MEMORANDUM

March 15, 2022

To: Todd Schatzki, Analysis Group
Chris Geissler, ISO New England

Cc: Dave Cavanaugh, NEPOOL Participants Committee
Sebastian Lombardi, Day Pitney

From: Pete Fuller, Autumn Lane Energy Consulting
David O'Connor, ML Strategies

Re: Comments on Behalf of NRG Energy on the Draft Pathways Report

---

On behalf of NRG Energy, we appreciate the opportunity to provide these written comments and feedback on the Draft Pathways Report ('Draft'), in addition to the fulsome discussion of the Draft at the March 1, 2022 NEPOOL Participants Committee meeting. Our comments are arranged from the most substantive to the least. We have attempted to capture some of the clarifications provided during the March 1 conversations but feel it is important to document our perspective on the issues identified below. We look forward to further discussion and completion of the final report.

NRG appreciates the extent of the analysis effort – on the part of the ISO and the Analysis Group team but also on the part of the state stakeholders and market participants – to get to this point. NRG has consistently advocated for adding market-based mechanisms that facilitate and advance states' decarbonization and clean energy objectives into the ISO New England market design and note the Pathways analysis and report as the culmination of over five years of discussion of options for accomplishing this goal. We believe all of that history and the quantitative and important qualitative analysis presented in the final report will provide stakeholders with sufficient information to identify a preferred path for moving forward.

Given the scope and scale of the decarbonization and energy system transformation challenge before us, NRG urges stakeholders to narrow the range of options so that the region can continue the important work of defining one preferred path, with the goal of implementing in the late 2020s as assumed in the Pathways analysis. Further delay in choosing a path will only further delay the efficiency and competitive benefits that this analysis shows can be achieved with any of the three approaches that do not rely on long-term contracts backed by electric ratepayers. While NRG maintains its strong preference for the FCEM, we are prepared to engage collaboratively and constructively to work through the important design decisions on whichever pathway is chosen by the region. Time is of the essence and the most important immediate challenge is to choose a path and begin the journey to make that path a reality.

<u>Overall Assessment of Pathways Options</u>

The discussion of the Status Quo approach does not clearly articulate the extent of the commitment and the assignment of risk associated with an increasing number and volume of long-term contracts. Given the billions of dollars of new capital required to achieve the 2040 clean energy and emission targets,

this level of long-term 'debt-equivalent' obligation on utilities and consumers should be more clearly spelled out and contrasted with the role of markets and private capital to manage those risks under the other pathways approaches.

Likewise, the final report should expand the discussion of the efficiency of capital allocation among the various approaches. Even a small percentage improvement in how the billions of dollars of societal capital gets allocated will have very large dollar implications.

Finally, the final report should emphasize the offsetting cost savings that will come from reduced fossil fuel purchases by consumers for heating and transportation, which will lower the cost of decarbonizing the economy compared to what is shown in the Draft, which is looking only at the electric sector.

Negative LMPs

The Draft emphasizes the potential for negative LMPs and potential consequences thereof, including low and negative average annual LMPs. It is not clear how well the production cost model reflects the role of demand bids in setting LMPs including, for example, energy storage charging as the 'next dispatchable increment' of energy that sets price. Demand participation in price-setting would lead to outcomes other than the discrete price outcomes at approximately -$30 and -$100 as shown in the report. In addition, the model explicitly does not capture the potential development of new technologies. These technologies may include hydrogen via electrolysis, renewable natural gas, longer duration storage, broad implementation of distributed energy resources, or more pervasive demand response that can increase as well as decrease load in response to price signals. While it is impossible to say with certainty which of these or other developments will occur, the final report should reflect a more complete discussion of the very likely potential for innovative market responses, especially if negative LMPs occur to the extent suggested by Analysis Group's modeling.

Battery Storage 'Churning'

The Draft identifies only one market response to the predicted extended periods of substantially negative LMPs. 'Churning' batteries, as described by the Draft, is a behavior that has not been observed anywhere in practice, to our knowledge. Discussions with battery storage owner/operators confirm our understanding that in addition to the O&M and performance degradation concerns that additional cycling would introduce, if negative LMPs occurred to the depth and duration that Analysis Group's model suggests, the arbitrage opportunity would be competed down to an efficient level and the type of inefficient 'churning' suggested by the Draft would not be sustainable. The Draft appropriately notes the limitations of current models to fully reflect battery storage operations and cautions that 'care should be exercised' in evaluating results related to battery operations. The final report should be clear that the 'churning' behavior is one potential outcome of extensive negative prices, but other responses and outcomes that were not modeled explicitly are possible, and probably likely.

Existing RPS Programs

The Draft does not attempt to quantify the impact of existing RPS programs on the overall economics of the pathway options. Given the magnitude of the aggregate value of RPS Instruments in New England (estimated by Sustainable Energy Advantage as currently approximately $1.64 billion/year) and the differential interactions of the various pathways options with existing RECs, these costs should at least be qualitatively discussed. The Status Quo approach purchases the RECs associated with selected new clean resources, so some share of the $1.64 Bn is not incremental to the Status Quo. The

States have emphasized their interest that efforts to define an FCEM product (and presumably, Hybrid) should satisfy existing RPS obligations, so a substantial share of the $1.64 Bn would not be incremental to FCEM. A smaller share, related only to the 'new' resources procured through the FCEM aspect of the Hybrid model, would not be incremental to that approach. The full $1.64 Bn would presumably be incremental to the costs estimated for the NCP approach since there is no apparent linkage between that approach and RECs.

'Choice Among Fossil Resources'

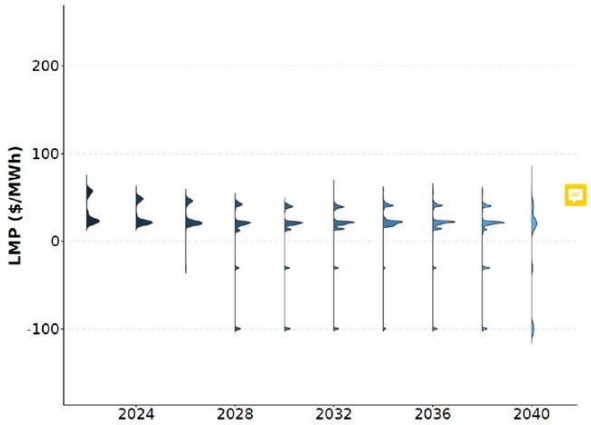
The Draft describes the lower emission *rate* of gas-fired CCGT vs. CT capacity but does not present information about the total emissions that we have been able to find. The unanswered question is whether the better efficiency of the CCGTs lead to more utilization and thus more total emissions than in the cases that add CTs instead of CCs? While highlighting the differences among the pathway options with respect to the incentives for choosing less *carbon-intensive* resources is valid, the total emissions metric also needs to be presented. And, while the Draft acknowledges the very clean resource mix in New England and the potentially high cost of reducing the carbon-intensity of fossil resources by replacing them with more efficient current technology, the final report should place more emphasis on the total emissions of the various options than on carbon intensity.

LMP Histogram Charts

The LMP distribution charts are presented without sufficiently explaining what they represent. The final report should offer a more descriptive explanation regarding what these charts are intended to demonstrate.

There are also come curious patterns in these charts. For example, Figure V-5 on p. 48 of the Draft shows a distinct change in shape from the 2038 values to the 2040. There is no explanation regarding what is going on in the model to drive that 'flattening' of the distribution.

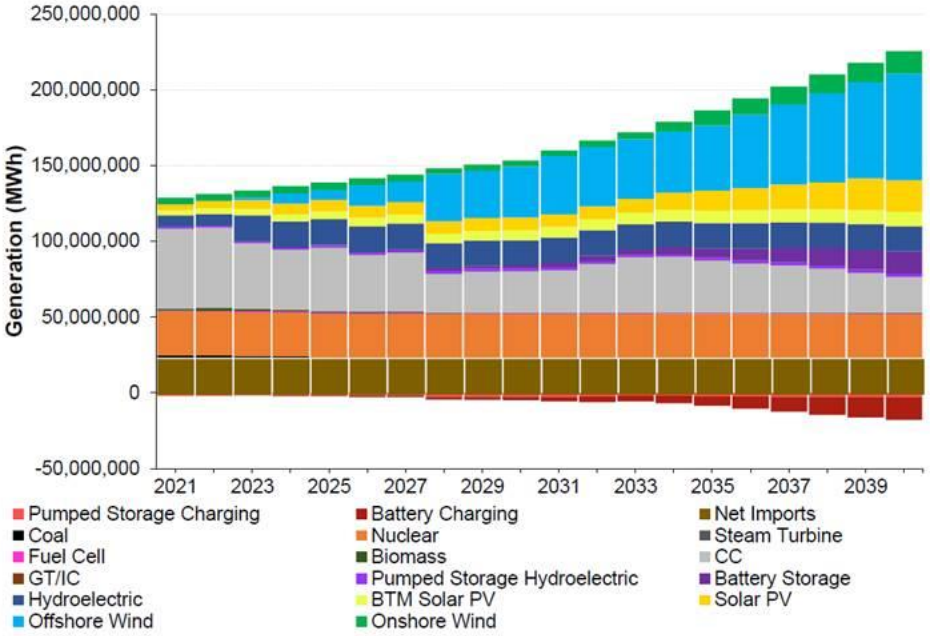
Figure V-5. Distribution of LMPs by Year, Status Quo Policy Approach, 2022-2040 ($2020/MWh)



'Over-compliance'

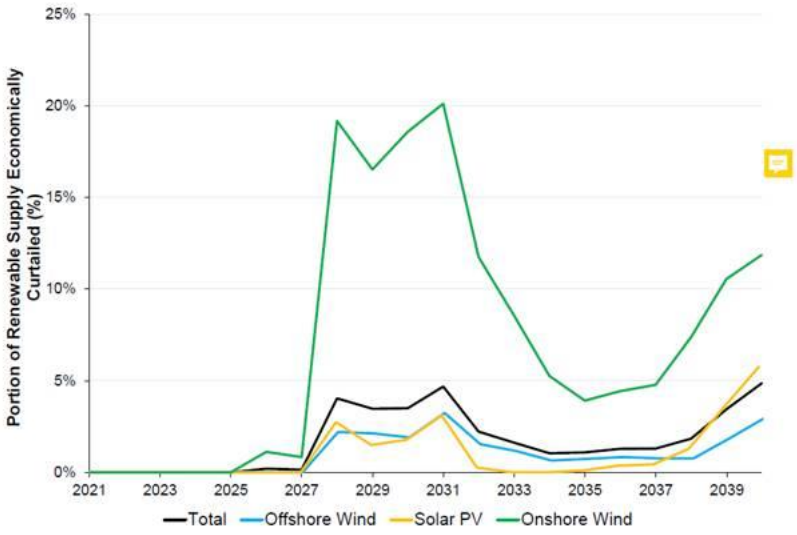
We understand from the March 1 discussion that the increase in CCGT output in the early '30's that appears on some charts (for example Figure V-4 on p. 45 of the Draft) is the result of clean energy resources added to the system in the late '20s as part of the 'Reference' assumptions displacing gas-fueled generation, which then picks up again for several years since the assumed carbon emission limits are not binding until later in the decade. That phenomenon should be described in the text immediately adjacent to these charts.

Figure V-4. Generation Mix, Status Quo Policy Approach, 2021-2040 (MWh)



There is also a curious pattern of renewable curtailments shown in Figure V-8 on p. 51 of the Draft that we understand to be a result of the same 'over-compliance' followed by the level of electricity demand 'catching up' with the amount of renewable energy on the system. We also suspect that the timing of the deployment of storage may play a role in this pattern. The drivers of this pattern should be explained in the final report.

Figure V-8. Annual Curtailments by Technology Type, Status Quo Policy Approach, 2021-2040 (%)



Wording Suggestions

References to 'energy' in the context of FCEM should be to the clean energy 'attribute' associated with the energy. FCEM does not envision transacting the energy itself, only the attribute. Likewise, FCEM does not 'fix environmental emission targets' in any real sense (p. ES-3). Rather, it relies on the states or their agents to establish a quantity of clean energy that will be needed to displace emitting resources

such that each jurisdiction reaches their emission target. FCEM is also probably better described as 'auctioning forward obligations to produce clean energy and associated attributes' as opposed to 'awarding CECs' (p. 12). The idea is to leverage the RPS concept of energy attributes but to introduce transparent price formation and liquidity to enhance efficiency and financeability of projects.

The draft report refers throughout to the Reference case as a 'less stringent target'. We suggest re-wording since the Reference case, while a useful benchmark, is not in any sense a 'target' for emissions under any state policy. The Reference case used here is not compliant with the state policy targets. Likewise, the 'central case' emission target should not be referred to as a 'more stringent' target. It is the central/base/mandated target.

Presentation Format Suggestions

Several charts are presented in terms of nameplate MW. It would be helpful to see these charts also presented as 'Qualified' capacity (using the ISO's current rules for capacity accreditation) and as 'Effective' capacity if the ELCC effect of increased saturation of wind and solar can be estimated. If the ELCC cannot be estimated, it would be helpful to have some discussion of the potential impacts of increased solar and wind penetration and the need to maintain adequacy and reliability.

Many of the charts include solid lines and dashed lines, but the legends don't indicate any difference in the two, making the charts difficult to interpret.