Planning Advisory Committee
Doubletree Hotel, Westborough, MA
October 19, 2016

Bruce Anderson	NEPGA
Bob Andrew	Eversource Energy
Dwayne Basler	Eversource Energy
Denis Bergeron	Maine Public Utilities Commission
Peter Bernard	ISO New England Inc.
Roger Borghesani	The Energy Consortium
Cal Bowie	Eversource Energy
David Burnham	Eversource Energy
Dorothy Capra	NESCOE
Dave Cavanaugh	NRG
Wayne Coste	ISO New England Inc.
Ray Coxe	Mosaic Energy Insights for Brookfield
Greg Cunningham	Conservation Law Foundation
Ben D'Antonio	NESCOE
Frank Ettori	Vermont Electric Power Company
Jeff Fenn	Emera Maine
Brian Forshaw	CMEEC
Bill Fowler	Exelon/Dynegy
Gabriel Gabremicael	New England Power Company
Steve Garwood	New Hampshire Transmission
Mike Henderson	ISO New England Inc.
Jeff Iafrati	Customized Energy Solutions
Sarah Jackson	Synapse Energy Economics
Eric Jacobi	FERC
Seth Kaplan	Marble River
Bill Killgoar	LIPA
Rich Kowalski	ISO New England Inc.
Abby Krich	Boreas Renewables
Marc Lyons	ISO New England Inc.
Alex Ma	Invenergy
George McCluskey	New Hampshire Public Utilities Commission
Bruce McKinnon	CMEEC
Ed McNamara	Vermont Department of Public Service
John Moskal	U.S. EPA
Margaret Neves	Power Engineers
Brent Oberlin	ISO New England Inc.
Bill Opalka	RTO Insider
Marianne Perben	ISO New England Inc.
Dan Phelan	New Hampshire Public Utilities Commission
Fred Plett	Massachusetts Attorney General Office
Francis Pullaro	Renew
Matthew Robinson	RLC Engineering
Alex Rost	ISO New England Inc.
Eric Runge	Day Pitney
Patricio Silva	ISO New England Inc.
Bob Stein	HQUS/PSEG/NRG/Footprint
Brian Thomson	Massachusetts Wholesale Electric Company
Greg Wade	ISO New England Inc.
Carol Wendel	ISO New England Inc.

Peter Wong	ISO New England Inc.

Item 1 – Chair's Remarks

Mr. Peter Bernard welcomed the committee and reviewed the day's agenda. Mr. Bernard advised the committee of the addition of a PAC meeting date on November 29, 2016 at the Westborough Doubletree Hotel.

Mr. Mike Henderson (ISO) advised the committee that there will be an EAG meeting on November 1, 2016 where we will discuss the 2015 Emissions Analysis and provide updates on the progress on ongoing regulatory initiatives.

Item 2.0 – 2016 Economic Study – Part III

Mr. Mike Henderson (ISO) provided a comprehensive overview of the 2016 Economic Study reviewing the metrics of the five base case scenarios.

Item 2.1 – Energy Market Contribution to Fixed Costs by Resource Type

Mr. Henderson reviewed the Energy Market Contribution to Fixed Costs by Resource Type.

Q – Regarding recovery of total costs, does that include variable O & M costs?
A – Yes, we analyzed units that recover total operating costs, to include variable O & M costs.
Q – Have you been able to check your Annual Carrying Charge costs versus the Concentric Energy evaluation as part of the inputs for FCA 12?
A – We are going with the EIA numbers for Annual Carrying Charges.
Q – On slide 10, can you explain how as output increases, average costs decline, but incremental costs increase?
A – It takes a little more to get the next MW out of the resource due to the loss of resource efficiency which results in an increase in incremental costs.
Q – On slide 11, how is the contribution of uplift is related to fixed costs?
A –The inclusion of uplift changed the value from negative to positive values.
Q – Can you reproduce slide 11 using the current date and conditions?
A – ISO Planning does not do market analysis so we cannot reproduce this slide based on current market conditions.

Item 2.2 – Uplift Costs

Mr. Henderson reviewed potential uplift costs for the 2025 and 2030 scenarios.

Q – Are the uplift values higher than what we are currently experiencing?
A – They are but we are doing additional research on this as part of Phase II of the Economic Study. Hopefully that will shed additional light on the uplift increases.

Item 2.3 – Net Energy Revenue for Energy Storage

Mr. Henderson reviewed Net Energy Revenue for Energy Storage Resources.

Q – Is GridView just accounting for pumped storage resources?
A – No, we also included battery storage as well.
Comment – We should look at pumped storage and battery storage separately as one is an existing technology and battery storage is a relatively new technology.
Q - What are you referring to when you say 9% to 12% capacity factor for battery storage.
A - There is only a device called "storage" that includes all types of storage devices. We developed what we believe is a reasonable and realistic capacity factor between 9% and 12%.

Item 2.4 – Ability of Resources to Physically Meet Growth of RSP
Mr. Henderson outlined the Ability of Resources to Physically Meet Growth of RSP.

There were no questions from the committee on this part of the presentation.

Item 2.5 – Next Steps and Inclusion of Additional Sensitivity Cases
Mr. Henderson reviewed the next steps in the 2016 Economic Study.

Comment – Can you provide a sensitivity regarding renewable spillage and how much would have been absorbed by storage?
Q - When you look at ramping, will there be any linkage to the storage? Would this cut down on the ramping requirements?
A – We looked at it a little bit but there were no major changes to the existing ramping structure?

Item 2.6 – Preliminary Order of Magnitude Transmission Development Costs
Ms. Marianne Perben (ISO) provided an overview of the Preliminary Order of Magnitude Transmission Development Costs.

Q – How was solar spread out? Is it evenly throughout New England?
A – It is consistent with our current PV forecast where it is targeted in the most active development area which is primarily in southern New England.
Q – Did you consider ignoring the existing AC system and connecting the wind right to the load pockets directly via a HVDC line in order to avoid system congestion?
A – Yes, we did consider that and we will address it later in the presentation.
Q – Is the congestion relief regardless of scenarios, or is it specific to certain scenarios?
A – The congestion varies dramatically between scenarios.
Q – Did you borrow some findings from the Maine Resource Integration Study?
A – We borrowed similar findings from that study for use in this analysis.
Q - Did you borrow anything from the EIPC study?
A - Yes we did, specifically the transmission cost estimates from the EIPC study.

Q – On the MVAR capability, in looking at the real the power transfer capability, 1/3 of that will be reactive power?
A – In some cases that is true.
Comment – I would like to see to breakdown of costs by AC, DC, and Voltage Support so we can see where the majority of installed costs are in $ per kW.
Comment – On slide 35 for scenario 1, it seems unlikely that there would be cost justification to build a 2nd HVDC line in order to provide 271 MWs of additional congestion relief using a standard capability 1200 MW HVDC line.

Item 3.0 – 2016 Economic Study – Integration and Planning of Large Inverter Based Resources

Mr. Eamonn Lannoye, (EPRI) Mr. Erik Ela (EPRI), and Mr. Daniel Brooks (EPRI) provided an overview of the Integration and Planning of Large Inverter Based Resources.

Q – Regarding the T &D system integration and interaction, are you seeing significant T &D System Interactions in other areas?
A – Perhaps in ERCOT and Europe.
Q – On slide 13 on the bottom graph, could you elaborate on governor participation?
A – We can provide addition information on this through Mike Henderson.
Q - Are the synchronous condensers applied at the transmission level, distribution level or both?
A – Primarily on the transmission system with a few exceptions at the distribution level.
Q - Are the ages of transmission and generation factored into your risk based planning inputs?
A – The age factor is not fully accounted for in this model.
Q - Do you believe Power Flow Controllers being commercially available now or is this theoretical?
A – There is extensive research being performed on Power Flow Controllers now and there is an expectation they will be widely available in the semi-near future.
Q - Is a Synchronous Condenser a reliability component or a market component?
A – At present it is a reliability component, but financially it is included as part of the transmission rates.

Planning Advisory Committee meeting adjourned at 3:10 PM

Respectively submitted

Marc Lyons
Secretary, Planning Advisory Committee