to identify potential leasing areas in federal waters south of Massachusetts. Throughout the stages in the process, BOEM has worked closely with two intergovernmental task forces and has sought extensive stakeholder input and coordination. In addition to more than 100 public meetings in coastal communities, BOEM has also sought the advice and guidance of two working groups for fisheries and habitat convened and led by EEA and MassCEC. While additional state and federal policy support mechanisms will be necessary to support financing of offshore wind facilities, these leasing processes begin to set the stage for multiple, large-scale offshore wind facilities developed in federal waters south of Massachusetts over the next decade. Please refer to **Figure 1** on page 4.

- In February 2012, BOEM identified the Rhode Island/Massachusetts WEA (RIMA) within the area of mutual interest identified by Rhode Island and Massachusetts in a Memorandum of Understanding between the two states executed in 2010. The RIMA covers approximately 164,750 acres and is located a little over 12 nautical miles south of the Rhode Island coastline. Deepwater Wind LLC secured leases for the area through a competitive auction and indicates that it can develop up to 1,200 MW of offshore wind generating capacity in the RIMA.

- In May 2012, BOEM identified the Massachusetts Wind Energy Area (MAWEA) for potential future commercial leasing for offshore shore wind. The MAWEA is the largest offshore wind planning area along the East Coast, totaling approximately 742,974 acres. Approximately 17 developers have expressed an interest in obtaining a commercial lease for a wind energy project in the MAWEA. BOEM expects to conduct a formal leasing auction for the MAWEA, divided into four or five smaller lease areas, in late 2014 or early 2015. The National Renewable Energy Laboratory has estimated that 4,000 to 5,000 MW of generating capacity could be developed in the MAWEA[2].

[2] *Assessment of Offshore Wind Energy Leasing Areas for the BOEM Massachusetts Wind Energy Area*, W. Musial, Z. Parker, J. Fields, G. Scott, D. Elliott, and C. Draxl, National Renewable Energy Laboratory, December 2013.

Proximity to Electric Load Centers. As described above, the RIMA and MAWEA areas can accommodate 5,000 to 6,000 MW of offshore wind generating capacity. With electrical interconnection at points identified in the MassCEC Offshore Wind Transmission Study[3] several thousand MW of offshore wind generating capacity can be sited within 45 to 90 miles of suitable high voltage interconnection points serving major load centers in Eastern Massachusetts and Rhode Island.

Performance of Offshore Wind. The wind resource at the MAWEA and RIMA areas is robust and well-matched to peaks in regional energy use. Cape Wind has frequently cited wind resource data from its meteorological tower in Nantucket Sound to demonstrate that the output from its project would synchronize well with seasonal peak loads. With respect to the MAWEA and RIMA areas, analysis based upon representative commercial project configurations and modeled atmospheric conditions predicts (a) that annual average capacity factors can exceed 40 percent and (b) that offshore wind has good coincidence with peaking electric LMP prices in winter. See, for example, *Offshore Wind: Mitigation of Natural Gas Based Market Price Spikes During Extreme Cold Weather Conditions*[4].

Preparing for Offshore Wind Deployment. Massachusetts has completed or is undertaking advanced planning activities designed to support the responsible development of offshore wind in the MAWEA and RIMA areas. For example:

- MassCEC and BOEM have sponsored three years of marine wildlife surveys to characterize the distributions and abundances of large whales, sea turtles and sea birds.
- MassCEC sponsored a transmission study5 to characterize offshore wind transmission technology options and identify and evaluate potential grid interconnection points for offshore wind. The study identifies a number of potential interconnection points in Massachusetts and coastal southern New England where offshore wind projects can interconnect to the grid and concludes that it is technically feasible to interconnect 500 to 1,000 MW, and in certain cases up to 2,000 MW, of offshore wind capacity at each potential 345 kV interconnection point. This study has also been used by the Massachusetts Office of Coastal Zone Management to identify specific preferred transmission routes in state waters.

As follow-on activities, MassCEC is undertaking a scoping exercise to evaluate metocean (i.e. wind, wave, tidal and current) data collection options for the MAWEA and expects to conduct seabed characterization surveys for transmission routes in state waters.

In addition to these efforts to advance new offshore wind development, Massachusetts has made two world class investments for the offshore wind industry:

1. In partnership with the U.S. Department of Energy, MassCEC built and operates the Wind Technology Testing Center, one of the world's largest indoor wind blade testing facilities.

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[3] *Offshore Wind Transmission Study Final Report* , ESS Group, September 2014 available at http://mapping.masscec.com.s3.amazonaws.com/MassCEC-OSW-Transmission-Study-2014.pdf.
[4] *Offshore Wind: Mitigation of Natural Gas Based Market Price Spikes During Extreme Cold Weather Conditions*, Whitney J. Houston, AWS Truepower, Poster presentation at AWEA Offshore Windpower 2014, October 2014.
[5] *Offshore Wind Transmission Study Final Report* , ESS Group, September 2014.

2. The Marine Commerce Terminal in New Bedford is the first facility in the nation designed to support the construction, assembly and deployment of offshore wind projects. Construction of the Terminal is scheduled to be completed in late 2014. Cape Wind has signed a two-year lease with MassCEC to use the terminal for construction of it project in Nantucket Sound.

Thank you for the opportunity to review and comment on the modeling process and resource alternatives for the DOER Low Gas Demand Modeling Analysis. Please feel free to contact me at 617-315-9330 or bwhite@masscec.com or my colleague Nils Bolgen at 617-315-9311 or nbolgen@masscec.com, if you have any questions.

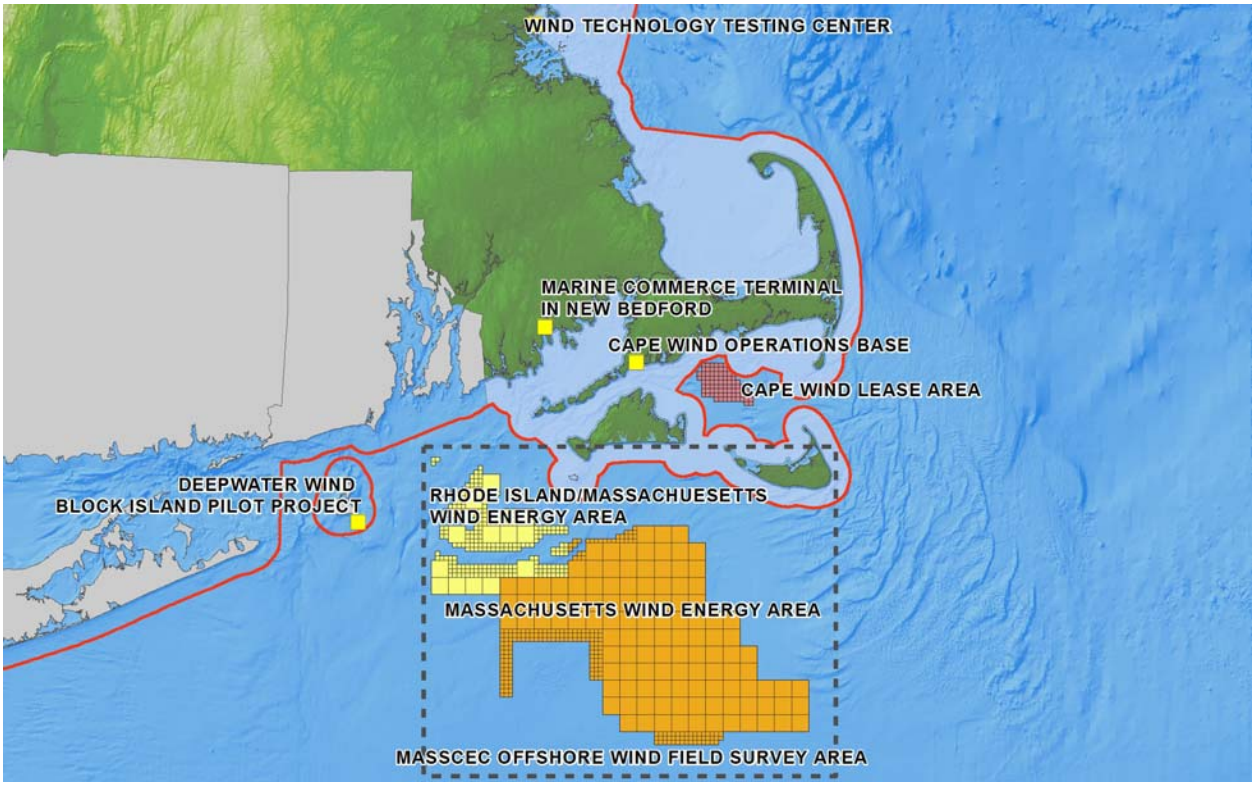
We look forward to following and supporting this important analysis effort.

Sincerely,

Bill White

Director, Offshore Wind Sector Development
Massachusetts Clean Energy Center

Figure 1. Massachusetts and Rhode Island/Massachusetts Wind Energy Areas.



Offshore Wind: Mitigation of Natural Gas Based Market Price Spikes During Extreme Cold Weather Conditions

Whitney J Wilson – Program Manager, Electrical Services - AWS Truepower

Abstract

Recently, natural gas has become less expensive and gained priority in the US generation portfolio. With increased demand for natural gas, limitations in the infrastructure have been recognized. These limitations cause large winter price spikes in the New England, New York, and Mid-Atlantic power system. During cold weather events, pipelines have issues related to flow rate and capacity, causing increased competition for procurement of natural gas and driving up fuel prices. Expansion of the pipeline system is expensive, and much of the cost will be transferred to ratepayers. As such, it is important to identify and study mitigation strategies.

Offshore wind has a unique coincidence with electricity demand profiles and produces maximum capacity factors during the winter. Additionally, facilities are proposed throughout the region experiencing the most severe natural gas price spikes. This presentation looks at how offshore wind coincides with peaks in prices and how offshore wind can stabilize overall energy prices by mitigating the need for peaking or reserve units and high cost natural gas. Offshore wind production estimates based on historic climatic data is used in conjunction with Locational Marginal Pricing data and historic natural gas price data during the winter of 2013-2014. The analysis identifies the magnitude of price changes, the production capabilities of offshore wind, and the ability of offshore wind to mitigate price spikes during this time period. The objective is to investigate the capability of offshore wind to complement natural gas expansion and mitigate the need for more expensive peaking or reserve units during extreme conditions.

Objectives

- Understand the coincidence of offshore wind and winter spikes in natural gas prices
- Understand the potential of offshore wind to mitigate the need for expensive peaking or reserve production
- Understand how offshore wind can play a part in a complete mitigation strategy that is beneficial to ratepayers

Data and Background

Backgound:

- During extreme cold weather events, the demand for power, and thus natural gas, increases. Record cold weather in the winter 2013-2014 resulted in record high prices for natural gas. Three main factors led to the increased price: shortages in natural gas storage for increased withdrawals, limitations in flow rate of pipelines in severe cold, and freeze-offs reducing production capability. The figure below shows the withdrawal level verses the expected withdrawals.

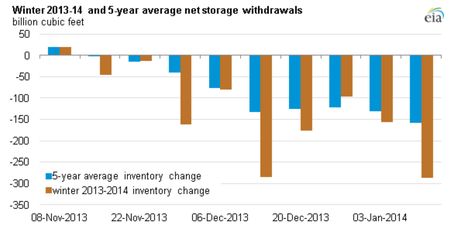


Figure 1: Winter 2013-2014 withdrawal level verses the expected withdrawals.

Source: *EIA [1]*

- Market prices, or Locational Marginal Prices (LMP) are based on 3 factors, the cost of energy, the cost of congestion on the transmission line, and the cost of losses.
- The cost of energy is set by the marginal generator offer or the highest priced generation source required to meet the load. All nodes will receive a marginal cost of energy based on that unit. Typically, this is set by natural gas, especially during cold weather conditions.
- Infrastructure updates, such as new storage and an expanded pipeline system are costly, and will not necessarily mitigate all issues. As such, alternative mitigation efforts, to team with expanded infrastructure, need to be explored.
- This assessment looks at the potential of offshore wind to offset the most expensive natural gas facilities, including reserves and peaking units, during some key peak hours to reduce the price spikes seen on the system.

Resource Data:

- The AWS Truepower national wind map and NASA *Modern Era Retrospective-Analysis for Research and Applications (MERRA)* dataset were used to determine long-term wind estimates and hourly modeled wind flow.

Production Data:

- Coordinates for the publicly announced regional offshore wind facilities were gathered using the Ventyx Energy Velocity dataset (Aug 2014), as well as information from the project specific websites. MERRA data were pulled at these coordinates. The identified sites were: Cape Wind, Deepwater Block Island, and Deepwater ONE (Figure 6).
- Hourly time-series production data was created for each of the sites, using the resource data discussed above, the loss assumptions described, the multi-density power curves for standard offshore turbines, and the AWST 8760 production calculator.
- Losses were applied based on typical losses for regional projects, described below. It should be noted that these losses are not site specific and losses will vary on an individual project basis; however, the values below are reasonable typical assumptions.

Loss Accounting	
Wake Effect	9.5%
Availability	6.2%
Electrical	3.1%
Turbine Performance	3.2%
Environmental	3.8%
Curtailments	0.0%
Average Total Loss	23.4%

Market Pricing Data:

- Historic real time hourly Locational Marginal Pricing (LMP) data were acquired from ISO-NE [2]
- Historic real time hourly energy offers were acquired from ISO-NE[3]

Results

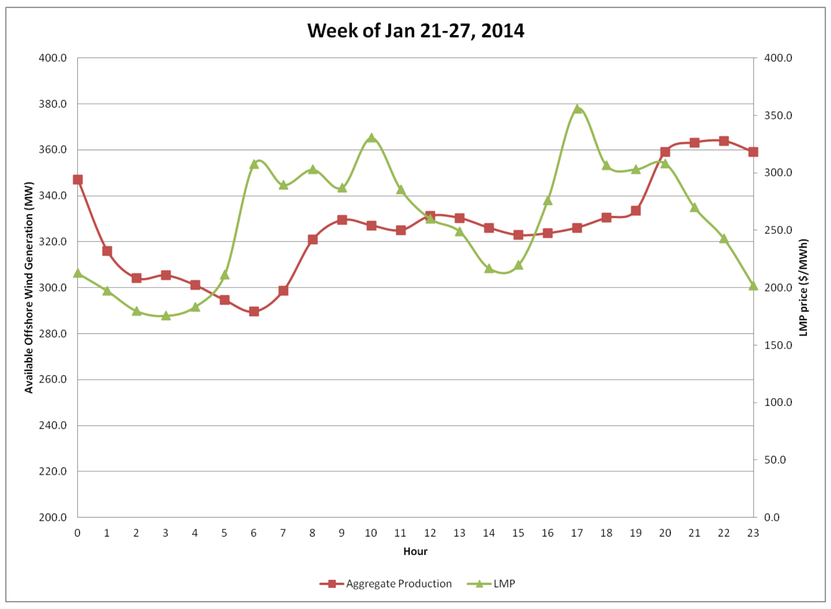


Figure 2: Coincidence of LMP and the Aggregate Wind Production of Offshore Wind for the Week of Jan 21-27, 2014

Source: *AWS Truepower, LLC and ISO-NE*

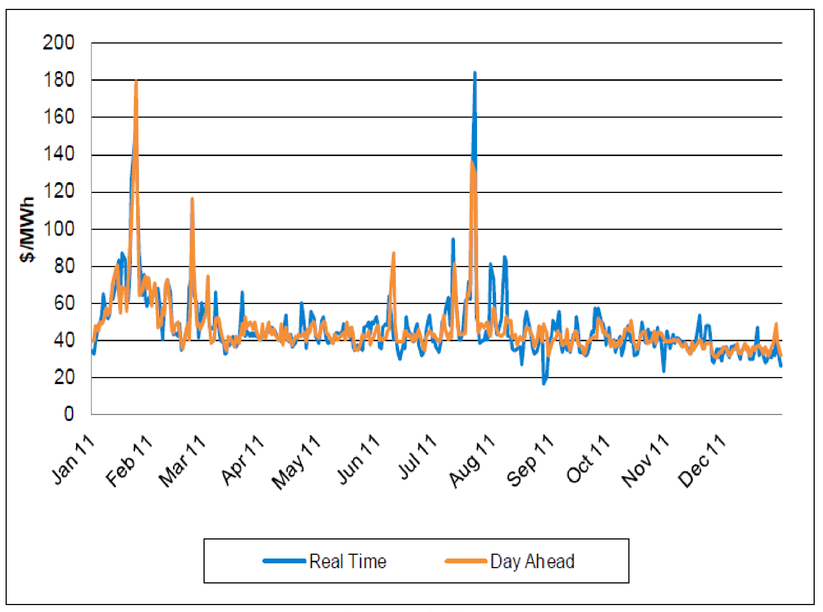


Figure 4: LMPs for 2011

Source: *ISO-NE [4]*

- Figure 2 shows that although coincidence is not perfect between offshore wind and peak LMPs, the coincidence is much higher than other clean energy alternatives, and offshore wind maintains a high production factor through the hours most affected by natural gas price spikes and/or need for peaking and reserve units.
- Figure 3 shows a peak LMP day for the test node during the January 2014 cold weather event. A real-time final LMP price of around $750/MWh was recorded for all Massachusetts test nodes in ISO-NE. This was driven by the use of 27 MW of reserve from a natural gas facility, which set the price of energy to near $720/MW. Some congestion issues were also seen, bringing the LMP price even higher.
- The LMPs during the 2013-2014 cold weather event peaked at $1140/MWh and averaged around $200/MWh. Historically, the annual real-time average price in the region is $37-47/MWh and winter real-time average prices were around $45-60/MWh. Cold weather price spikes had previously topped out around $180-200/MWh. Figure 4 shows the historical LMP scatter, while Figure 5 show the scatter from Jan 2014.
- ISO-NE reported an increase in Q1 cost of energy of 75% and real-time LMP price of 77% in 2014, over the same period in 2013. According to the quarterly market update, this was driven by a 72% increase in natural gas prices in the same reporting periods. The real-time reserve payments were 158% higher in Q1 2014 than in Q1 2013.
- Figure 6 shows the wind facilities considered in the aggregate production profile – for a maximum installed capacity of 693.6 MW into the ISO-NE system

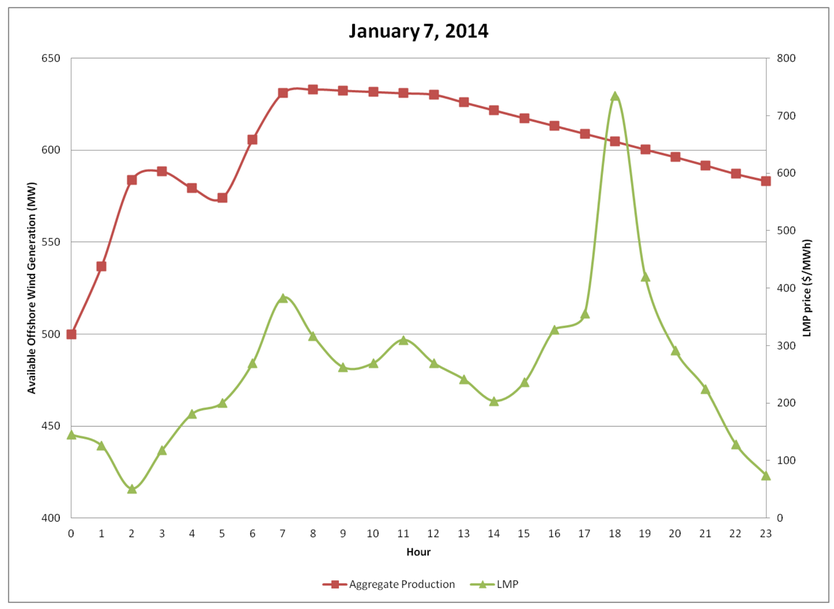


Figure 3: Coincidence of LMP and the Aggregate Wind Production of Offshore Wind for the Peak LMP Day of Jan 7, 2014 ($752/MWh)

Source: *AWS Truepower, LLC and ISO-NE*

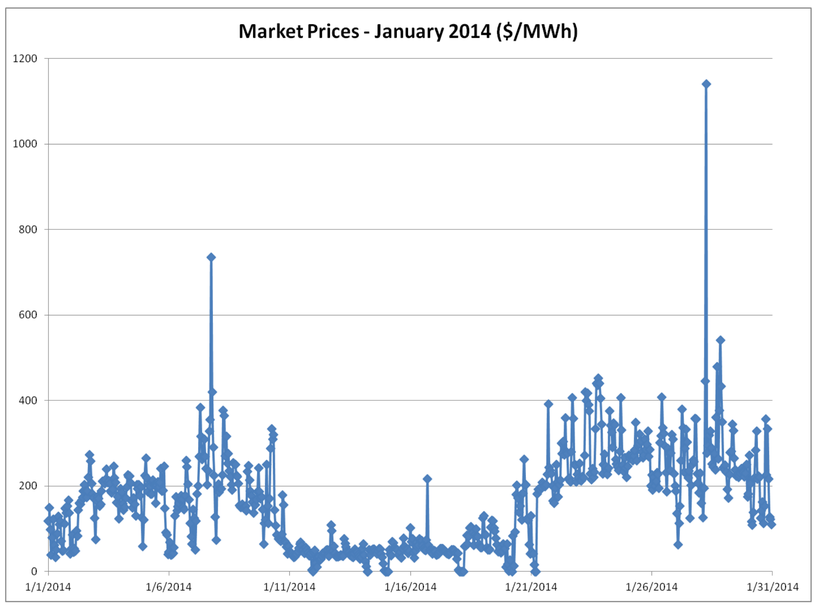


Figure 5: LMPs for January 2014

Source: *ISO-NE [2]*

Figure 6: Offshore Wind Facilities Considered in Aggregate and Natural Gas Test Node

Source: *AWS Truepower, LLC and Ventyx Energy Velocity Suite (Aug 2014)*

Highest Price Unit (starting at highest committed)	Jan 7, 2014 Hr 19		Jan 28, 2014 Hr 6	
	Offer Price	Offer MW	Offer Price	Offer MW
1	712.83	27	1140	1
2	604	12	1000	15.6
3	602	270	975.65	76
4	572	270	975.55	77.8
5	***562***	270	975.5	36
6			***646.02***	19
Available Wind (MW)		600		217
Offset MW		579		206.4
Original Energy Price		$ 712.83		$ 1,140.00
New Energy Price		$ 562.00		$ 646.02
Reduction Per Node		***$ 150.83***		***$ 493.98***
Total MW Committed		21365.2		15490.78
Price Savings ($)		$ 3,222,513.12		$ 7,652,135.50

- To determine the benefit of offshore wind to the reduction of the LMP during peak hours, the aggregate production level was considered available to offset the most expensive units in that hour. Hour 19 of January 7, 2014 and hour 6 of January 28, 2014 were assessed, as those hours peaked around or above $750/MWh.
- The nodal price reduction was determined by finding the next highest generation source that could not be offset by wind energy and assessing the difference in the new nodal energy price and the original nodal energy price.
- The price savings in energy cost for that hour was determined as the reduction in nodal price times the hourly demand for ISO-NE. This method assumes that the nodal price for all of ISO-NE was set by this price, not just the local zone. This assumption was made as the reduction is expected to affect multiple zones.

Conclusions

- During extreme cold weather, the need for energy is high; however, limitations are seen in natural gas production and availability, which constitutes the largest energy source.
- Overall, offshore wind has good coincidence with peaking LMP prices. Even when there is slightly lower coincidence, offshore wind can offset the need for high price reserves and peaking units, minimizing the spikes in price.
- For the 2 hours reviewed, offshore wind offsets would have shown a total savings of around $10 Million.

References

[1] US Energy Information Administration. “Today in Energy” 12 April 2013. http://www.eia.gov/todayinenergy/detail.cfm?id=10791
[2] ISO-New England. “Final Real Time LMP.” http://www.iso-ne.com/isoexpress/web/reports/pricing/-/tree/lmps-rt-hourly-final
[3] ISO-New England. “Real Time Energy Offer Data.” http://www.iso-ne.com/isoexpress/web/reports/pricing/-/tree/real-time-energy-offer-data
[4] ISO-New England. “2011 Annual Markets Report.” 15 May 2012.

Whitney J Wilson, Program Manager, Electrical Services - AWS Truepower, LLC wwilson@awstruepower.com
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Good Afternoon:

Attached are comments of Tennessee Gas Pipeline Co. L.L.C. dated October 20, 2014 in the subject effort. Please confirm receipt of this email.
Thank you for the opportunity to participate.

Sincerely,
Dodson Skipworth
Tennessee Gas Pipeline Co.
713-420-2727 (office)

October 20, 2014

Ms. Meg Lusardi
Acting Commissioner
Massachusetts Department of Energy Resources
100 Cambridge Street, Suite 1020
Boston, MA 02114

Submitted via email: lowdemandstudy@state.ma.us

RE: Comments of Tennessee Gas Pipeline Company L.L.C.
Regarding DOER's Low Demand Analysis Project

Dear Acting Commissioner Lusardi:

Tennessee Gas Pipeline Company, L.L.C. ("Tennessee") appreciates the opportunity to offer support and submit comments for review by the Massachusetts Department of Energy Resources ("DOER") and Synapse Energy Economics, Inc. ("Synapse") as part of the low demand modeling analysis effort launched October 15, 2014 and continuing through December 23, 2014. Tennessee intends to participate in this process over the coming weeks as a key stakeholder and supplier of natural gas to Massachusetts consumers for over 60 years.

Kinder Morgan and its affiliates are the largest natural gas pipeline and storage operators in North America which includes Tennessee. As you are aware, Tennessee supplies critically needed natural gas used in homes and businesses throughout Massachusetts and New England safely and reliably every day, and has been doing so for many decades. We continue to be committed to providing such required services to Massachusetts citizens through Tennessee's existing natural gas pipeline facilities totaling approximately 14,000 miles from Texas through New Hampshire, including approximately 850 miles in New England and 600 miles in Massachusetts. We are proud of our presence in Massachusetts and the human needs we help to serve on a daily basis in partnership with others.

There is no doubt that the New England region and Massachusetts in particular, needs significantly more natural gas supplies. There are countless statistics, studies, facts, pleadings, and real time boots-on-the-ground examples that show this critical need, all of which Synapse can, (and presumably will), seek out as part of a fully formed analysis. There are many examples of elected officials and regulatory bodies throughout the region taking note of this fact and seeking ways to increase the supplies of natural gas to the benefit of New England citizens. As recently as last week, for example, FERC Commissioners, commenting on the Winter of 2014-15, publicly repeated their serious concerns about the lack of sufficient natural gas pipeline infrastructure serving New England and the harmful economic toll being

paid now. New England and Massachusetts families and businesses are bearing the brunt of such economic hardship every day. These difficult circumstances are documented and widely publicized. Solving this challenge for the future is a must and fortunately, is achievable. On this point all stakeholders in the process at hand should agree. Companies like Tennessee are actively developing pipeline expansion projects to bring more gas to New England to meet the increased demand and help lower energy costs.

Tennessee has the capacity to deliver through its existing pipeline network approximately 1.4 Billion Cubic Feet (Bcf) per day of natural gas to New England markets from traditional supplies to the south; a large part of those volumes bound for Massachusetts. Tennessee does so safely and reliably as requested by its customers every day. However, Tennessee's current capacity is unable to fully meet the requested current and expected future demand for gas in Massachusetts and New England. Tennessee's existing pipeline system in New England is generally sold out and largely fully utilized. In fact, in recent winter periods, it is not uncommon for Tennessee to have to deny requests to transport volumes of natural gas approaching 1 Bcf/d to New England markets. Even during historically slower shoulder and summer periods, Tennessee often must turn away significant volumes of requested natural gas otherwise destined for New England. Clearly, there is not sufficient pipeline capacity to transport these needed volumes. Whether the requests are from electric generation resources, natural gas suppliers, parties engaged in a gas supply marketing role, or others seeking to get needed natural gas supplies to New England, without additional pipeline transportation capacity there is insufficient firm capacity to put additional firm contracts in place. The immediate and harmful economic consequences to such fundamental lack of required supply is increased energy costs totaling several billion dollars last winter alone. These additional costs are borne ultimately by the citizens of New England, including of course those of Massachusetts. There are no signs today that such harmful costs to Massachusetts will not continue, especially as the demand for natural gas in the region is expected to grow.

Tennessee is committed to doing what it can to help solve this critical need. In fact, Kinder Morgan and Tennessee have been busy over recent years; having invested over $1.5 billion of capital to develop more than a dozen pipeline infrastructure projects to provide requested and contracted outlets for the historically prolific and low cost natural gas supplies in the Northeast. Within New England, this includes the Connecticut Expansion Project, fully contracted to serve critically needed markets in Connecticut and pending before FERC to be in service by November, 2016.

More significantly here, Tennessee is developing the Northeast Energy Direct Project ("NED"). NED is a project carefully designed to transform the availability of natural gas for New England users including, in large part, those of Massachusetts. NED is planned to help lower costs Massachusetts consumers pay in the future by serving traditional LDC load and electric generation needs. NED, uniquely, seeks to provide incrementally beneficial natural gas liquidity, nonstop access to historically abundant low cost supplies, operationally beneficial flexibility, regional economic growth, and importantly, wide spread reliability to New England's electric generation and distribution systems. NED is designed to provide Massachusetts consumers, and those that serve them, access to incremental natural gas supplies along a new corridor to be permitted and constructed, while also taking advantage of Tennessee's existing substantial facilities delivering throughout Massachusetts directly. This project is flexibly scalable from approximately 800,000 Dth/d to 2.2 Bcf/d based on the capacity contracted for by the market. NED is being contracted by various parties now, and the outreach and FERC approval processes have begun. The resulting wide-ranging benefits to Massachusetts are planned to begin during the winter of 2018. As is the case for all infrastructure projects of this type, NED seeks to minimize effects on landowners

and substantial population centers as prudent and possible while at the same time providing incremental energy benefits to those who need them. The Northeast Energy Direct Project - needed, transformative, and achievable - is at its core a partnership effort with various stakeholders and regulatory bodies, as all such infrastructure projects are. Tennessee is pleased to be able to devote resources and experience to developing this transformative project for the region to the ultimate benefit of Massachusetts citizens.

Tennessee encourages DOER to recognize the benefit of natural gas transportation capacity of the scale and timing of the Northeast Energy Direct Project and how such additional pipeline capacity will result in reduced energy prices. Tennessee urges Synapse to conduct a thorough, realistic, feasible, and objective analysis at this critical time. All stakeholders agree that inputs must be sound, factual, and defensible. Tennessee looks forward to DOER's analysis and the opportunity to further comment over the coming weeks and months.

Sincerely,

Sital Mody
Vice President, Marketing & Business Development

The Northeast Gas Association (NGA) is pleased to submit the attached comments on the low demand study being conducted by Synapse Energy Economics for the Massachusetts Department of Energy Resources.

Sincerely,

NGA

Northeast GAS ASSOCIATION

October 20, 2014

Ms. Meg Lusardi
Acting Commissioner
Massachusetts Department of Energy Resources
100 Cambridge Street, Suite 1020
Boston, MA 02114

Re: DOER's Low-Demand Gas Study

Dear Acting Commissioner Lusardi:

The Northeast Gas Association (NGA) appreciates the opportunity to provide comments on the Massachusetts Department of Energy Resource's (DOER's) low demand analysis.

The initial stakeholder meeting on October 15 provided some helpful context on the intent of the study. Initial comments were requested to be submitted by October 20, although the details on assumptions and variables have yet to be revealed. As such, at this time NGA is providing brief comments for your consideration and looks forward to reviewing forthcoming data and modeling characteristics.

Certainly, the issue of natural gas supply and demand in New England and its inter-relations with the regional power market has been well-studied over the past decade. Synapse Energy Economics noted at the first stakeholder meeting on October 15, 2014 that it would review and incorporate to the extent possible the numerous studies on this topic as it undertakes its own analysis for DOER. These studies include, to name a few, the recent Black & Veatch studies for NESCOE, the ICF studies for ISO-NE, the Levitan studies for ISO-NE, the Sussex Economic Advisors study for Spectra Energy, and the proceedings of the New England Gas-Electric Focus Group. They treat various aspects of system modeling, infrastructure capability, price impacts, and scenario analysis. At the outset, we encourage DOER and Synapse to utilize these available studies as directly pertinent resources – of particular value given the short timeframe of this new analysis.

Gas expansion opportunities should be modeled by Synapse to reflect the economically feasible potential for utility system growth. In 2013, DOER commissioned a study by Sussex Economic Advisors to develop an analytical framework, findings, and recommendations for the Commonwealth "to review gas distribution expansion in light of changing market conditions and environmental imperatives." We think it would be helpful to Synapse for DOER to make the Sussex study available as a relevant piece of analysis. The Sussex presentation to the DOER-assembled stakeholder group a year ago, at a public meeting on October 25, 2013, noted that there are approximately 1.2 million homes in the Commonwealth not heating with natural gas, and that the feasible potential market for conversions was half that, or 0.6 million households.

In addition, the Commonwealth enacted legislation (H. 4164) in June 2014 that includes a provision on gas expansion, which has the potential to expand considerably the gas utilities' demand growth over the next several years, within the timeframe of this analysis. This

legislation was approved unanimously by both houses of the Legislature and signed by Governor Patrick.

On a related note, we look forward to discussing with DOER and Synapse in this process the level of real-time customer demand that the Commonwealth's natural gas utilities are experiencing, especially in regards to the recent winter. We hope that this pending study will reflect the natural gas demand that the LDCs are currently experiencing -- and that is before considering the impact of implementing the recent legislation regarding gas expansion that is designed to reduce economic barriers toward connecting new customers throughout the Commonwealth that are requesting natural gas service. It is our hope that the study will be able to utilize the most recent available utility data on design day, for example.

The model structure is designed to focus on the sufficiency of gas pipeline capacity under winter peak day conditions, and will consider a series of three winter peak days. As was noted at the stakeholder meeting, the Commonwealth's natural gas utilities model for design day and design season. We would encourage Synapse to consider a sensitivity scenario that addresses the potential of an extended cold period and not just an individual peak day or a few peak days, to capture the true impacts of protracted high demand on capacity, power generation, spot market prices, and consumer impacts.

Thank you for the consideration of our initial comments.

Sincerely,

Thomas M. Kiley
President and CEO

cc: Fahrad Aminpour

Please find attached joint comments from a number of environmental and business stakeholders in response to materials and topics presented at the October 15th stakeholder meeting.

Peter Shattuck
Director, Market Initiatives
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Massachusetts Low Demand Analysis

October 20th, 2014 Stakeholder Comments

Developed and endorsed by: ENE (Environment Northeast), Berkshire Environmental Action Team, Clean Water Action, Environmental Entrepreneurs (E2), Environmental League of Massachusetts, Groton Stop the Pipeline Coordinating Committee, Massachusetts PipeLine Awareness Network, Mount Grace, Nashoba Conservation Trust, No Fracked Gas in Mass, SPCC Groton, and StopNED.

Our organizations welcome the opportunity to submit initial comments on the design of the Massachusetts Department of Energy Resources (DOER) Low Demand Analysis. We look forward to continuing engagement as Massachusetts evaluates benefits and costs associated with energy resources and policies capable of meeting our energy needs while reducing greenhouse gas emissions and minimizing consumer risk.

Before addressing specific design elements of the Low Demand Study, we want to thank Massachusetts policymakers for recognizing the need to evaluate demand side and distributed resources that can reduce our current over-reliance on natural gas in the region. Many of our organizations requested such analysis in a June sign-on letter to New England Governors,[1] and we appreciate the Patrick Administration's leadership in pursuing additional analysis to address identified deficiencies in earlier analyses of energy resource options.[2]

Analysis Framework

We support the overarching framework of evaluating resources that can reduce energy price volatility driven by over-reliance on natural gas for heating and electricity. We further offer specific feedback on evaluation of extreme weather, the design of the supply curve, and sensitivities.

When evaluating the sufficiency of gas pipeline capacity under extreme winter peak conditions, it is important to consider the likelihood of such extreme conditions occurring in order to avoid over-building expensive and long-lived infrastructure. If analysis considers a three day cold-snap during a cold winter, that resulting pipeline capacity 'need' should be accompanied by statistical analysis of such an event occurring. A cost-optimized system in all likelihood should have elevated prices during a once in 20 years event, as the cost of infrastructure that will only be used once in twenty years would likely be higher than the price escalation.

The supply curve developed as part of the analysis should 1) evaluate resources for their peak winter capacity paired with annual benefits, 2) determine the economically-efficient threshold based on the highest projected cost of the alternative – in this case pipeline capacity, and 3) evaluate resource feasibility under a range of natural gas prices.

Economic valuation of resources should be annual because energy resources will be in place for the whole year. Only by considering the full annual benefits and costs of energy resources can the study evaluate resources that will be of greatest value to the Commonwealth on the few coldest days of the

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[1] Over 100 environmental, consumer, public health, and conservation groups, businesses, and academics signed on to the June 24th letter "Right-Sizing Infrastructure for an Energy System in Transition", available at: http://www.env-ne.org/resources/detail/right-sizing-infrastructure-for-an-energy-system-in-transition

[2] *New England Gas-Electric Focus Group Final Report* states on p, 14:
"Successfully implementing natural gas and electricity energy efficiency programs, renewable thermal heating applications, and distributed electric generation that cause the demand for natural gas and the net electric load to decline in the long-term could eliminate any need for additional infrastructure. The associated cost of achieving a Low Demand Scenario is not known. Further analysis would be required to determine whether policies that would result in a Low Demand Scenario are cost-competitive with infrastructure investments."
Available at: http://www.nescoe.com/uploads/NEGas-ElectricFocusGroup_FinalReport_31Mar2014.pdf

year *and* all of the other days that we rely on energy. Economic valuation should further reflect the requirements of the Global Warming Solutions Act (GWSA) by crediting GHG emissions-free resources with the avoided cost of compliance proposed for similar analysis in the context of energy efficiency programs in DPU 14-86.[3] Including the avoided cost of compliance based other resources that would be required to achieve GWSA's targets is the most appropriate mechanism to reflect the GWSA's legal requirements and accurately account for public policy objectives within this analysis.

In order to reflect and avoid consumer risk, the economically-efficient threshold used to determine resources for inclusion in the Low Energy Demand Case must be based on the highest projected cost of procuring and utilizing additional pipeline capacity. If the objective of the study is to evaluate resources that reduce demand in comparison to adding supply, additional supply should serve as the basis for comparison. Since hydroelectric supply is considered independently, the appropriate comparison would be to additional pipeline capacity. The cost and economic benefit of such capacity should be evaluated under a highest-possible-cost scenario to avoid stranding investments if gas prices increase. This cost would include both the cost to construct pipeline capacity, the annual cost of service, and cost and benefits to Massachusetts under high natural gas prices (see section below on assumptions for additional input on gas prices).

Similarly, in the interest of assessing natural gas price risk, the sensitivities should evaluate hydroelectric imports under high gas prices for both the base and low case. In addition to emissions reductions, one of the main attributes of hydro imports would be price certainty, and the best way to evaluate price-stability attributes of electricity imports is to compare to higher gas prices.

Feasibility Analysis

We appreciate the broad initial list of energy resources and policies that will be considered in the feasibility analysis, and we recommend adding to the list rate reforms, solar thermal, heat pump water heaters, and transmission for wind firmed by hydro. Rate reforms including time-varying rates, peak time rebates, and demand charges have the capacity to shift electric load away from peak demand periods, and smart appliances increase the opportunity to seamlessly take advantage of different rate structures. While summer peaks have historically been the focus of load-shifting, it is worth exploring whether winter peaks can be smoothed as well, drawing on literature in the Massachusetts Grid Modernization proceeding and analyses in other jurisdictions. Solar thermal has been identified by Massachusetts as one of the technologies that will contribute to achievement of GWSA targets, and the potential for solar thermal has been evaluated in Commonwealth Accelerated Renewable Thermal Strategy report[4] and prior analyses. Heat pump water heater technology has improved significantly in recent years, and should be evaluated for capacity to reduce natural gas and electricity demand. Wind firmed by hydroelectricity may not require additional feasibility analysis, but the combined benefits and costs of transmission lines carrying 30% wind and 70% hydro (to reflect wind's capacity factor) should be evaluated in addition to pure hydroelectric imports, as a number of transmission lines proposed for electricity import into the region may carry wind.[5]

Assumptions

In relation to assumptions, we make two main suggestions related to gas prices and energy efficiency potential. First, the high gas price scenario should be utilized to evaluate consumer risk under a plausible

[3] These values are determined to be $52/metric ton in 2020, and $59/ton in 2030, see http://web1.env.state.ma.us/DPU/FileRoom/dockets/bynumber

[4] Available at: http://www.mass.gov/eea/docs/doer/renewables/thermal/carts-report.pdf

[5] Additional information on transmission proposals available at: https://www.snl.com/InteractiveX/Article.aspx?cdid=A-28202667-13099

scenario where increased natural gas exports drive a rapid and significant increase in gas prices. Without evaluating such a scenario, the study will fail to address the core challenge related to making long-lived investments in energy infrastructure, namely how to support investments that create the greatest benefits and lowest costs in across a range of future circumstances. EIA's gas price forecasts in the 2014 Annual Energy Outlook appear to inadequately reflect the risk of increased natural gas exports driving a near-term price increase. EIA's base case assumes that the US becomes a net exporter in 2018, and net exports increase to approximately 5bcf by 2030.[6] However, the high gas price scenarios layered over this base case focus on high economic growth and low recoverability of oil and gas resources, and do not specifically evaluate the price impact of accelerated exports. Due to increasing political support for exports to support geopolitical objectives and the accelerated pace of approval for liquefied natural gas (LNG) export terminals, market-watchers have recently begun to assume a more rapid rate of increase in exports.[7] A more appropriate assumption for the high gas price scenario can be derived from EIA's deep dive on the impact of increasing exports in *Effect of Increased Natural Gas Exports on Domestic Energy Markets*.[8] Of the four scenarios explored in this analysis, the rapid increase in exports to a high level is most appropriate. The US exported 1.6bcf in 2013,[9] which is in line with their projection for the rapid expansion, and the high level of export should be utilized as the most appropriate means of addressing risk.

Assumptions related to energy efficiency should reflect the proceeding in MA DPU 14-86 to evaluate the avoided cost of compliance with the GWSA. Only by accounting for the legal requirements of the GWSA can the analysis accurately reflect the economic potential for energy efficiency in comparison to other resources.

Clarifications

The analysis and final report should also make a number of clarifications related to the analytical scope and limitations. First, the analysis is limited to resources that Massachusetts can procure, but additional resources in the region can provide additional wintertime price relief and help the region meet its energy needs in the future. The analysis, for example, will not evaluate energy efficiency potential outside of Massachusetts, yet other New England states are far from achieving energy savings comparable to Massachusetts' programs, let alone capturing all cost-effective potential. Second, GHG impacts evaluated in the study do not reflect lifecycle emissions. This limitation is particularly important to acknowledge in light of the high global warming potential of fugitive methane from the production, processing, and transportation of natural gas, and in light of the high uncertainty related to leakage rates across the natural gas lifecycle. Third, as explained verbally at the October 15th stakeholder meeting, the report should state clearly that the quantity of electric transmission imports is not intended to reflect any particular transmission proposal. Fourth, the analysis should make clear that energy efficiency measures may be economically preferable as a means of addressing wintertime price volatility even if they are not strictly cost-effective – but so long as they are more cost-effective than alternatives. This holds for all resources evaluated in the study, but in light of the standard cost-benefit analysis applied to energy efficiency, it will be particularly important to explain that efficiency measures with a benefit-cost ratio of less than one may be preferable to alternative investments that have fewer benefits in relation to costs.

[6] See: http://www.eia.gov/forecasts/aeo/mt_naturalgas.cfm
[7] See: http://www.eenews.net/energywire/stories/1060006051/search?keyword=LNG+wall+street
[8] Available at: http://www.eia.gov/analysis/requests/fe/
[9] See: http://www.eia.gov/naturalgas/importsexports/annual/

Thank you for your time and attention to these comments, and we look forward to continuing engagement in this analysis and subsequent policy development as we work address promote energy resources that provide the greatest consumer and environmental benefits.

Please see the attached for written comments from the Metropolitan Area Planning Council, and let me know if you have any questions or require further clarification.

Best regards,
Cammy

Cammy Peterson
Manager | Clean Energy
Metropolitan Area Planning Council
60 Temple Place | 6th Floor | Boston, MA 02111
617-933-0791 | cpeterson@mapc.org
www.mapc.org/clean-energy

Comments on Proposed Low Demand Analysis
Submitted by: Metropolitan Area Planning Council (MAPC)
October 20, 2014

The Metropolitan Area Planning Council (MAPC) would like to submit the following stakeholder comments regarding the Department of Energy Resources (DOER)'s proposed Low Demand Analysis, to be conducted by Synapse Energy Economics Inc.

1. **Gaps in ISO-NE's 2014 CELT Report.** While the CELT report incorporates factors such as real gross regional product as a surrogate for overall economic activity; projected energy efficiency and distributed generation due to renewable energy deployment; anticipated inflation of energy prices aggregated across sectors; and economic recovery and growth, it does not account for a number of other significant development growth areas that will substantially impact energy demand in the State. Perhaps most notably, the CELT does not account for any projected increase in the number of housing units in the State. According to MAPC projections, housing demand in Eastern Massachusetts will likely increase by at least 17%, and potentially up to 24%, between 2010 and 2040, requiring construction of up to 435,000 new units. (It is important to note that housing demand will grow faster than population. As average household size declines due to a greater number of empty-nesters and fewer children per family, a greater number of units are needed even if the population remains constant.) This growth most certainly will have an effect on energy demand in both base and low-case scenarios and should be incorporated.
    - We suggest that Synapse models incorporate housing unit growth of 13% to 17% for Eastern Massachusetts between 2010 and 2030. We recommend that that all 8 scenarios are modeled with this assumption when considering what energy demand in the residential sector (and thus for all sectors when aggregated) will look like through 2030.
    - Greater detail into projections of population change, household growth, and housing demand can be found at http://www.mapc.org/projections, and MAPC Data Services would be eager to discuss these findings, their implications, and approaches for including the data with the Synapse team in more depth. MAPC has also prepared preliminary housing demand projections for the 187 municipalities outside of our modeling area (where growth rates are considerably lower) and would be happy to share these preliminary results for modeling purposes.
    - As the CELT only forecasts these data points for a 10-year period into the future whereas the Low Demand Analysis will forecast through at least 2030, Synapse and DOER should provide a roadmap for how the subsequent 5+ years will be modeled for this analysis.

2. **Account for Avoided GWSA Compliance Costs.** The Joint Petition of DOER and the Department of Environmental Protection (DEP) Requesting Adoption of the Avoided Costs of Complying with the Global Warming Solutions Act (GWSA) in Energy Efficiency Programs Using the Marginal Abatement Cost Curve Methodology calls on the Department of Public Utilities (DPU) to adopt an avoided GWSA compliance cost of $54 per metric ton CO_2e. DOER and DOE refer to the testimony of both Dr. Elizabeth Stanton and Tim Woolf of Synapse Energy Economics to support this finding. To reflect consistency and to ensure that the economic analysis of alternative resources is based on a future that

engenders GWSA and Clean Energy and Climate Plan for 2020 (CECP) compliance, DOER should require that Synapse utilize this same avoided GWSA compliance cost rather than the current RGGI price in both the base case and alternative scenarios.

3. **Peak Winter Day.** An extreme cold weather event should account for the probability of occurrence.

4. **Years Modeled**. We support DOER's inclination to model beyond 2030, replicating the 2050 timeframe institutionalized in the Global Warming Solutions Act, and advise that Synapse follow this path. MAPC may be able to provide support on some of the data points beyond 2030.

5. **Feasibility Analysis.** Solar thermal and heat pumps should be studied as alternative resources.
   - Solar thermal: In addition to solar hot water, solar thermal technology for space heating and cooling as well as concentrated solar thermal resources should be included on the list for feasibility analysis. The potential for solar thermal has been evaluated in DOER's Commonwealth Accelerated Renewable Thermal Strategy (CARTS) report and prior analyses.
   - Heat pumps: Heat pump water heater technology has improved significantly – serving many more residents in recent years than previously due to State incentive programs for air-source heat pumps and ground-source heat pumps. Both should be evaluated for their role in reducing natural gas and electricity demand.

Please contact Cammy Peterson, Manager of Clean Energy, at cpeterson@mapc.org or 617-933-0791 with any questions on these comments.

Please find the attached comments of the Industrial Energy Consumer Group.

Thank you,

R. Benjamin Borowski
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Concord, NH
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Salem, MA

October 20, 2014

To: lowdemandstudy@state.ma.us
Submitted by e-mail

RE: IECG Comments to Synapse "Massachusetts Low Demand Analysis"

The Industrial Energy Consumer Group ("IECG") appreciates the opportunity to comment on Synapse Energy Economics, Inc.'s "Massachusetts Low Demand Analysis" in reaction to the First Stakeholder Meeting on October 15, 2014. While IECG understands the process is not a consensus-building exercise, the IECG believes its comments below already represent a consensus view and must be considered in any analysis designed to inform decision-making around the reliability, cost, and environmental challenges facing New England as a result of inadequate pipeline capacity.

Model Structure: The proposed model focuses on winter peak day. The IECG believes this is a fundamentally insufficient definition of the problem; pipelines are constrained for over 1,000 hours a year and each hour has a different consequence for energy markets. Any model that looks only at one or a fraction of the hours of the year is inadequate. In addition, the model should not focus on "expected winter conditions." A more robust approach would use a defined 12-month period (or periods) to ensure that a full range of weather conditions are evaluated in a consistent manner.

Key Sensitivities: The proposed sensitivities are gas prices and Canadian hydro. The IECG believes these sensitivities are fundamentally insufficient and, with regard to Canadian hydro, may be more distracting than beneficial given its improbability. The most critical sensitivity must focus on the price of alternative fuels at the margin, generally oil or LNG. Additionally, any analysis of natural gas demand and supply conditions in New England must incorporate demand and supply conditions in the Canadian Provinces of New Brunswick and Nova Scotia, as well as projected LDC growth in New England. In particular, it is critical to include gas flows both north-to-south down Maritimes and south-to-north on Maritimes from Portland into New Brunswick. Another important sensitivity should focus on the availability of coal-fired, nuclear, and other "at-risk" generation in New England.

Energy Modeling: It is unclear how the model will treat pumped hydro. Energy modeling should incorporate energy demand created by pumped storage hydro units operating during their pumping cycle as well as the energy generated during their discharge cycles. Pumped storage, when it is at the margin in the dispatch stack, does not behave as a renewable resource. Rather, it must be treated according to its marginal cost, which is generally determined by the price of the marginal fuel (usually natural gas) during recharge.

LNG Facilities: It is unclear how the proposed model will treat existing LNG facilities. However, the IECG believes it is critical to consider, for example, how the Canaport LNG terminal will operate in a market where its utility is reduced to a very few hours of operation each year. As through-put falls, the cost pressures on the plant from its fixed and variable costs will increase, forcing the facility to increase the price of injected gas. If the through-put falls low enough, the plant may simply be forced to shut down. While it may be possible to increase pipeline capacity into New England in small incremental "bites," it may not be possible to displace LNG capacity in comparable small bites.

The IECG looks forward to the issuance of Synapse's final report on December 23, 2014 and will continue to provide comments in the hope of assisting Synapse to create the most comprehensive and robust analysis possible.

Sincerely,

/s Anthony Buxton
Robert Borowski
on behalf of the
Industrial Energy Consumer Group

Please find attached a few observations from NESCOE in relation to the October 16th meeting.
Thanks for considering -

Heather Hunt
Executive Director
New England States Committee on Electricity
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Mobile: 203-610-7153
HeatherHunt@nescoe.com
www.nescoe.com

New England States
Committee on Electricity

To: **Massachusetts DOER & Synapse Energy Economics, Inc.**
From: **NESCOE**
Date: **October 20, 2014**
Subject: **Comments on October 16, 2014 study presentation**

NESCOE appreciates the opportunity to provide some preliminary observations in connection with the study discussed at the October 16, 2014 stakeholder session. In this context, NESCOE's views do not reflect the views of officials from the Commonwealth of Massachusetts.

Caution Against Study Approach Understating the Size of the Regional Problem: If the study assumes that gas pipeline maximum daily quantity (MDQ) design capacities are the appropriate metric for defining available pipeline capacity on the winter peak day, it may understate the size of New England's problem. It is instructive that several prior gas-electric studies have examined the relationship between contracted capacities and gas price basis differentials. Empirical analysis has shown a statistically significant relationship when contracted capacity exceeds 75-80% of MDQ. While the MDQ approach is technically feasible, it is unclear whether it is economically feasible. To be consistent with the alternative resource supply curve approach, simultaneous technical and economic feasibility should be applied to the definition of available pipeline capacity. Accordingly, some value less than MDQ should be considered, at least as a spreadsheet modeling sensitivity, in the analysis. Incorporating economically feasible pipeline capacity limits will more accurately reflect the size of the pipeline constraint problem.

Size of Hydro Imports: It appears that two of the eight electric sector modeling runs will be dedicated to imported hydro. The proposed quantity for those modeling sensitivities is 2400 MW. If one assumes current technology, it may actually take three transmission lines to accomplish that level of imports, instead of two. Using voltage source converter (VSC) technology, high-voltage direct current (HVDC) transmission lines are limited to 1000 MW, rather than the single-source planning contingency limit of 1200 MW. If the alternative resource supply cost curve includes imported hydro, the relative position on the supply curve will be affected by the assumption of two versus three transmission lines. Consequently, if the study assumes two rather than three transmission lines to achieve 2400 MW of imports, the cost of imported hydro would be understated by the cost of an entire transmission line. To reflect current technology and resulting price implications, the study could examine the costs of adding 2000 MW and assume the cost of two new transmission lines, or examine the cost of adding 2400 MW and assume the cost of three new transmission lines.

Size of the Problem Not Fully Examined: At this time, the study does not appear to be designed to examine the extent and duration of the pipeline network constraints. Rather, the study assumes that the hypothetical peak winter day will provide information relevant to whether or not new infrastructure is required. In 2012, NESCOE expressed to ISO-NE significant concern about ISO-NE's Phase I Gas Study for relying on a similar deterministic approach, and cautioned

ISO-NE not to draw any conclusions from analysis that looks at one design day. In response, ISO-NE commissioned a Phase II Gas Study in 2013 that included duration analyses. The extent and duration of the constraint remains a critically important factor.

Generator Retirement Assumptions Affect the Extent and Timing of the Regional Challenge: NESCOE understands that the study timeframe is necessarily compressed and the number of modeling runs is limited. Important factors may therefore not be able to be included in the analysis. For example, all eight electric sector modeling runs will assume the same generator retirements and additions. Thus, the impact of unexpected generator retirements and gas-fired additions on the electric sector demand for gas will not be explicitly examined. NESCOE's Gas-Electric Study completed in September 2013 assumed certain generators in the region would continue in operation and several non-natural gas-fired generators - to everyone's surprise - announced retirement shortly thereafter. This of course meant as soon as the study was completed, it understated the extent of New England's natural gas constraint problem. NESCOE shares that experience in light of the current study's ability to look at only one set of potential generator retirement assumptions.

NESCOE appreciates the opportunity to share its views and looks forward to reviewing other forthcoming assumptions including the electric and gas load forecasts, generator retirements and additions, pipeline additions and flows, imported and peak shaving LNG send-out rates, alternative resource technical and economic potential, alternative resource capital and carrying cost assumptions, and fuel prices.

Please find attached the comments of the Massachusetts Sierra Club following up on the Stakeholders Meeting of October 15, 2014 for the Low Demand Analysis Study by Synapse.

Thank you.

Edward Woll, Jr., Vice Chair, Chair Energy Committee
Massachusetts Sierra Club
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Massachusetts Sierra Club Comments
Massachusetts Low Demand Analysis

October 20th, 2014

The Massachusetts Sierra Club is grateful for the opportunity to participate with many other stakeholders in the meeting on October 15, 2014 and to submit additional comments. We look forward to continue working constructively with you and all stakeholders in this effort.

The goals of the Massachusetts Sierra club are the same as those of the Commonwealth, i.e., to have a clean energy economy in the relatively near future by avoiding policies that perpetuate and increase the excessive dependence on natural gas, which is trending to supply 60% of the Commonwealth's energy needs, [1] by developing a vibrant economy with clean energy jobs and by meeting the Global Warming Solutions Act's goal of reducing green house gasses (GHG).

The Massachusetts Sierra Club has read and supports the comments submitted by the signatory stakeholders to ENE's (Environment Northeast) letter and submits the following requests.

Point 1: The goal of the Commonwealth is to have a clean energy economy. Therefore, we request that the study be written so that its results can be used to enable decisions to be made that advance that goal.

Point 2: We request that you take into account that increasing natural gas imports and pipeline infrastructure will reduce the incentive and slow the pace of investment in clean and renewable energy sources and energy efficiency and will impair the Commonwealth's goal of achieving a clean energy economy.

Point 3: We request that the report identify risk factors that may affect its conclusions so that decision makers and stakeholders may identify and develop policies that advance the goal of a clean energy economy. The following are some examples of specific risk factors:

- The effect of a revenue neutral carbon tax being adopted in Massachusetts. We would hope that you would also quantify that effect to the extent you are able in the time frame available.

[1] The price of natural gas in Massachusetts has ranged from about $2.00 to as much as $6.00 per mBTU in the past 4 to 5 years. It is about $4.50 to $5.50 per mBTU since after this past winter. Therefore every $1.00 increase in the natural gas price increases the cost of energy for 60% of the Massachusetts economy by about 20%.

See "Modeling the Economic, Demographic, and Climate Impact of a Carbon Tax in Massachusetts" by REMI available at http://www.remi.com/carbon-tax-study

- The effect on the United States market price of natural gas of exporting United States produced natural gas as Liquid Natural Gas (LNG).

  There is a consensus that export of domestic gas as LNG will put upward pressure on domestic prices because of higher global market prices and reduced domestic supply.

  The global market price for LNG in recent years has ranged from about $10 per mBTU (or mmBTU depending on the convention one uses) in Europe and as high as $20 per mBTU in Asia compared to US market price ranges set out in footnote 1. See discussion of links between global natural gas and global oil market prices and price volatility and unpredictability at http://www.eia.gov/analysis/requests/fe/.

  An export terminal at Cove Point, MD may open as early as 2016, and there are applications pending for over 36 LNG export terminals in the United States. Massachusetts has at least three off shore conduits that could be used to export natural gas as LNG, and at least two LNG export terminals are being developed in the Canadian Maritimes, accessible by a pipeline (capacity: 833mmcf/day) owned by Maritimes Northeast that currently flows to Dracut and Beverly, MA but could be reversed to export gas. There is limited ability to restrict gas export to Canada to those terminals.

  Dow Chemical uses natural gas domestically as industrial feedstock oppose exporting for price reasons and have most likely done thorough studies on the impact of exporting LNG on domestic natural gas prices and availability. See "Dow exec warns of policy-driven price spikes for homeowners" at http://www.eenews.net/energywire/2014/05/23/stories/1060000089

- The impact of the Environmental Protection Agency's new emission standards for fossil fueled electricity generation and the impact on both natural gas price and availability of reasonably foreseeable regulations for methane emissions now being considered by the Environmental Protection Agency.

- The possible regulation of methane under Massachusetts's Global Warming Solutions Act. Methane is a green house gas (GHG) that is measured in a relevant time frame as being 80 to 100 times more powerful a greenhouse gas than carbon dioxide, pound for pound.

Point 4(a): Given the dysfunctional separation between the thermal gas and electric power generation gas markets, thermal being supplied under long term contracts that tie up most of the pipeline capacity and electric power generation gas market being acquired under relatively shorter term contracts and on the spot market, we request that you consider changes in market policies that would better allocate natural gas in times of exceptional need, such as a very hot summer or a cold snap in winter.

Point 4(b): LDCs contract long term for pipeline capacity. We request that you examine the LDCs short and long projections to make sure they are properly discounted or adjusted downward to reflect the impact of each of the following alternative sources of thermal energy:

- Improvements in energy efficiency to reduce heating demand.

- Improvements in thermal energy conservation by insulation, smart thermostats, modern windows and doors, and other such devices and technologies. Massachusetts has led the nation for the past three consecutive years in energy efficiency improvements.

- Competition by both ductless, air source and ground loop heat pumps, which will reduce the demand for thermal energy sources. Please take into account the following:

  passage this year of "An Act relative to credit for thermal energy generated with renewable fuels", http://www.eesi.org/articles/view/massachusetts-bill-rewards-renewables-used-for-heating-and-cooling, and the likelihood of accelerated development and installation of such heat pumps during the period before a increased pipeline capacity comes on line. [2]

  such heat pump installations will most likely initially happen in areas served by oil heating and propane tanks, thereby reducing the future market for natural gas. See Addendum A.

- The eligibility for thermal renewable energy credits under the new legislation of certain CHIP facilities and the limited scope of eligibility of certain facilities powered by biomass.

- The effect of reducing gas leaks in order to comply with the recently passed Act Relative to Natural Gas Leaks. http://www.mass.gov/governor/pressoffice/pressreleases/2014/0707-governor-signs-gas-leaks-legislation-.html

- As the future demand for natural gas is reduced by the foregoing factors, please consider the likelihood that LDCs will end up with excess gas, with the only market being the export LNG market with higher prices and without strict resale price and volume controls for that excess. It would be to the LDCs advantage to over estimate their needs as a hedge and then sell any excess to electric power companies in the short term at higher prices. One method of over procurement is discussed in DPU Docket 14-111, Affidavit of Mellissa Whitten, ¶¶27-31.

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[2] A qualifying energy source under the act includes:

"(i) combined heat and power; (ii) flywheel energy storage; (iii) energy efficient steam technology; (iv) any facility that generates useful thermal energy using sunlight, biomass, biogas, including renewable natural gas that is introduced into the natural gas distribution system, liquid biofuel or naturally occurring temperature differences in ground, air or water, whereby 1 megawatt-hour of alternative energy credit shall be earned for every 3,412,000 British thermal units of net useful thermal energy produced and verified through an on-site utility grade meter or other means satisfactory to the department; provided, however, that facilities using biomass fuel shall be low emission, use efficient energy conversion technologies and fuel that is produced by means of sustainable forestry practices; or (v) any other alternative energy technology approved by the department under an administrative proceeding conducted under chapter 30A."

"The following technologies and fuels shall not be considered alternative energy supplies: (A) coal; (B) petroleum coke; (C) oil; (D) natural gas, except when used in combined heat and power or as a biogas generating useful thermal energy; (E) construction and demolition debris, including but not limited to chemically treated wood; and (F) nuclear power."

Point 4(c): We request that you consider and factor into your report the impact of the following on the need for electricity generated from natural gas:

- Improvements in energy efficiency to reduce electricity demand, including full conversion to efficient lighting.
- Increased generation of solar electric by solar, mainly photo voltaic and the increasing reduction in cost of solar facilities.
- Development of wind power, which, in combination with solar, increases the capacity factor of the solar and wind combination of as two intermittent sources, making it more reliable.
- Accelerating improving and upgrading the grid to accommodate intermittent and distributed electric energy sources and adding grid capacity so as to utilize fully existing energy resources, such as wind in Maine that is now being spilled.

Point 5: Consider as a likelihood that last summer's and last winter's shortfalls resulted from the electric power companies not adequately accounting for the contingencies of such very hot or very cold spells and that the issue is not pipeline capacity but a lack of adequate contingency planning. This involves considering how peak demand can be reduced or accommodated three or so years from now, i.e., at a time when more pipeline capacity may otherwise come online. For example, LNG should be considered as a means of accommodating possibly 5-20 peak days per year. The LDC's, we understand, may have as many as 46 peak-shaving storage facilities in New England, with others being planned, but it is difficult to determine what percentage of the 16 Bcf of storage can be or is currently used for electricity generation. And has the DistriGas (Everett) LNG terminal storage capability of 3.4 Bcf been underutilized (having received 60 Bcf/yr in 2013 versus 140 Bcf/yr in 2011) and been used to supply primarily the Mystic power station (1,550MW)?

Point 6: Wind, solar and geothermal are principally capital expenditures of long life (20 to 30 years) with relatively little variable cost so that energy costs over their life are fixed. We request that you take into account in determining what is economically feasible what is the appropriate price point to use over the next 20 to 25 years to assess economic feasibility of these long term capital investments in wind, solar and geothermal (heat pumps). Fossil fuel prices are volatile and trending up over the long term. See, for example, http://www.eia.gov/analysis/requests/fe/

We appreciate your considering these requests.

Respectfully

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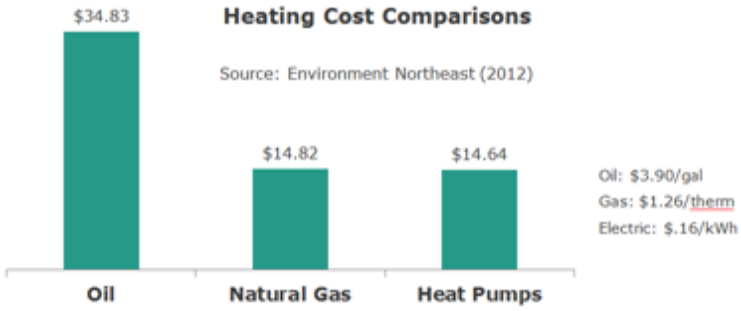
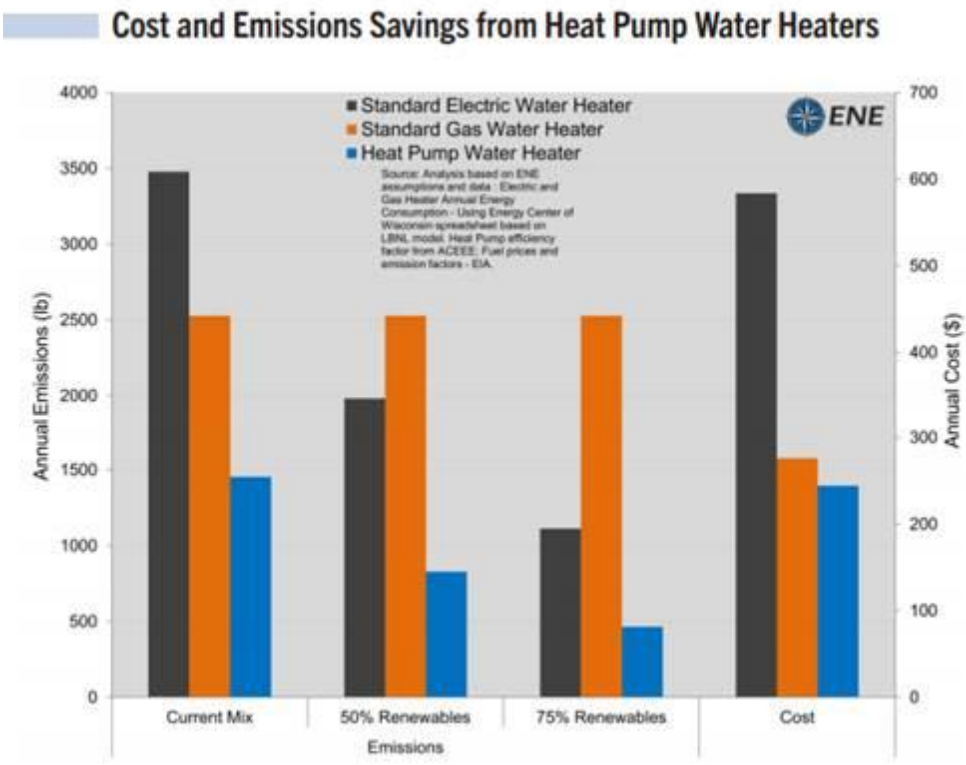
ADDENDUM A

See for example "Heat Pumps, and alternative to oil heat in the northeast" at http://www.rmi.org/Knowledge-Center/Library/2013-05_HeatPumps.
From a 2012 ENE study:



See also, among other available sources, the following from Environment Northeast regarding water heating: http://www.env-ne.org/public/resources/ENE_EnergyVision_Framework_FINAL.pdf



Please accept the attached comments of the Low Demand Analysis Study.

Jane

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Jane Winn, Executive Director
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BERKSHIRE ENVIRONMENTAL ACTION TEAM (BEAT)
BEAT, 29 Highland Ave, Pittsfield, MA 01201-2413 www.thebeatnews.org
Working with you to protect the environment for wildlife
You make our work possible - **Please donate now!**

October 20, 2014

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Via email to: lowdemandstudy@state.ma.us

Re: 10/15 Low Demand Analysis Study Kick-off Stakeholder Meeting

Thank you for the opportunity to submit comments on the Massachusetts Low Demand Analysis. We appreciate Governor Patrick's acknowledgment of the deficiencies of previous studies and his administration's willingness to initiate this study to evaluate the many options to meet our energy needs while considering the costs, benefits, and risks.

We strongly support the comments submitted by ENE.

We would like to emphasize, that in evaluating the sufficiency of gas pipeline capacity under extreme winter peak conditions, it is important to consider the likelihood of such extreme conditions occurring in a time of global warming in order to avoid over-building expensive and long-lived infrastructure.

Issues not encompassed
We are concerned that the study will not take into consideration ecosystem benefits that will be lost if a new pipeline were to be constructed – such as the loss of carbon sequestration by the forests that will be cut down to make way for any pipeline.

We are concerned that the study will not take into consideration the full life-cycle (from well-head to burner-tip) methane and CO2 emissions of natural gas. While we hope this will appear in the caveats section, we believe that the greenhouse gas emissions associated with the way gas is currently hydraulically fractured in the Marcellus Shale region are outrageously high. Massachusetts should take responsibility for potentially contributing to the increased use of this fossil fuel by acknowledging the

full life-cycle emissions when doing this study or when pipelines are going through the Massachusetts Environmental Policy Act process.

An additional consideration rising from the methane leakage at the fracking fields in the Marcellus Shale region is that the federal government has institutee stronger regulations to require the reduction of fugitive emissions.
(http://www.statejournal.com/story/17526063/epa-requires-green-completion-cuts-pollution-from-fracked-wells)
This type of federal action is likely to result in higher natural gas prices.

Questions
Does the study consider fully utilizing the existing natural gas infrastructure? Can we use line packing of, for example, the Maritimes and Northeast Pipeline to have more gas in the Northeast system during the winter ahead of possible cold snaps?

Does the study address the current curtailment of existing Maine wind turbines due to insufficient transmission to where the power is needed?

Thank you for the opportunity to comment. We look forward to participating in the rest of this process.

Sincerely,

Jane Winn, Executive Director

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Hello!

Thanks for a very informative and inclusive meeting today at the DOER offices.

This is the letter I brought up in my questions to Dr. Stanton. I hope that these omissions in ISO-NE's ICR projections, brought to light by FERC, are included in calculations used for your models. ISO-NE's leaving them out created a bias against renewables and efficiency in their projections that has resulted not only in higher energy cost projections, but a seemingly larger demand for fossil fuel solutions. We need to fully count renewables and efficiency and performance incentives to get a true picture.

Thanks!

Rose
Rosemary Wessel

NESCOE Points Out ISO-NE Omissions

New England States
Committee on Electricity

NESCOE Statement at the NEPOOL Participants Committee on ISO-New England's Installed Capacity Requirement values for the 2018-19 Capability Period (FCA9)

October 3, 2014 - NESCOE offers observations about the ICR for FCA9 and work to be done prior to ISO-NE determining ICR for FCA10 and future annual reconfiguration auctions. We expressed the same in the committee process. While the calculations conform to the market rules, ISO-NE's proposed ICR for FCA9 is higher than it should be. A least two issues - assumed generator availability and distributed generation - must be addressed to arrive at an accurate ICR value.

The first relates to generator availability and over-procurement. Pursuant to the market rule, ISO-NE calculates generator availability on a 5-year historic average basis. The average generator availability has dropped annually. ISO-NE indicated in its presentation to the Reliability Committee that it is increasing the ICR for FCA9 by 178 MW over that in FCA8, which also saw a large increase from the prior year, because of decreased generator availability. However, in the commitment period for which ISO-NE is purchasing, ISO-NE's Performance Incentive (PI) program will be in place, and ISO-NE has stated that PI will result in increased generator availability. There is accordingly a disconnect between the assumed generator availability that ISO-NE is using in the ICR calculation and the improved generator availability ISO-NE says PI will deliver - and what consumers are paying for - in the commitment period. The disconnect will result in consumers over-purchasing resources to meet the ICR.

Second, ISO-NE's ICR calculation ignores its interim, conservative forecast of hundreds of MWs of solar PV projected to come on-line in the next three years. ISO-NE's forecast includes small net-metered installations and MW-sized resources, all of which have benefited from state policies and programs. By excluding these resources from the three-year forward ICR calculation, consumers are paying for unneeded future capacity. Further, as noted at the recent DG Forecast Working Group (DGFWG) meeting, by accounting only for currently installed and operating solar PV resources as load reducers, the forecast undervalues their contribution to reducing load in the interim until finally almost "catching up" ten years out (far beyond the commitment associated with the next FCA auction).

Over the past year, NESCOE and states have repeatedly raised the issue of using the DG forecast to accurately determine the ICR value. In the past month, ISO-NE indicated market rules are a barrier. At the last DGFWG meeting, ISO-NE also stated that its preferred solution is to have individual DG resources - including 10 kW residential net metered projects - go through the FCA qualification process.

The market rules must take a realistic approach to including DG in the ICR. Without that change, consumers will over-procure capacity at a significant cost and there will be an increasing disconnect between the operative market rules and just and reasonable market rules that provide accurate and appropriate signals to the market.

NESCOE understands ISO-NE's calculations conform to the market rules and restates these observations to suggest that ISO-NE, NEPOOL and the states need to work on changes to the market rules before ISO-NE determines the ICR for FCA10 and also examine potential modifications to the Annual Reconfiguration Auctions to address the current issues.