Submitted via Email to DGFWGMatters@iso-ne.com

March 9, 2016

Michael Henderson
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RE: Joint Comments on ISO New England's Draft 2016 PV Forecast

Dear Mr. Henderson:

The Sustainable FERC Project, Acadia Center, Conservation Law Foundation (CLF), and Natural Resources Defense Council (NRDC) respectfully submit these comments on ISO New England's (ISO-NE) draft 2016 solar photovoltaic (PV) forecast.[1] We appreciate the opportunity to provide these comments, and look forward to discussing them further with ISO-NE and stakeholders in the Distributed Generation Forecast Working Group (DGFWG).

As data from ISO-NE show, solar PV is a rapidly growing clean energy resource in New England, with significant implications for the region's electricity grid. This year, for the first time, ISO-NE adjusted the installed capacity requirement (ICR) for its 10th annual forward capacity auction (FCA10) downward by 367-390 MW to account for behind-the-meter (BTM) solar PV that has already been or is projected to be installed by 2019 and is not yet embedded in load. Accounting for BTM solar PV in FCA10 will likely save consumers around $30 million in avoided capacity costs during the 2019-2020 Capacity Commitment Period, and possibly more.[2] As solar PV continues to be added to the grid, consumers should continue to benefit from lower ICRs and lower capacity market costs in future years. The growing solar PV resource also has implications for the types and timing of transmission upgrades in New England, and could defer or eliminate the need for certain transmission system investments.

In recent years, ISO-NE has made improvements in how it accounts for solar PV in its load forecasts. However, as explained further below, we are concerned that ISO-NE's past PV forecasts have significantly underestimated solar PV growth in the region, and that the draft 2016 forecast, which in part relies on a similar methodology, is likely to continue this trend. We also have concerns about how ISO-NE used last year's PV forecast in calculating the annual ICR; namely, that ISO-NE only considered part of the PV resource in making adjustments to the ICR, while ignoring the capacity contributions of so-called Settlement Only Resources (SORs). Combined, these concerns raise questions about the justness and reasonableness of rates in New England's wholesale electricity markets.

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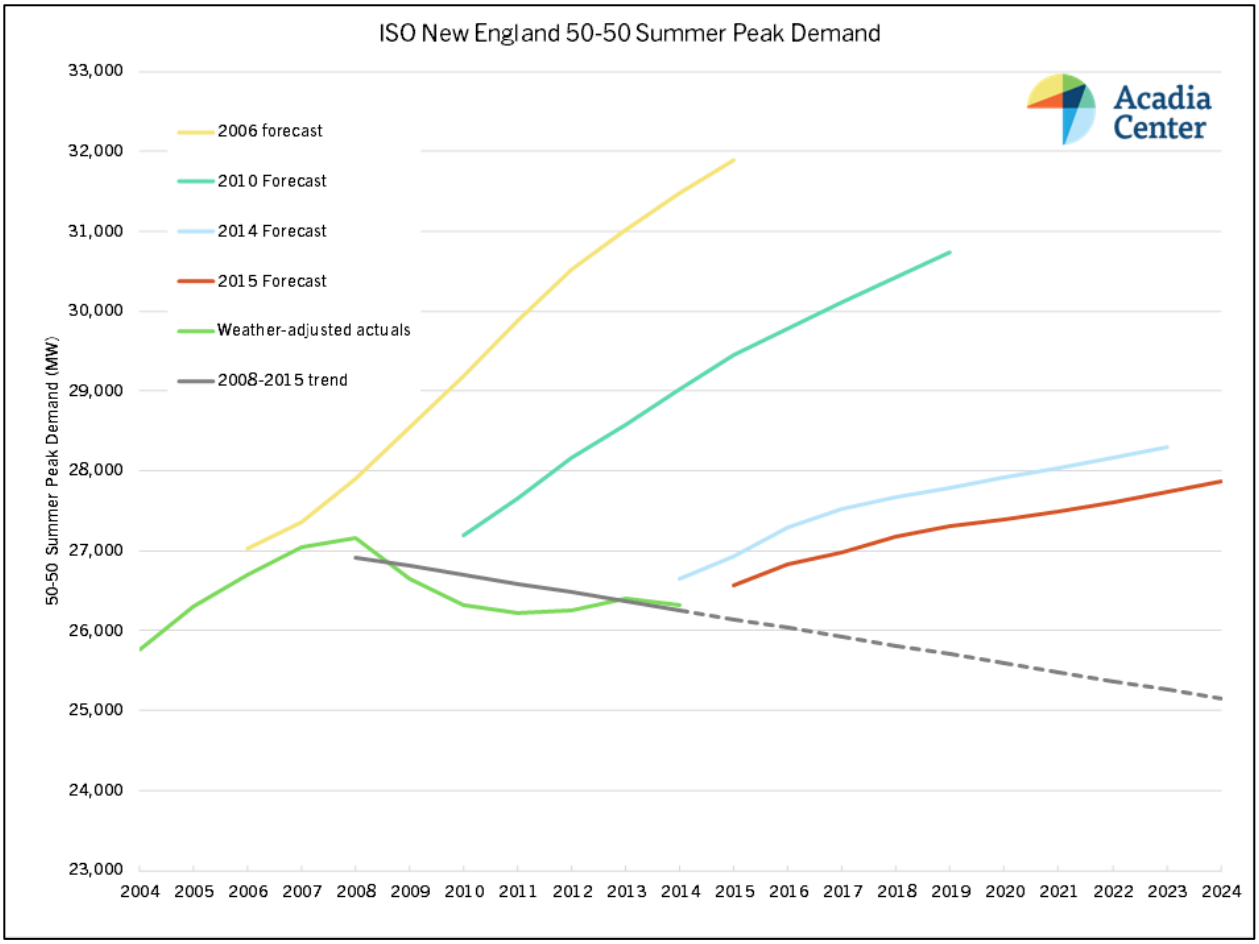
[1] ISO-NE, *Draft 2016 PV Forecast* (Mar. 7, 2016), *available at* http://www.iso-ne.com/static-assets/documents

[2] At the FCA10 clearing price of $7.03/kW-month, 367 to 390 MW of avoided capacity commitments equals annual savings of $31 to $33 million. These figures do not include potential additional savings to the extent that the lower ICR may also have resulted in a lower market-clearing price in the auction.

Our basic concerns about ISO-NE's forecast methodology are outlined in a report released last year by Synapse Energy Economics, entitled "Challenges for Electric System Planning."[3] In its report, Synapse details how ISO-NE's current load forecasting methodology systematically overestimates load growth and underestimates the contributions of both distributed generation (DG) resources, such as solar PV, and energy efficiency (EE).[4] As Synapse noted, this "leads to forecasts that overstate future electric system loads. As a result, ratepayers are being asked to pay for more transmission upgrades than are needed."[5]

The need to evaluate the accuracy of load-reducing factors, such as the PV forecast, as part of ISO-NE's overall load forecasting methodology is evident when comparing ISO-NE's peak demand forecasts over the last several years to actual, weather-adjusted annual peaks in New England. As the figure below shows, ISO-NE has consistently over-forecasted regional demand. Recent years' forecasts incorporate EE and solar PV projections, but continue to forecast growing peak loads in contrast to the observed trajectory in the region.



[3] Synapse Energy Economics, *Challenges for Electric System Planning: Reasonable Alternatives to ISO-NE's Discounts for Uncertainty* (July 24, 2015), *available at* http://www.synapse-energy.com/sites/default/files/Challenges-for-Electric-System-Planning_0.pdf.

[4] We also recently submitted comments to ISO-NE on its draft 2016 EE forecast.

[5] Synapse Energy Economics, *Challenges for Electric System Planning*, *supra* note 3, at 1.

Synapse raised specific concerns about ISO-NE's PV forecast, which predicts "that PV solar resources will be diminishing in future years and that new installations will become insignificant after 10 years . . . contrary to numerous other studies that show an escalation of PV installations over time as PV module costs continue to decline and battery storage becomes more cost-effective" as well as "the stated purpose behind state policies that provide discounts and tax breaks for PV installation . . . as a bridge to a future time when PV is cost-effective for small users (residential and commercial customers)."[6]

As shown in the table below, ISO-NE's first two PV forecasts, in 2014 and 2015, significantly underestimated observed solar PV growth in the region. In 2014, actual solar PV installations were 66 percent higher than ISO-NE had predicted. Last year, PV installations were 132 percent and 28 percent higher than ISO-NE's 2014 and 2015 forecasts, respectively, had predicted.

New Solar PV Installation (MW)	2014	2015
2014 forecast[7]	246.5	179.6
2015 forecast[8]		324.3
Actual[9]	**410.1**	**416.2**

These large early-year forecasting errors, combined with the mismatch between ISO-NE's forecast, actual state PV adoption goals, and numerous other studies that predict higher rates of future PV adoption, suggest that changes should be made to ISO-NE's forecast methodology.

Below, we provide comments on the following areas as well as recommended changes to the 2016 PV forecast to better reflect actual and anticipated solar PV growth in New England:

- State policy and post-policy discount factors
- Revised methodology for calculating peak load values
- Use of the PV forecast in calculating the annual ICR

1. State Policy and Post-Policy Discount Factors

As Synapse explained in its report, ISO-NE's projection that the rate of new solar installations will decline in the future is at least in part due to the forecast's discounting of states' adopted solar PV goals, with increasingly higher discounts applied to state goals in future years. The

[6] *Id*. at 11.
[7] ISO-NE, *2014 Interim Forecast of Solar Photovoltaic (PV) Resources* (May 1, 2014), *available at* http://www.iso-ne.com/static-assets/documents/committees/comm_wkgrps/othr/distributed_generation_frcst/2014_pv_frcst/2014_final_solar_forecast.pdf.
[8] ISO-NE, *Final 2015 Solar PV Forecast Details* (Apr. 27, 2015), *available at* http://www.iso-ne.com/static-assets/documents/2015/04/2015_solar_forecast_details_final.pdf.
[9] Calculated from the difference between the total installed capacity values through 2013, 2014, and 2015, as reported in ISO-NE's 2014, 2015, and 2016 PV forecasts. *See id*. at slide 35; ISO-NE, *2014 Interim Forecast of Solar Photovoltaic Resources*, *supra* note 7, at slide 23; ISO-NE, *Draft 2016 PV Forecast supra* note 1, at slide 30.

result is that the amount of PV that ISO-NE forecasts for the region is less than states' explicit policy goals. ISO-NE's forecast also assumes that once current state policies to promote solar PV expire, the rates of solar installations will fall dramatically to 50 percent of states' final year goals.

These discount factors have been lowered in the 2016 forecast, which we strongly support; however they remain problematic. The revised discount factors continue to have a large effect on ISO-NE's PV forecasts,[10] yet the justification for the specific discounts that ISO-NE has selected are unclear. ISO-NE has pointed to a report it commissioned from ICF, published in February 2015, as justification for these discounts.[11] However, while the ICF report identifies some uncertainties regarding the future economics of solar PV, it does not include recommended discount factors to apply to state PV goals – neither the ones that ISO-NE has selected nor others. Notably, the report also does not conclude that states will fail to achieve their PV policy targets, which, by discounting state goals, ISO-NE's forecast does. The largest uncertainty identified in the ICF study – the effect of the expiration of the federal ITC on January 1, 2017 – is also no longer relevant. As recognized in ISO-NE's draft 2016 PV forecast slides, the federal ITC was extended in December 2015, and will now provide a significant driver of new solar growth through at least 2021.

In the draft 2016 PV forecast, ISO-NE has proposed to use slightly lower discount factors than in its 2015 forecast, in part to reflect ISO-NE's greater comfort with state PV goals and, as stated at the February 19, 2016, DGFWG meeting, policy developments such as the ITC extension.

Given the forecast's history of underestimating PV growth in the region, we support making adjustments to the discounting assumptions, though we do not believe that the proposed adjustments go far enough. As a result of this year's proposed lower discount factors, the draft 2016 PV forecast includes 8.3 percent more new solar capacity additions through 2025 than it would have if ISO-NE had used last year's higher discount factors instead.[12] This is not an insignificant difference, but is still relatively small compared to the 28 percent and higher errors observed in ISO-NE's forecasts of new PV additions over the last two years. To the extent that changes to this year's discount factors are intended to reflect the recent ITC extension, it is notable that the National Renewable Energy Laboratory (NREL) predicts that the ITC extension on its own will increase new solar capacity additions between 2016 and 2025 by 27-39 percent nationally relative to expectations before the extension.[13]

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[10] In the draft 2016 forecast, discounting reduces ISO-NE's projection of cumulative solar capacity through 2025 by roughly 16 percent; the pre-discounted forecasted cumulative total of PV is 3,816.6 MW in 2025 compared to the discounted cumulative total of 3,214.3 MW. *See* ISO-NE, *Draft 2016 PV Forecast*, *supra* note 1, at slides 27 and 30.

[11] ICF, *Economic Drivers of PV Report for ISO-New England* (Feb. 27, 2015), *available at* http://www.iso-ne.com/static-assets/documents/2015/02/icf_economic_drivers_of_pv_report_for_iso_ne_2_27_15.pdf.

[12] Applying the 2015 forecast's discount factors for 2016-2025 (with a 25 percent policy discount factor in 2025) to the undiscounted 2016 solar PV forecast yields additional installed solar PV capacity of approximately 1,744.4 MW in 2025, as compared to ISO-NE's forecast of 1,889.3 MW when using the lower 2016 discount factors. It is noted that, through 2024, the draft 2016 forecast projects 26 percent more cumulative installed solar PV capacity than did the 2015 forecast. However, most of this change is due to the incorporation of more ambitious state PV goals into the 2016 forecast, rather than the changes to the discount factors applied in the forecast, which account for the 8.3 percent difference. *See* ISO-NE, *Draft 2016 PV Forecast*, *supra* note 1, at slides 26-27 and 29-30.

[13] NREL expects an additional 15-19 GW of new solar capacity to be installed nationally between 2016 and 2025, which is on top of 49-57 GW of new solar capacity expected without extension of the ITC. NREL, *Impacts of*

Given the concerns discussed above, we request that ISO-NE consider the following:

- At the February 19 DGFWG meeting, ISO-NE explained that it has accounted for the ITC extension by adjusting policy discount factors downward, relative to the 2015 forecast. However, ISO-NE has not made any similar adjustment to the post-policy discount factor of 50 percent, even though this discount is applied to multiple states in the 2016 forecast prior to the ITC's now-extended phase down in 2022. ISO-NE should reduce the post-policy discount factor to account for the ITC extension, which NREL projects will drive significant new solar PV installations, independent of other policies.

- In the draft 2016 forecast, ISO-NE continues to apply both policy and post-policy discount factors to all years of the forecast. Given that installed solar PV capacity in New England in 2014 and 2015 significantly exceeded ISO-NE's 2014 and 2015 forecasts, we recommend that ISO-NE adjust the policy discount factors in at least the first two years of the 2016 forecast (2016-2017) to zero percent (i.e., no discounting). This will better reflect observed trends in achieving and exceeding near-term policy goals overall across the region. Later year discount factors, if used, should also be adjusted downward to reflect more gradual phasing in of uncertainty after the first two years.

- We request that ISO-NE provide more details on how it has arrived at the specific discount rates proposed in all years. In setting discount rates for future years, it is not clear how ISO-NE is considering various factors that could make it either more or less likely that states achieve their goals. We understand that all forecast assumptions are to some degree uncertain, but how has ISO-NE arrived at the specific discount factors it is proposing, as opposed to others, in the 2016 draft forecast? What factors has ISO-NE used to determine the discount factors, and how has it weighed them? How, for example, has ISO-NE determined the specific adjustments to make to last year's discount factors to account for the ITC extension?

- To the extent that ISO-NE's forecast projects that states will *not* achieve their adopted PV goals, ISO-NE should explicitly acknowledge this fact. ISO-NE should also explain why it believes this is a prudent assumption, particularly given that it may result in consumers paying both to achieve their states' PV goals and for a grid that may be oversized – both in transmission infrastructure and wholesale capacity resources – if state goals are met.

- Even if ISO-NE believes that some degree of discounting of state goals is justified in its forecast, it would be helpful to stakeholders if ISO-NE were to conduct sensitivity analysis to make the effects of specific assumptions clearer and to help the DGFWG evaluate whether adopted assumptions, or others, should be used in the future.

- We also request that ISO-NE discuss with stakeholders how it plans to evaluate the performance of the PV forecast over time and make adjustments in future years as may be warranted.

Federal Tax Credit Extensions on Renewable Deployment and Power Sector Emissions (Feb. 2016), at 32-33, *available at* http://www.nrel.gov/docs/fy16osti/65571.pdf.

2. Revised Methodology for Calculating Peak Load Values

In the draft 2016 PV forecast, ISO-NE proposes a revised methodology for calculating the peak load contributions of solar PV resources.[14] ISO-NE has developed an estimated curve for the peak load contributions of cumulative installed PV capacity at different levels of resource penetration, based on a review of recent summer peak load days in New England and data on solar PV performance in the region across different hours of the day.

We are encouraged by this new methodology for calculating PV's peak load contributions using cumulative peak reductions, and will continue to assess its applicability going forward. We note that for subsequent forecasts:

- The production data from the Yaskawa-Solectria sites are heavily concentrated in the eastern part of Massachusetts, where most of the PV development has occurred to date. However, going forward it would be helpful to update the net load scenarios and include additional production data points from a broader geographic scope to reflect the increasing regional development and diversity and assess whether this has an impact on the availability of solar during peak periods.

- We recommend that the analysis used to develop PV's peak load contribution be expanded to include more than eleven load shapes. The current trajectory based on installed nameplate capacity seems to be an averaging of nine of the days. Increasing the number and variety of peak load shapes will help determine whether the two low peak, high output days that were left out are in fact outliers, as well as whether using the median of the peak load reduction curves would be a more appropriate approach.

3. Use of the PV Forecast in Calculating the Annual ICR

As noted above, in FCA10, ISO-NE for the first time reduced the ICR to account for lower regional demand as a result of BTM solar PV resources. We support ISO-NE's greater incorporation of solar PV into its ICR calculations. However, we are concerned that in FCA10 ISO-NE ignored the capacity value of certain PV resources, known as Settlement Only Resources (SORs), in its ICR calculation. The draft 2016 PV forecast does not specify how the forecast will be used in the calculation of the FCA11 ICR, other than to say that the final 2016 PV forecast will be used in CELT 2016. The draft PV forecast does, however, make clear that ISO-NE will continue to classify solar PV resources as (1) PV as a capacity resource in the Forward Capacity Market (FCM); (2) non-FCM PV SORs; and (3) BTM PV. In FCA10, only the first and third categories were accounted for in the ICR; SORs were ignored.

Ignoring SORs in the ICR imposes potentially significant additional costs on consumers who may pay for excess capacity resources that are not needed. Ignoring SORs also prevents consumers and states from realizing the full benefits of their investments in solar PV, which provide not only energy, but also capacity. In the 2015 PV forecast, ISO-NE projected that the region will have 724 MW of solar PV SORs by 2019, representing seasonal claimed capability of 287.5 MW.[15] Yet ISO-NE ignored SORs' capacity values in setting the ICR for 2019-2020. ISO-

[14] *See* ISO-NE, *Draft 2016 PV Forecast*, *supra* note 1, at slides 33-59.
[15] ISO-NE, *Final 2015 Solar PV Forecast Details*, *supra note* 8, at slides 41-42.

NE has not explained how SORs provide substantively different capacity benefits to the grid than do BTM PV resources, which are included in the ICR calculation. As with BTM PV, SORs are not directly dispatched by ISO-NE, but they do provide capacity benefits to the grid. Based on the 2015 PV Forecast, the methodology needed to estimate SORs' capacity values appears to be identical to the methodology ISO-NE uses to estimate BTM PV capacity values.

We strongly urge ISO-NE to account for the capacity value of PV SORs in the annual ICR, just as it now accounts for the capacity values of BTM PV. Continuing to ignore SORs' capacity values may result in excess procurement of capacity in the FCM and, as solar penetration increases, raises significant questions about the justness and reasonableness of wholesale capacity rates in New England.

Getting the PV forecast right is critical to ensuring that electricity system investments in New England are justified and that wholesale rates in the region are just and reasonable. While no forecast will ever paint a perfect picture of the future, we believe that there are several areas, as discussed above, where the current PV forecast methodology is flawed, and should be corrected. Thank you for considering our comments, and we look forward to your responses.

Sincerely,

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