FINAL

Pursuant to notice duly given, a teleconference meeting of the NEPOOL Participants Committee was held beginning at 9:30 a.m. on Tuesday, March 1, 2022. A quorum determined in accordance with the Second Restated NEPOOL Agreement was present and acting throughout the meeting. Attachment 1 identifies the members, alternates and temporary alternates who participated in the meeting.

Mr. David Cavanaugh, Chair, presided and Mr. Sebastian Lombardi, Acting Secretary, recorded.

APPROVAL OF DECEMBER 6, 2021 PATHWAYS STUDY MEETING MINUTES

Mr. Cavanaugh referred the Committee to the preliminary minutes of the December 6, 2021 Pathways Study meeting, as circulated and posted in advance of the meeting. Following motion duly made and seconded, the Committee unanimously approved those minutes, with an abstention noted on behalf of Mr. Sam Mintz.

ANALYSIS GROUP (AGI) PRESENTATION ON DRAFT PATHWAYS STUDY REPORT

Mr. Cavanaugh then introduced Mr. Todd Schatzki of AGI, who reviewed materials circulated and posted in advance of the meeting. Mr. Schatzki stated that the purpose of his presentation was to provide an overview of the draft Pathways Study (Draft Report) – to cover its scope and provide opportunities for questions, comments and reactions to the full range of issues, tradeoffs, points of emphasis, and the qualitative analysis in each of the sections of the Draft Report. The presentation was designed to follow the structure of the Draft Report. Mr. Schatzki indicated that the Draft Report included scenario modifications (that, in the end, did not modify previous conclusions) and two new scenarios (a Transmission and an Alternative Hybrid approach). The

Draft Report and the presentation would go beyond the quantitative information and focus of prior meetings.

Scope & Preliminary Conclusions

Mr. Schatzki described the Draft Report as an evaluation of alternative policy approaches to decarbonizing the New England Grid, with a focus on alternative economic and market outcomes. He reminded members that, by assuming and maintaining the same level of reliability (operable capacity), the Report left the evaluation of reliability outcomes to the separate Future Grid Reliability Study efforts, and instead and by design, considered the economic and market differences resulting from a continuation of current New England state-sponsored procurement policies (Status Quo) compared to three alternative, centralized approaches (i.e., Forward Clean Energy Market (FCEM), Net Carbon Pricing (NCP), and Hybrid approaches). He acknowledged that the four approaches (or pathways) were not exhaustive of all possible alternatives, but were those that reflected common interest among the region's stakeholders for AGI's study purposes. Study assumptions were selected to evaluate the differences in policy approaches, and were tested through scenario analyses. He cautioned that the assumptions should not be viewed as a forecast of actual outcomes, predictive of future technology, or promoting future rules or rule changes. In response to a question, Mr. Schatzki acknowledged that the Report did not consider how existing Renewable Portfolio Standard (RPS) systems would or could be transitioned under each of the alternative approaches, but committed to consider further whether that issue called for further study.

Mr. Schatzki then reviewed a number of preliminary conclusions. He explained that policy design considerations, emission reduction incentives, the nature and extent of other market consequences (e.g., locational marginal prices (LMPs), curtailments), social costs, and customer payments differed among approaches. Scenario analysis changed the magnitude, but not the general findings, with respect to the Draft Report's results. Based on feedback received, a table

summarizing the key modeling results would be reorganized and clarified in the final Report. He encouraged stakeholders to provide additional feedback, particularly on the more detailed points, so that the feedback could be incorporated into the final Report.

Specific Policy Approaches

Mr. Schatzki reviewed summaries of the four approaches (Status Quo, FCEM, NCP, and Hybrid), noting the differences in public policy, incentives for emission reductions, pricing, and other market outcomes (e.g., negative LMPs, curtailment and participation in the energy market). He described differences in key metrics, including expected social cost(s) and customer payments. In response to comments, he explained that, while the summary of specific policy approaches was intended to be conceptual and generally separated from AGI's quantitative analysis, there was, particularly with respect to the Status Quo approach, a band of uncertainty in the results that could be clarified. He committed, to the extent possible, to be clear in describing those results in the final Report. A stakeholder suggested that public policy complexity be comparatively described rather than simply mentioned, which Mr. Schatzki agreed to consider.

Quantitative Analysis Approach: Central Case Assumptions

Addressing the analytic basis for assessing each of the differing policy approaches, Mr. Schatzki identified the central case assumptions with respect to timeframe and decarbonization targets, demand for energy, resource mix, baseline state policies, potential new generation technologies assumed, and remaining use of carbon-emitting resources. He explained that the assumptions were held constant across each policy approach and a reference case was used to measure the incremental change in economic outcomes produced by the greater decarbonization of each of those four policy approaches in comparison to the reference case. He said that new resources from Canada were not included in the underlying assumptions because, notwithstanding

impacts on the level of costs and market outcomes, those resources did not materially affect AGI's comparison of the policy approaches.

Quantitative Modeling Results: System Decarbonization

Mr. Schatzki proceeded to summarize the modeling results set forth in Chapter V of the Report. The modelling results were intended principally to serve as a foundation for the evaluation of the tradeoffs between the alternative policy approaches described later in the Report. He described several key mechanisms by which the power system could be made to evolve so as to drive emissions down to the target of 80% below 1990 emissions by 2040. Those mechanisms included: renewable resource mix, substantial increases in clean energy output, excess variable renewable generation, economic curtailments, negative LMPs, and the role of storage. Other factors affecting Energy Market outcomes included variable resource fleet diversity, the existence of firm, dispatchable clean energy resources, and for variable energy resources, the source and levels of revenues earned outside the market. The issues and concepts identified were common among the four policy approaches.

In response to questions, Mr. Schatzki explained that the illustration of economic curtailments for offshore wind, and to a similar extent onshore wind, during the 2020s was driven by a relatively large imbalance between the amount of variable renewables being added to the system pursuant to state policies relative to overall system demand. That imbalance would shrink in the early 2030s, when increased demand was projected, and what was previously curtailed could be consumed, but increased again through the latter part of the 2030s, largely in response to a push for additional renewables to meet reduced emissions target deadlines that would outpace demand. To varying degrees, the imbalance was mitigated by battery storage levels. The illustration did not account for a variation in, or impact of, power purchase agreement (PPA) prices. In response to additional questions and interest in the assumptions behind negative offers and LMPs, Mr. Schatzki

offered to provide at a later time more detailed information on the offer prices set for variable renewable resources.

Assessment of Policy Approaches to Achieving Decarbonization Design Considerations

Noting that all four policy approaches were capable of achieving substantial levels of decarbonization, Mr. Schatzki highlighted two key areas which differentiated the potential levels of under each approach. The first was the extent to which each approach could accommodate different levels of cooperation and coordination among the New England States. The second was the degree of certainty that each approach could provide as to whether a particular emission target could be achieved. He compared and contrasted the differences for each approach. There were no questions on this aspect of the summary.

Cost Effectiveness & Market Outcomes

Mr. Schatzki reviewed a table that compared the cost effectiveness of key resource decisions (resource substitution and choice among clean energy and fossil-fuel resources) for each of the policy approaches. He then summarized how each policy approach affected renewable resource mix and dispatch and the distribution of LMPs. In response to a question about the LMP distribution by policy approach in 2040, Mr. Schatzki explained that the LMP spreads were impacted at that point in time by the incentives or support received by variable resources, with the results impacted by the ability of PPA-supported resources to offer at lower prices than those resources relying solely on carbon price incentives. He acknowledged and addressed concerns that the Report did not appear to assume the need for PPA financing in all cases, as then employed in the development of significant renewable resources, noting that the Report allowed for the possibility that policy makers might in the future provide a credible forward commitment to continued demand

for environmental attributes as an alternative to PPA support, one of the potential long-term tradeoffs between financing costs and costs to customers.

Mr. Schatzki then summarized differences in various market opportunities, particularly for storage charging and discharging. In response to members' questions, he noted that battery storage 'churning' (where batteries take advantage of negative LMPs by earning positive net revenues through energy losses) appeared to incent more infra-marginal operations by battery storage, rather than the substantial addition of more battery storage capacity. He said increased operational activity would affect capital and variable operations costs for battery storage, though it was less clear what impact the increased activity would have on payments. Some members suggested that, not only did periods of prolonged negative pricing suggest different opportunities for how battery storage might be operated, but also suggested the possibility of other market responses by known and yet-to-be-determined technologies.

He concluded his summary of this section by addressing the potential complications, challenges and unintended consequences that can arise because of differences in how the policy approaches compensate resources for services provided.

Social Costs

Turning to total social costs (the resources used to supply energy services -- capital investments, fixed operation & maintenance (O&M) costs and fuel costs), Mr. Schatzki reviewed how those costs increased over the study period due to ever more stringent emission targets and increased electrification of the heating and transportation sectors. He noted that social benefits (e.g. the level of energy supply/demand, resource adequacy, environmental benefits) were held constant over the policy approaches. The data showed that total social costs start to incrementally increase in

2033, and by 2040, incremental costs would be in the $15-20/MWh range. Total social costs were similar under the FCEM and NCP approaches, but higher for the Status Quo approach.

Prices & Customer Payments

Mr. Schatzki explained that differences in LMPs demonstrated dramatic and growing differences among the policy approaches over time, particularly as environmental constraints began to bind, roughly in the 2033 timeframe. FCM prices followed a similar pattern across policy approaches, increasing when environmental constraints began to bind, but decreasing over time as battery storage become the cost-effective resource and energy market arbitrage opportunities increase. Carbon and Clean Energy Credit (CEC) prices grow with increasing environmental targets, with that growth potentially flattened by permitting CEC and allowance banking. Under the NCP approach, carbon price credits lowered customers' effective LMP. Members asked questions and provided feedback, requesting that AGI consider providing additional information about the price patterns, including increases illustrated in the FCM prices by policy approach. Mr. Schatzki responded by noting that the FCM outcomes provided the most challenging results, and posited that, among the reasons for that challenge, aside from modeling nuances, could be more sensitivity to (i) assumptions about battery storage (which were admittedly simplified), given battery storage was the marginal resource in later years and by 2040, and (ii) the multi-year aspect of FCM pricing. He committed to spending more time considering the feedback and questions as the final report was prepared.

Turning to customer payments, he identified the categories of payments under each approach (energy market payments, FCM payments, CEC payments in FCEM and the Hybrid approach, and carbon tax payments credits in NCP and the Hybrid approach), and whether they reflect "in market" or "out of market" payments. After explaining customer payment assumptions

made with respect to the Status Quo approach, Mr. Schatzki highlighted differences across the policy approaches, including the cost of emission reductions, price discrimination and market interactions, particularly between energy and environmental market outcomes and capacity market outcomes. Those differences resulted in the Hybrid approach having the lowest expected customer payments, followed by NCP, Status Quo and FCEM, which had similar payments, and the most costly, the Alternative Status Quo. When viewed on a state-by-state basis, payments varied largely due to load differences, such that states with more ambitious emission reduction goals would bear a larger fraction of total customer payments. Payments were spread more evenly across states in proportion to load when the approach included carbon pricing. Allocation of all payments by load rather than by state shifted payments from states with greater-than-average commitments to states with less-than-average commitments to decarbonization.

Other Environmental, Economic and Market Consequences

Mr. Schatzki concluded his summary of the policy approach assessments by identifying several potential consequences for the New England Markets, many alluded to earlier in the presentation, that may vary across policy approaches, and while discussed, were not fully accounted for in the quantitative analysis. Those included negative LMPs, broader implications for resource adequacy (including exit and entry considerations), the economic consequences of multi-year contracts, and policy-approach specific implementation challenges.

Scenario Comparisons

Mr. Schatzki then provided an overview of scenario comparisons. Quantitative scenarios, he explained, were designed to test the conclusions reached with respect to the differences between the policy approaches. As a whole, the scenarios did not change the conclusions reached, but did provide an increased level of confidence in the findings. He identified the scenarios evaluated,

many of which were summarized and discussed at the December Pathways meeting, and proceeded to summarize findings with respect to two additional scenarios – a Transmission and Alternative Hybrid Policy scenario – not yet reviewed or discussed with the Committee. He explained that the Transmission scenario, with its simplified assumptions and increasing congestion along several key interfaces, did not meaningfully change the outcomes under any of the policy approaches. By contrast, the Alternative Hybrid approach, which assumed a higher target LMP for existing renewable resources, resulted in modest shifts in resource mix (less total variable renewable resources, reduced battery storage, increased combined cycle capacity), reduced social costs, and increased customer payments, outcomes which were consistent with expectations that social costs decrease with greater reliance on more cost-effective carbon prices to achieve emission reductions, and payments increase because higher carbon prices reduces the degree of price discrimination.

He then highlighted three conclusions from AGI's scenarios analyses: (i) changes in economic and resource outcomes (relative to the Central Case) were consistent with expectations; (ii) relative social costs for each of the policy approaches did not change based on scenario (with social costs lowest under NCP, more under the Hybrid Approach and FCEM, and highest under Status Quo); and (iii) with respect to customer payments, differences in price discrimination drove the relative ranking of policy approaches.

Next Steps

Addressing next steps, Mr. Cavanaugh encouraged those with any follow-on questions to e-mail those directly to Mr. Schatzki. Mr. Schatzki asked that any written feedback on the Draft Report be submitted by e-mail no later than March 15, 2022. Specifics with respect to the submission of that feedback, which would be posted on the NEPOOL website, would be e-mailed to the Committee following the meeting. Feedback received by March 15 would be considered prior

to the posting of the Final Pathways Report, which would itself be reviewed and discussed at the next Pathways meeting scheduled for April 26, 2022. Members thanked Mr. Schatzki and his team for their work and presentation. There being no further business, the meeting adjourned at 4:35 p.m.

Respectfully submitted,

Sebastian Lombardi, Acting Secretary

PARTICIPANTS COMMITTEE MEMBERS AND ALTERNATES
PARTICIPATING IN THE MARCH 1, 2022 MEETING

PARTICIPANT NAME	SECTOR/ GROUP	MEMBER NAME	ALTERNATE NAME	PROXY
Acadia Center	End User	Melissa Birchard		
Advanced Energy Economy	Associate Non-Voting	Caitlin Marquis		
AR Large Renewable Generation (RG) Group Member	AR-RG	Alex Worsley		
AR Small RG Group Member	AR-RG	Erik Abend		
AR Small Load Response (LR) Group Member	AR-LR	Brad Swalwell		
Ashburnham Municipal Light Plant	Publicly Owned Entity		Brian Thomson	
AVANGRID: CMP/UI	Transmission		Jason Rauch	
Belmont Municipal Light Department	Publicly Owned Entity		Dave Cavanaugh	
Block Island Utility District	Publicly Owned Entity	Dave Cavanaugh		
Borrego Solar Systems, Inc.	AR-DG	Liz Delaney		
Boylston Municipal Light Department	Publicly Owned Entity		Brian Thomson	
BP Energy Company	Supplier			José Rotger
Braintree Electric Light Department	Publicly Owned Entity			Dave Cavanaugh
Brookfield Renewable Trading and Marketing LP	Supplier	Aleks Mitreski		
Calpine Energy Services, LP	Supplier			Bill Fowler
Castleton Commodities Merchant Trading	Supplier			Bob Stein
Chester Municipal Light Department	Publicly Owned Entity		Dave Cavanaugh	
Chicopee Municipal Lighting Plant	Publicly Owned Entity		Brian Thomson	
Clearway Power Marketing LLC	Supplier			Pete Fuller
Concord Municipal Light Plant	Publicly Owned Entity		Dave Cavanaugh	
Connecticut Municipal Electric Energy Coop.	Publicly Owned Entity	Brian Forshaw		
Consolidated Edison Energy, Inc.	Supplier	Grant Flagler		
Constellation Energy Generation, LLC	Supplier	Steve Kirk	Bill Fowler	
CPV Towantic, LLC	Generation	Joel Gordon		
Cross-Sound Cable Company (CSC)	Supplier		José Rotger	
Danvers Electric Division	Publicly Owned Entity		Dave Cavanaugh	
Dominion Energy Generation Marketing	Generation		Weezie Nuara	
DTE Energy Trading, Inc.	Supplier			José Rotger
Dynegy Marketing and Trade, LLC	Supplier	Andy Weinstein		
Emera Energy Services	Supplier			Bill Fowler
Environmental Defense Fund	End User	Jolette Westbrook		
Eversource Energy	Transmission			Parker Littlehale
Galt Power, Inc.	Supplier	José Rotger		
Generation Group Member	Generation		Abby Krich	Alex Worsley
Georgetown Municipal Light Department	Publicly Owned Entity		Dave Cavanaugh	
Granite Shore Companies	Generation			Bob Stein
Great River Hydro	AR_RG			Bill Fowler
Groton Electric Light Department	Publicly Owned Entity		Brian Thomson	
Groveland Electric Light Department	Publicly Owned Entity		Dave Cavanaugh	
H.Q. Energy Services (U.S.) Inc. (HQUS)	Supplier	Louis Guibault	Bob Stein	
Harvard Dedicated Energy Limited	End User			Jason Frost
Hingham Municipal Lighting Plant	Publicly Owned Entity		Dave Cavanaugh	
Holden Municipal Light Department	Publicly Owned Entity		Brian Thomson	
Holyoke Gas & Electric Department	Publicly Owned Entity		Brian Thomson	
Hull Municipal Lighting Plant	Publicly Owned Entity		Brian Thomson	
Ipswich Municipal Light Department	Publicly Owned Entity		Brian Thomson	
Jericho Power, LLC	AR-RG	Ben Griffiths		
Jupiter Power LLC	Provisional			Ron Carrier
Littleton (MA) Electric Light and Water Department	Publicly Owned Entity		Dave Cavanaugh	
Maine Public Advocate Office	End User	Drew Landry		

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PARTICIPATING IN THE MARCH 1, 2022 MEETING

PARTICIPANT NAME	SECTOR/ GROUP	MEMBER NAME	ALTERNATE NAME	PROXY
Mansfield Municipal Electric Department	Publicly Owned Entity		Brian Thomson	
Marblehead Municipal Light Department	Publicly Owned Entity		Brian Thomson	
Mass. Attorney General's Office (MA AG)	End User	Tina Belew		Rebecca Tepper
Mass. Bay Transportation Authority	Publicly Owned Entity		Dave Cavanaugh	
Mass. Municipal Wholesale Electric Company	Publicly Owned Entity	Brian Thomson		
Mercuria Energy America, LLC	Supplier			José Rotger
Merrimac Municipal Light Department	Publicly Owned Entity		Dave Cavanaugh	
Middleborough Gas & Electric Department	Publicly Owned Entity		Dave Cavanaugh	
Middleton Municipal Electric Department	Publicly Owned Entity		Dave Cavanaugh	
Mintz, Sam	End User	Sam Mintz		
National Grid	Transmission		Tim Martin	
Natural Resource Defense Council	End User	Bruce Ho		
Nautilus Power, LLC	Generation		Bill Fowler	
New England Power Generators Association (NEPGA)	Associate Non-Voting	Bruce Anderson		
New Hampshire Electric Cooperative	Publicly Owned Entity	Steve Kaminski		Brian Forshaw; Dave Cavanaugh
North Attleborough Electric Department	Publicly Owned Entity		Dave Cavanaugh	
Norwood Municipal Light Department	Publicly Owned Entity		Dave Cavanaugh	
NRG Power Marketing LLC	Supplier		Pete Fuller	
Pascoag Utility District	Publicly Owned Entity		Dave Cavanaugh	
Paxton Municipal Light Department	Publicly Owned Entity		Brian Thomson	
Peabody Municipal Light Plant	Publicly Owned Entity		Brian Thomson	
Princeton Municipal Light Department	Publicly Owned Entity		Brian Thomson	
Reading Municipal Light Department	Publicly Owned Entity		Dave Cavanaugh	
Rowley Municipal Lighting Plant	Publicly Owned Entity		Dave Cavanaugh	
Russell Municipal Light Dept	Publicly Owned Entity		Brian Thomson	
Shell Energy North America	Supplier	Jeff Dannels		
Shrewsbury Electric & Cable Operations	Publicly Owned Entity		Brian Thomson	
South Hadley Electric Light Department	Publicly Owned Entity		Brian Thomson	
Sterling Municipal Electric Light Department	Publicly Owned Entity		Brian Thomson	
Stowe Electric Department	Publicly Owned Entity		Dave Cavanaugh	
Sunrun Inc.	AR-DG			Pete Fuller
Taunton Municipal Lighting Plant	Publicly Owned Entity		Dave Cavanaugh	
Templeton Municipal Lighting Plant	Publicly Owned Entity		Brian Thomson	
Vermont Electric Power Company (VELCO)	Transmission	Frank Ettori		
Vermont Public Power Supply Authority	Publicly Owned Entity			Brian Forshaw
Versant Power	Transmission	Lisa Martin		
Village of Hyde Park (VT) Electric Department	Publicly Owned Entity		Dave Cavanaugh	
Wakefield Municipal Gas and Light Department	Publicly Owned Entity		Brian Thomson	
Walden Renewables Development LLC	Generation			Abby Krich
Wallingford DPU Electric Division	Publicly Owned Entity		Dave Cavanaugh	
Wellesley Municipal Light Plant	Publicly Owned Entity		Dave Cavanaugh	
West Boylston Municipal Lighting Plant	Publicly Owned Entity		Brian Thomson	
Westfield Gas & Electric Department	Publicly Owned Entity		Dave Cavanaugh	
Wheelabrator North Andover Inc.	AR-RG		Bill Fowler	