The following comments were submitted to the Governor's Energy Office in reference to the draft *Maine Pathways to 2040: Analysis and Insights* technical report.

State of Maine
Office of the Public Advocate
112 State House Station, Augusta, Maine 04333-0112
(207) 624-3687 (voice) 711 (TTY)
www.Maine.gov/meopa

Janet T. Mills
GOVERNOR

William S. Harwood
PUBLIC ADVOCATE

November 18, 2024

Governor's Energy Office
62 State House Station
Augusta, ME 04333
geo@maine.gov

RE: Pathway to 2040

To the Governors Energy Office:

Thank you for the opportunity to provide comments on the draft technical report for the Pathway to 2040 (Report). The Office of the Public Advocate (OPA) appreciates the comprehensive analysis provided by the Brattle Group. The input from a variety of stakeholders - state agencies, nonprofit organizations, private businesses and individuals - incorporates the multiple interests of Maine citizens for reaching Maine's greenhouse gas (GHG) reduction goals.

The OPA takes this opportunity to highlight some areas of interest from the Report: 1) Equity Considerations and Affordability; 2) Transmission access; 3) Long Duration Energy Storage (LDES); 4) Load Flexibility; and 5) Greenhouse Gas (GHG) emissions.

1) Equity Considerations and Affordability

The OPA appreciates the Report's recognition that the financial burden of the energy transition falls more heavily on low to moderate income customers than on wealthier consumers. The Report states:

> One of the primary issues in this regard for Maine's clean energy transition is to ensure that low- to moderate-income (LMI) customers are protected from undue cost increases for energy and energy infrastructure. In Maine, to an even greater extent than in other states, the primary focus is on electric sector costs, since Maine has relatively limited reliance on natural gas…

Report at 69.

The OPA analysis of a typical residential consumer's energy burden uses a 6% affordability threshold for all home energy costs (electricity, fossil fuels and wood). Keeping LMI customers within this energy burden threshold for all home energy costs is a primary equity consideration.

Assistance programs help LMI consumers, but do not have sufficient funding to bridge the "affordability gap" that exists. Current funding of $22.5M for the Low Income Assistance Program (LIAP) is woefully inadequate for Maine's 100,000 low-income households. The OPA estimates that the total annual funds needed to achieve affordability targets is over $100M. There are efforts to reduce the "affordability gap" but they do not go nearly far enough. Last year the Public Utilities Commission increased ratepayer funding for the LIAP program from approximately $7.5M/yr. to $15M/yr. The Legislature added more funding by approving a two-year budget appropriation of $15M ($7.5M/yr.) for LIAP. Unfortunately, this current level of $22.5M/yr. of funding does not come close to closing the funding gap. Even this funding is at risk in the future as the Legislature has not approved LIAP funding for this biennium budget. As electric consumers are expected to shoulder the financial burden of reducing GHG emissions, more funding is necessary to assist those in need.

Cost shifts among electricity consumers also is an ongoing concern. When costs for implementing GHG reduction policies are allocated to electricity consumers through a customer charge, low energy users, which include many LMI consumers, experience a proportionately greater rate increase than higher income consumers. While electric bill increases are expected to be offset to some degree by decreases in fossil fuel consumption, equity concerns are raised by the high customer charges for LMI consumers. These nonbypassable charges take a greater percentage of LMI household budgets than the same charge for higher income consumers.

The Report goes on to emphasize the significant financial burden of the upfront costs for individuals in making the transition to clean energy.

> Perhaps more importantly from an equity perspective, the conversions necessary can involve significant initial costs for customers, and these may create a particular barrier to adoption and an economic burden for LMI customers.

Report at 69.

Consumers that are struggling now to pay their electric bills cannot afford the capital investments needed to invest in long-term GHG reduction strategies. These short-term cost impacts are a significant burden for LMI consumers. This is true even if longer term energy prices stabilize five to ten years from now and reduced fuel use lowers the impact of future household energy budgets.

The OPA appreciates the Report's concern with equity impacts. The OPA agrees that for each policy choice made to support the clean energy transition, the financial implications for LMI consumers must be evaluated, "both to facilitate adoption among LMI customers in the first place, and to ease the financial burden when they do." Report at 69.

2) Transmission Access

Incorporating the development of transmission capacity into the timeline for meeting Maine's clean energy goals will assist in prioritizing Maine's investments. Additional transmission

transfer capability is needed to allow further growth of green energy resources in Maine. Recently, the New England States Committee on Electricity (NESCOE) wrote a letter to ISO New England on the need for more transmission. NESCOE points out that efforts to develop resources in Maine to reduce GHG emissions will be frustrated by the lack of transmission capacity. All six New England states recommend relieving Maine's transmission congestion as the number one priority for transmission investment. NESCOE states:

> The 2050 Transmission Study and other studies show that bottlenecks on the interfaces between Maine and southern New England will persist and only worsen in the future. Additional 2050 Transmission Study analysis further shows that even relocating generation south of these interfaces did not resolve the constraints. Strengthening the connections between northern and southern New England will enhance reliability and market efficiency by resolving known constraints on the transmission system and will also position the region to more efficiently integrate affordable resources in coming years. Recent studies, along with the current interconnection queue, indicate that on the order of 3,000 megawatts (MW) of additional generation capacity could potentially be developed in northern Maine.

https://nescoe.com/resource-center/lttp-rfp-letter/

The lack of adequate transmission also contributes to the curtailment of renewable generation within Maine as more generation as added, limiting the potential contribution of new and existing projects to regional GHG reduction. In addition to the interface between Maine and southern New England, similar bottlenecks exist at Orrington and Surowiec. Increasing transmission capacity through such bottlenecks unlocks incremental renewable production from existing renewable generation project

As the Report identifies Maine's reliance on developing more non GHG emitting resources for the Pathway to 2040, recognizing the need for additional transmission capacity will help Maine realize its clean energy goals.

3) Long Duration Energy Storage

The Report recognizes the role of LDES in reaching 2050 goals, particularly in the 100% renewable pathway. It states:

> New England electric storage reaches almost 38 GW (over 6,000 GWh of energy storage capacity) in the 100% Renewable Generation pathway by 2050, driven primarily by additional long duration energy storage (LDES). This is about 60% of New England's 2050 peak load, and over a week's worth of average load… several LDES developers are pursuing early-stage development and deployment of their technologies to scale up production and demonstrate its ability to meet the future system needs, supported by state, utility and federal LDES-specific programs. Given these characteristics, LDES may be able to play a significant role in meeting the needs of a deeply decarbonized power system, especially in a future where access to carbon-neutral fuels is limited.

Report at 45-47.

It is important to note that certain LDES technologies have reached early commercialization. Targeting ways to support full commercialization of LDES beyond pumped storage systems can be part of a cost-effective plan to meet GHG reduction goals. Electro-chemical technologies (zinc air, iron air and sodium-ion systems); mechanical technologies (compressed air, liquid air) and thermal technologies (sensible heat, i.e. molten salt, heated rock) are all in early stages of commercialization. (LDES Council, 2024 Annual Report at 38-44.) https://ldescouncil.com/ Many of these have round trip efficiencies better than that of pumped hydro storage. Recognizing that different types of LDES have reached commercialization creates more options for GHG reduction strategies. Adding LDES will avoid the need for some new energy resources thereby reducing transmission congestion, and potentially reducing the costs of decarbonization.

4) Load Flexibility

The OPA agrees with the Report's evaluation of the importance of load flexibility in reducing infrastructure costs. Through the OPA's work with the Nonwires Alternative Coordinator (NWAC), the OPA recognizes that reducing peak loads is the key to reducing costs of increasing electricity reliance. The Report reflects this correlation between reducing peak energy use and reducing costs, stating:

> [t]he Core pathway, which incorporates a substantial amount of withinday load flexibility, has materially lower requirements for electricity infrastructure and thus lower overall cost than the No Flexible Load pathway. The High Load Flexibility pathway performs even better on these dimensions.

Report at 67.

The Report's findings are consistent with NWA experience in evaluating the cost effectiveness of infrastructure investments.

Efficiency Maine Trust, a collaborator in NWA investigations, continues to invest in programs designed to manage peak load. https://www.efficiencymaine.com/triennial-plan-vi/ These efforts help manage electricity costs by managing time of use for electronic equipment and avoiding periods of peak demand. By integrating the work of Efficiency Maine Trust and the NWAC with the Climate Action Plan, as envisioned by the 2019 Nonwires Alternative legislation, cost savings for Maine consumers will be realized.

5) Greenhouse Gas Emissions from Gas Utilities

Absent from the Report is a discussion of potential changes to state regulations to reduce GHG emissions from the gas utility industry. While Maine's gas utility footprint is relatively small, Maine needs a more effective strategy to reduce expansion of gas infrastructure and the resulting expansion of emissions. Doing so will not only reduce GHG, but will reduce the stranded costs that are expected when Maine reduces or eliminates its reliance on carbon fuels.

Thank you for the opportunity to provide these comments. The OPA looks forward to continuing the collaboration with all stakeholders to make Maine's energy transition.

Respectfully submitted,

/s/ Susan Chamberlin

Senior Counsel and Climate Policy Advisor
Office of the Public Advocate

/s/William Harwood
Public Advocate
Office of the Public Advocate

November 18, 2024

TO: Dan Burgess, Director, Governor's Energy Office

FROM: Steve Clemmer, Director of Energy Research and Analysis, Union of Concerned Scientists

RE: Comments on Maine Pathways to 2040 analysis

Thanks for the opportunity to submit comments on the Maine Pathways to 2040 report on behalf of the Union of Concerned Scientists (UCS). Overall, the report presents a comprehensive and compelling analysis showing that there are several feasible and affordable pathways for Maine to meet its climate and clean energy goals primarily with wind, solar, energy storage, electrification, energy efficiency, and demand management. The results are consistent with recent decarbonization studies completed at the global and national levels by the Intergovernmental Panel on Climate Change (IPCC), International Energy Agency (IEA), UCS, Princeton, and others.

I offer the following comments on how the report could be further improved in several areas.

Executive Summary

I would suggest including more numerical results for each of the key findings in the executive summary of the report. It's a long and detailed report and decision makers and other key stakeholders may only have time to read the executive summary. Having some numerical results to supplement the more qualitative language will improve understanding of the magnitude of the changes and key differences between pathways, which is important for informing policy design and decision making.

Energy costs

In particular, I would suggest including more numerical results on energy supply costs and electricity prices in both the executive summary and results section of the report as well as making a few additional points from later in the report in the summary. This could include:

- adding increases or decreases over time in percentage terms and dollar amounts for the various pathways and saying how much costs would go up or down under the alternative pathways compared to the core pathway.
- replacing "Overall energy supply costs are *unlikely to increase significantly*…" with "*are projected to decline X% by 2050 in the core pathway*" as shown in Figure ES-3. Similarly, I would suggest replacing "higher electricity costs are *largely offset* by savings from decreased reliance on fossil fuels" with "*more than offset"*. I would also add that electricity prices are projected to decline by X% by 2035 and Y% by

2050 in the core scenario, as shown in Figure ES-3. Similar language should be replaced in other parts of the report (see pages 23, 38-40, 59, 73-74, 78-79).

- adding the reductions in costs for an average Maine household from page 42: "The total cost of serving the energy needs of an average Maine household falls by about 20% from 2023 to 2050 (just over $1,300 per-year), relative to 2023 costs. Both home and transportation energy costs are projected to fall as end uses powered by fossil fuels are transitioned to lower cost renewable electricity." This result is important for understanding how transitioning to clean energy, energy efficiency, and electrification can help lower energy burdens for all Maine households. It can also help inform recommendations in the forthcoming Climate Action Plan for reducing energy burdens in low- and moderate-income households and OPA's updated energy burden analysis.
- adding the point made later in the report (p. 43) that transitioning away from fossil fuels to clean energy can help reduce future volatility in fossil fuel prices and consumer energy bills.
- clarifying in the summary that the cost estimates are conservative (or the savings would be greater) because the report does not include avoided climate damages, public health benefits from reducing other pollution from fossil fuels, and employment and other macroeconomic benefits, as discussed in the box on p. 42 of the report.

Clean Fuels

The discussion of so-called "clean fuels" greatly understates many of the challenges and concerns of producing and using these fuels in thermal plants. More clarity is also needed on what clean fuels are being deployed in the modeling earlier on in the report. It appears that the model is mostly deploying renewable natural gas (RNG), synthetic natural gas (SNG), hydrogen, or biodiesel (as described on pages 26, 42, and 61 of the report). This should be clarified in the executive summary (on p. x) and introduction (p. 6) of the report.

While the report acknowledges a few challenges and concerns of using these fuels in existing and new thermal power plants, they are high level and primarily focused on plant level considerations not captured in the modeling. Footnote 116 also notes the importance of conducting a lifecycle analysis of these fuels to ensure they are low or zero carbon: "It will be important to understand the extent to which these "clean" fuels are actually low/zero-carbon, according to a lifecycle analysis that accounts for emissions during production, transportation, and use. If there are any small residual non-zero GHG emissions associated with "clean" fuels, it will be important to mitigate or offset those emissions, to be able to meet the 100% clean electricity requirement." I would suggest

moving this important text to the body of the report and briefly mentioning it in the executive summary. It could also be expanded to mention that other important environmental and public health safeguards will be necessary to ensure that the fuels are produced sustainably.

Examples of additional challenges and concerns of producing and using clean fuels in gas plants are highlighted in a new issue brief UCS released in October called *Beyond the Smokestack: Assessing the Impacts of Approaches to Cutting Gas Plant Pollution*. We also released the UCS Gas Plant Alternatives Tool (GPAT), which is an interactive spreadsheet tool for understanding pollution from specific gas power plants and the impact that biomethane, CCS, and hydrogen co-firing can have on their carbon emissions.

I would suggest including some of these examples in the report, such as:

- Because hydrogen has a lower energy content than natural gas, reductions in carbon emissions can be a lot less than the blending percentage.
- Burning hydrogen or biomethane in gas plants can result in an increase in nitrogen oxide (NOx) emissions and other pollutants that can be harmful to people living near those plants.
- Most hydrogen is currently produced from natural gas, which is an energy and carbon intensive process. Producing hydrogen from wind and solar through electrolysis has a much lower carbon intensity, but is much less efficient than using the electricity from wind and solar directly.
- Upstream leakage of natural gas, hydrogen, and biomethane from producing and transporting those fuels could result in an overall increase in heat trapping emissions and more than offset CO2 reductions at the smokestack.
- Increased production of biomethane can result in more air and water pollution and other environmental and public health impacts for people living near the sources of those fuels.
- Adding CCS to a gas plant reduces its efficiency, which means you need more gas or clean fuels to produce the same amount of electricity.
- While the cost of producing low or zero carbon hydrogen through electrolysis is projected to fall significantly over time, currently the cost is several times higher than the cost of producing hydrogen from gas per unit of energy.
- Retrofitting or upgrading gas plants to burn hydrogen or biomethane or adding CCS can be expensive and it would be difficult to recover the additional costs if the plants are only operating a few hours of the year (less than 2% of their rated capacity) in the future. Changes to market rules would also be necessary to provide enough compensation for gas plants to operate this way in the future.

The report also notes that the primary engineering and reliability challenge of achieving the 2040 targets is finding a cost-effective approach for meeting electricity demand when renewable energy output falls far short of load for extended periods, typically in winter (p. 34). The report should explicitly acknowledge that offshore wind can make a higher contribution to resource and energy adequacy in the winter and especially during extreme cold events that have negatively impacted many gas plants and resulted in major power outages in the region, as highlighted in a recent UCS analysis included in comments submitted to GEO in May.

Energy efficiency

The report greatly understates the importance of energy efficiency in meeting the state's climate and clean energy goals. For example, on p. 23, the report says efficiency helps reduce incremental demand but is not a central driver of emission reductions. This is not consistent with the findings of other recent global and national decarbonization studies referenced above, which show that efficiency can play an important role in reducing energy use and emissions and lowering energy bills, especially in the near-term as fossil fuels are being phased out from the electricity system and broader energy system. Efficiency can also be deployed more quickly than most supply-side solutions. I would suggest including some additional language and key results in the executive summary and body of the report highlighting the important role that energy efficiency can play in reducing energy use and emissions and in lowering energy bills in the buildings, industrial, and transportation sectors.

Equity impacts

The report talks about policy mechanisms such as low-income qualified grants, low-cost financing, and information and technical assistance to help reduce the higher upfront costs of investing in clean energy, efficiency and electrification, and reducing energy burdens to LMI customers. It also specifically mentions the Maine Climate Council Equity Subcommittee recommendations from 2023. I would suggest adding a few sentences referencing the recommendations in the updated climate action plan focused on reducing energy burden for LMI customers and other state and federal programs such as the IRA incentives Maine is receiving for the Solar for All Program, Green Bank, Home Energy Rebates and heat pumps. You could also mention that the federal Justice 40 initiative requires that at least 40% of the benefits of the IRA incentives flow to environmental justice and disadvantaged communities and LMI households.

Other detailed comments

p. vi-vii: Are the targets assumed for EVs reflected in Figure ES-1 based on the targets developed for the 2020 Climate Action Plan or the revised lower targets for forthcoming updated plan? Please clarify.

p. 26. Says small amounts of pipeline gas, diesel, and other petroleum products remains in 2050, primarily for use in transportation and industry. How are the emissions from these sources offset to get to 100% clean/carbon neutral?

p. 30-31. Suggest specifying the % of total generation coming from clean fuels used in thermal plants in 2035 and 2050 to better understand the relative contribution of this option compared to other solutions.

p. 36. Suggest specifying how much new thermal capacity gets built and the % of new capacity by 2035 and 2050.

p.48-49. As mentioned above, suggest specifying how much more the 100% RE case costs than the core pathway. Same with the other alternative pathways. Maybe include a chart or table comparing total energy supply costs and average electricity prices and indicate % increases or decreases over time and across all the pathways.

pp. 74-75. Under addressing barriers to adoption section, could explicitly mention expanding EMT programs and incentives Maine is receiving under the IRA related to rebates and cost assistance.

pp. 78-79. In the conclusion, the 3rd bullet says "Thermal electricity generation powered by clean fuels….currently appear likely to be lower cost…" Lower cost than what? This is also misleading as they are only deployed after 2035 to achieve the last ~5-10% because they are more expensive than other solutions. I would also suggest revising the sentence "A broad definition of what qualifies as "clean" will facilitate the use of the most effective technology." Perhaps more importantly, the definition of clean fuels should include strong guardrails and safeguards, such as sustainability criteria and requiring life cycle assessments, to help avoid negative outcomes and ensure fuels are low carbon.

I would also recommend adding a bullet in the conclusion on the key role that wind, solar, and storage play in meeting emission reduction targets combined with widespread electrification and emphasizing the importance of energy efficiency in reducing the overall level of load growth and supporting infrastructure that will be needed.

Thanks again for the opportunity to submit comments on this important report.

Maine Electrical Utility Load Management

By

Richard V. de Grasse, P.E.

I'm an electrical engineer retired to Islesboro, Maine. My technical specialty is electric utility load management. I began my electric utility load management work as Deputy Commissioner of the Vermont Public Service Board (PSB) appointed by then Governor Dean C. Davis. My duties were to seek out and recommend implementation of energy and cost saving opportunities for Vermont electricity customers and electric utilities. During my tenure at the PSB I hosted Tom Strickland an Australian utility regulator. During our many technical, electrical utility rate structure and power economic discussions, he described the Australian countrywide optional off-peak, time-of-use (TOU) electric rates and especially the widespread use of electric thermal storage (ETS) heating. Neither off-peak electric rates suitable for ETS heating and ETS appliances were available in Vermont and the United States at that time.

Following my discussions with Tom Strickland I received a grant from the National Science Foundation to review European electric utility ETS load management practices. I learned that all major electric utilities in the United Kingdom, France and Germany have over the years reduced their need for fossil fuel-fired peak generation by offering daily off-peak TOU electric rates and promoting the widespread use of electric thermal storage (ETS) heating. Electricity for ETS off-peak heating was principally provided by base load generation capacity. As a result of my European observations, I recommended that Central Vermont Public Service Corporation, Green Mountain Power and Vermont Public Power Supply Authority design and offer optional daily off-peak rates to help manage their electrical load. In conjunction with the daily 8 hour nighttime off-peak electric rates I imported European ETS heating equipment for testing in Vermont homes. Today there are hundreds of ETS installations in Vermont and elsewhere around the country. ETS heating is unknown in Maine except in the Madison, Maine municipal electric department service area.

Approximately 24 years ago Central Maine Power (CMP) and Bangor Electric Department (BED) were required by Maine law to divest themselves of their in-state power generation. This divestiture resulted in the power supply portion of a Maine customer's electric service - approximately 60% - becoming unregulated by the Maine Public Utility Commission (MPUC). The approximately 60% supply portion of the customers service is best known as the Standard Offer. The Supply portion of the customer's service is not time-of- use (TOU) differentiated.

Following the divestiture of Maine power generation the in-state transmission and distribution (D&T) portion of the customer's service – approximately 40% of the customers service - continues to be regulated by the MPUC. CMP currently offers 3 TOU rates effective for the transmission and distribution portion of the customer's service. For Maine to create an economic incentive for load management – termed "load flexibility" on page 55 in the Brattle report- to reduce fossil fuel-fired peak generation Maine electric utilities must offer time-of-use (TOU) electric rates at <u>both</u> the electricity generation supply level and transition and distribution (D&T) level. The Maine electricity supply is unregulated by the MPUC and is not time-of-use (TOU)

differentiated yet the out-of-state Maine power supple utilities offer optional TOU rates in their home service areas. For Maine to achieve its long-term energy and environmental objectives it should immediately require electricity supply utilities to offer optional off-peak rates in alignment with existing CMP TOU rates and begin testing and implementing both heat pump electric thermal storage heating systems and controllable loads. It could be argued that Maine made a mistake years ago in requiring generation divestiture resulting in the MPUC ignoring power supply load management opportunities. As an example of low-cost load management practice, prior to Maine power supply generation divestiture, I consulted with Sugarloaf Corporation, a large CMP electric customer, and was able to work out an agreement whereby Sugarloaf would control their large electric snowmaking load in such a way as to be non-coincident with the CMP peak. Also I was the load management consulting engineer for nearby Nova Scotia Power. Presently off-peak rates and ETS heating is widespread in Nova Scotia.

I presented testimony advocating time-of-use electricity Supply rates to the Maine Public Utility Commission Docket 2023-00019 late in 2023. It is more environmental and cost-effective for Maine to take advantage of all available customer load management opportunities - referred to as “flexible loads” in the Brattle Group draft report - before developing offshore wind generation. Offshore wind generation will require vast shore side energy storage facilities. As an example of aggressive load management practices, Green Mountain Power in Vermont is currently offering a host of customer owned storage and load control TOU rates. As a result of GMP’s load management practices their electric rates are lower than Maine and they have much less need for fossil-fuel-fired peak generation.

Flexible Load Pathways and Heat Pumps. Brattle report pages 50-57

Utilities which aggressively practice electric load management have been able to reduce the need for peak generation, transmission and distribution capacity. Heat pumps adoption is detailed on pages 50-53 of the Brattle report. Heat pumps use significantly less electric energy than conventional direct electric heat but since they extract heat energy from outside air or from the earth heat pumps are least efficient on coldest days and, therefore, require the electric utility to utilize peak generation to serve them. To take advantage of heat pump efficiency and provide an off-peak managed load the Steffes Company developed an off-peak heat pump system. No electric energy is needed during peak days reducing the need for peak generation.

Flexible loads are much more cost-effective and environmentally beneficial for both consumers and electric utilities than non-flexible loads as proven for decades by hundreds of electric utilities and electricity customers around the world. As mentioned, there are 2 essential elements to electric load flexibility: time-of-use (TOU) electric rates and energy storage and/or controllable loads. Solar energy can be further augmented using non coincident rates with customer owned storage. Space heating is a very large Maine load which can be deferred and reduced using electric thermal storage heating with and without heat pumps as noted in the Steffes attachment.

Maine Governor's Energy Office
62 State House Station
Augusta, Maine 04333

Submitted via electronic mail to geo@maine.gov

November 18, 2024

Re: MREA and ACT Comments, Draft "Maine Pathways to 2040: Analysis and Insights" Technical Report

To Whom It May Concern:

On behalf of the Maine Renewable Energy Association (MREA) and the Alliance for Climate Transition (ACT), thank you for the opportunity to comment on the draft "Maine Pathways to 2040: Analysis and Insights" technical report. MREA's and ACT's varied members, including wind, solar, biomass, and hydropower developers and generators, as well as battery energy storage developers and operators and suppliers of goods and services to the renewable energy industry, support the Mill's Administration's goal to achieve 100 percent clean energy in Maine by 2040. We believe that this report, on the whole, is thorough and presents reasoned and reasonable approaches to achieving a goal that is critical to mitigating the worst impacts of climate change, improving public health, and bolstering a clean energy economy that already supports more than 15,000 Maine jobs and has contributed over $2.31 billion to Maine's economy. That said, our primary critique is that we believe the "Core Pathway" relies too heavily on assumptions that may not, given potential changes in federal policy and Maine's attrition patterns, come to pass. As such, we believe that Maine's ensuing Energy Plan must incorporate elements of both the Core and "100% Renewable Energy Generation" Pathways, as well as incorporate expanded investment in DERs. Our comments will expound on this critique and will include others.

The draft report states that to "achieve 100% clean energy by 2040, Maine must accelerate its procurement of renewable energy" and that "Maine is making strides with its commitments to offshore wind projects, the Northern Maine Renewable Energy Development Program, and additional solar initiatives…"[1] While MREA and ACT are wholly supportive of these programs, given the amount of attrition that took place in the Maine Public Utilities Commission's (MPUC) 2020 and 2021 procurements, delays in the Northern Maine program, and likely changes in federal policy outlook regarding offshore wind, we strongly believe that Maine must accelerate renewable energy procurements beyond existing policy to guard against

[1] *See* Maine Pathways to 2024: Analysis and Insights, prepared by The Brattle Group and Evolved Energy Research for the Maine Governor's Energy Office, Page x.

a reasonable likelihood that Maine does not meet its current policy commitments. Such procurements should be regular[2] and include volumetric targets[3] and increase minimum threshold and evaluation requirements[4], all of which are recommendations from "An Assessment of Maine's Renewable Portfolio Standard" and will spur bidder interest and guard against attrition.

Similarly, we believe the report does not adequately highlight the importance of expanded investment in distributed energy resource (DER) adoption to timely achievement of Maine's clean energy goals. DERs are a proven technology, with an established workforce, and a demonstrated record of completing thousands of projects statewide. Again, while MREA and ACT wholly support Maine's offshore wind and Northern Maine programs, we recommend that the report better acknowledge the capacity of DERs to drive continued progress toward Maine's goals. An MPUC analysis of the NEB program[5] shows that DERs are already delivering benefits in excess of costs. This cost-effectiveness stands to increase with continued improvements in distribution system planning, data collection and sharing, rate design, and new tools for DER management. As such, GEO's forthcoming Energy Plan must include expanded investment in DER adoption, along with "following though on [existing clean energy policy] commitments".[6]

Maine can also "follow through" on existing clean energy policy commitments, reduce costs, and keep pace to meet its 2040 goal by "streamlining land-use, siting and permitting policies, and processes" as recommended in the draft report.[7] Current rulemaking at the Maine Department of Environmental Protection and Maine Department of Agriculture, Conservation, and Forestry that would impose fees and permitting requirements exclusively on renewable energy development directly contradicts this recommendation. MREA and ACT believe both rulemakings must be significantly revamped or abandoned if Maine is to meet its 100 percent by 2040 goal.

MREA and ACT acknowledge that certain "clean" resources such as zero-carbon dispatchable thermal generation may have a role to play in lowering the cost of the transition to renewable energy. We look forward to further engagement with the GEO and other stakeholders to define appropriate parameters for "clean" resources and their role in achieving Maine's policy goals. As a threshold matter, we would observe that current definitions for Class I and Class IA resources should not be expanded to include these "clean" generators. Rather, any "clean energy standard" (CES) should be structured as a portfolio requirement complementary to the existing renewable portfolio standard. Massachusetts offers an example of this general structure, with a CES designed to create incremental demand for Class I resources until any

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[2] *See* Maine Climate Council Energy Working Group June 2024 Recommendations.
[3] *See* An Assessment of Maine's Renewable Portfolio Standard, prepared by Sustainable Energy Advantage for the Maine Governor's Energy Office, in collaboration with the Maine Public Utilities Commission, March 31, 2024, Page 98.
[4] *See* Id. at 96.
[5] *See* Id.
[6] *See* Maine Pathways to 2024: Analysis and Insights, prepared by The Brattle Group and Evolved Energy Research for the Maine Governor's Energy Office, Page x.
[7] *See* Id. at xii.

qualifying “clean” resources are available to supply the CES at lower cost than Class I resources.

MREA and ACT also take issue with the suggestion that, in the Core Pathway, the remaining gap in extended winter shortfalls may be met in part by importing Canadian hydropower.[8] Including resources located outside of Maine would weaken support for Maine’s renewable energy programs, which are grounded in Maine-based investment, spending, and revenue generation. That positive economic impact is diminished by regional eligibility.

Taking into consideration all of MREA’s and ACT’s critiques of the report, we strongly recommend that the GEO’s forthcoming Energy Plan incorporate a hybrid of the Core and “100% Renewable Generation”[9] Pathways, with expanded investment in DERs. As discussed, we believe that this approach guards against the report’s unreliable assumptions. It also provides flexibility should the economics of the “100% Renewable Energy Generation” pathway change.

Thank you for your consideration. We look forward to remaining engaged in this important process.

Sincerely,

Eliza Donoghue
Executive Director
Maine Renewable Energy Association

Natalie Hildt Treat
Director of Public Policy
The Alliance for Climate Transition

[8] *See* Maine Pathways to 2024: Analysis and Insights, prepared by The Brattle Group and Evolved Energy Research for the Maine Governor’s Energy Office, Page 34.
[9] *See* Id. at 41.

State of Maine
Governor's Energy Office

Maine Energy Plan: Pathway to 2040

Draft Technical Report of Brattle Group

Comments of Peter Evans (New Power Technologies Inc.)

November 18, 2024

I would again like to recognize the Governor's Energy Office (GEO) for the scope of the Pathways to 2040 Analysis, particularly that the analysis looks at the energy system on an hourly basis. This type of analysis is the only way to understand the interaction between non-coincident and independently-varying load profiles and non-dispatchable renewable supply profiles in a nominally decarbonized future energy system. It is no longer enough to call an energy system that meets its needs via zero carbon resources on an annual basis "carbon free." The daily and seasonal peaks, when they occur, and how (or if) they are served, all matter. What we have now, through this analysis, is an honest way to begin to understand what an energy system must look like to actually deliver given greenhouse gas reduction goals with alignment of supply and demand.

Thank you for the opportunity to offer the following comments on the draft technical report, referred to here as the Pathways to 2040 Analysis.[1]

1. Energy Cost Impact on Maine

By far the most important policy consideration for the Maine Energy Plan is its impact on energy costs for Maine residents. The Pathways to 2040 Analysis provides at least one realistic and internally-consistent view of what supply and delivery resources will be needed when (and to some extent where) to

[1] These comments are based on the "draft technical report" on the GEO website: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.maine.gov/energy/sites/maine.gov.energy/files/2024-10/Maine%20Pathways%20Report%20Draft%20for%20Comment.pdf; accessed 10/30/2024. All of the footnotes here refer to this document.

support electrification of end-uses and decarbonization of supply simultaneously. This analysis thus provides a valid, objective platform from which to project energy cost impacts.

The Pathways to 2040 Analysis projects that overall energy supply costs and average electricity costs on a per-kWh basis will decline in the implementation of the plan.[2] This projection is of course a function of many underlying assumptions. The final version of this analysis should include a detailed appendix identifying the actual assumptions used, their sources (with good links), how they have been incorporated into the study, and how they drive the conclusions.

It should be possible for other stakeholders to duplicate the results of the analysis, and test and run sensitivities on the assumptions. Perhaps more importantly, it should be possible for policymakers to monitor how real future conditions diverge from these assumptions and alter course as appropriate.

A related point, the Pathways to 2040 Analysis anticipates the conversion (really replacement) of most fossil fuel-consuming vehicles and space heating systems to electric within a few decades. Each of these conversions involves multiple tens of thousands of dollars, per system, per customer. Some of these costs are noted in Part VII, Key Policy Implications.[3] However, while the analysis notes these costs, it suggests that they are external to the analysis. To the extent that these conversions must occur ahead of some normal rate of replacement, these are really costs of the plan and should be included (with due allowance for the recovery of upfront costs from future savings over time). To the extent these costs are actually borne by others, through grants, below-market financing, or other financial incentives, these costs are in fact costs of the plan.

2. Role of Flexible Load

The Pathways to 2040 Analysis "core pathway" anticipates an increase in the peak load on the distribution system from about 2.1 GW in 2023 to about 5.1 GW in 2050[4] due to electrification.

By definition the distribution system does not always operate at its nominal peak, so at most times there is unused capability to serve additional load. To the extent incremental demand occurs at other than peak periods, or is shifted out of peak periods, the need for physical distribution system upgrades and those associated costs may be avoided.

[2] Figs. ES-3 and III-13

[3] VII.C.1, p. 73.

[4] Fig. III-12.

Notably, the "core pathway" *already* assumes and includes substantial load flexibility: 67% of EV load can be delayed up to 8 hours, 10% of space heating/cooling load can shift one hour, and 10% of water heating load can shift up to 2 hours.[5] It is not stated in the analysis, but still could be the case, since every distribution feeder may peak at a different time of day, and that peak time may vary through the year, these shifts might be different every day, that is, relatively dynamic, to gain the maximum benefit.

In the analysis, without the assumed load flexibility distribution peak load (and required distribution capacity) would be about 10% higher in 2050, with related increases in the need for thermal capacity and storage resources. Additional load flexibility could reduce the distribution peak load by another 10%.[6]

Since its inception, retail electricity service has been on-demand – really more a convenience than a purchased service or product. Central Maine Power even says "Flip a switch and we're there." To achieve the analysis' assumed level of load flexibility will require voluntary customer participation. This in turn will require solution providers with offerings that in fact attract customer participation. This in turn will require a business case for solution providers to enter and stay in the market.

We believe addressing these needs to achieve load flexibility should be a primary, initial focus of planners such as the GEO. Moreover, pursuing and achieving load flexibility is the lowest of low-regret initiatives. Whatever load flexibility that can be achieved has value in any future energy scenario.

3. Role of Thermal Resources

The Pathways to 2040 Analysis states that thermal power generation resources are needed in a 100% clean energy portfolio, these should be retained, and that thermal generation facilitates high renewable penetration.[7] "[W]hile meeting the state's goals without any thermal generation is *probably* possible, it would be more challenging and more costly." [8] [emphasis added].

[5] Fig. III-21

[6] P. 56

[7] P. 61

[8] P. 61

We see this as one of the most notable conclusions of this analysis, particularly for those outside the energy domain. A 100% clean supply portfolio that meets actual loads is not just PV and wind. This conclusion has at least two related implications.

The Pathways to 2040 Analysis assumes thermal generation will operate on clean fuels such as renewable natural gas (RNG), synthetic natural gas (SNG), hydrogen, or biodiesel.[9] This assumption prompts questions about whether such fuels are presently available at GW scale (and at what cost). It also prompts questions about whether such fuels can be made available to generating plants on short notice for sustained operation (days or weeks) after perhaps months or years of inactivity. Even if the answers are "no" or "not yet," the system's need for dispatchable thermal generation apparently would persist. It may be the case that the Energy Plan should explicitly include continued use of gas-fired thermal generation to facilitate its other goals, even if on a declining and transitional basis.

ISO-New England and Maine presently have a relatively limited inventory of thermal generation.[10] Further, the analysis treats the cost of these resources as "sunk"[11] – so presumably there is no allowance for the cost to construct the needed dispatchable thermal capacity. In other parts of the country thermal generation resources – even recently-built plants – are being shut down. If we now understand that such resources, albeit with different fuels, are actually needed to facilitate a high renewable supply resource mix, such resources will need a business case and revenue sources to sustain them. This need will remain so in the future – a power generation resource that operates 2% of the time[12] but must deliver when needed will have to be sustained via a revenue stream other than energy sales. The Energy Plan should identify these assumed-for-the-future resources, and stakeholders should monitor their viability on an ongoing basis.

[9] P. 61

[10] Note 70 says Maine thermal capacity is to rise from 2.36 GW in 2032, presumably mostly existing. Appendix B.1.f says Maine has 80 MW of conventional steam generation, 1.4 GW of combined cycle generation, and 354 MW of combustion turbine generation.

[11] P. 34

[12] P. 61

4. Customer-Sponsored Resources as Grid Resources

As stated, the Pathways to 2040 analysis anticipates dramatic increases in the peak demand on, or capability of, the electric power distribution system to support increased loads from electrification. Expanding the capability of the distribution system will increase electric delivery costs for all customers.

In principal, power generation within the distribution system (so-called distributed energy resources or DER), generally customer-sponsored, could materially offset these increases. The analysis states "It would likely be more cost-effective to target DER adoption in locations where they are most valuable for reducing electricity infrastructure requirements and costs, particularly where they can avoid or limit distribution system upgrades."[13]

Where increases in distribution demand run up against distribution system constraints is highly location-specific. A delivery constraint could emerge first at a service transformer serving a customer or neighborhood, or at a feeder line segment, or in a regional substation. In addition, to relieve a constraint, a given DER even in the right location would have to have an operating profile that aligns with the grid constraint.

Once a grid need or constraint is identified, a DER or group of DERs could deliver capacity and energy at an agreed upon location and time, under agreed-upon operating conditions, with agreed upon notice, all set forth in a "grid service" agreement, to relieve the constraint, again, *in principal*.

The use of DER to mitigate distribution system upgrade costs represents an opportunity that has not yet been fully implemented successfully in system planning. New Power Technologies provided testimony in Docket 2022-00322 with some encouraging examples.[14] Here utilities have characterized their grid needs in terms that would support alternative or infrastructure as-a-service solutions, then procured such solutions from third parties.

The increases in peak distribution demand and needed distribution system expansion identified in the Pathways to 2040 Analysis now present an imperative to develop and use this opportunity.

[13] Page ix

[14] Docket 2022-00322 Item 71, "Comments regarding characterizing grid needs to support alternate solutions", Evans, Peter

REVISION ENERGY

November 18, 2024

Dan Burgess, Director
Governor's Energy Office
62 State House Station
Augusta, Maine 04333

VIA ELECTRONIC MAIL

RE: Maine Energy Plan: Pathway to 2040 Draft Technical Report

Dear Mr. Burgess:

ReVision Energy Inc. (ReVision) offers these comments in response to the Governor's Energy Office's (GEO's) invitation for public comment on the draft report: "Maine Pathway to 2040: Analysis and Insights" (the Draft Report) prepared by The Brattle Group and Evolved Energy Research.

I. Introduction

Founded in Maine twenty years ago, ReVision is an employee owned, certified B Corporation clean energy construction company. ReVision has grown to over 275 employees headquartered at its branches in South Portland and Montville. Guided by a mission to make life better by building our just and equitable electric future, ReVision has designed and constructed thousands of distributed energy resources (DERs) serving Maine households, municipalities, schools, and businesses. These installations span solar systems, battery energy storage, heat pumps, heat pump water heaters, and electric vehicle chargers. Together, these products enable our customers to take strides toward whole-home and whole-business electrification, supplied with renewable generation.

ReVision appreciates the clarity of the Draft Report's conclusions on the feasibility of achieving Maine's clean energy and greenhouse gas reduction targets. The fundamental finding that "widespread electrification…of transportation and heating, combined with transitioning to clean electricity supply…will achieve Maine's GHG reduction goals" affirms the direction the energy transition that is already underway across Maine.[1] Especially notable is the Draft Report's finding that overall energy costs do not increase, but instead "remain generally stable…as electricity substitutes for fuels" used for heating, transportation, and other end uses.[2] ReVision appreciates the elevation of this conclusion

[1] Maine Pathway to 2040: Analysis and Insight - Draft Report (Draft Report), at page 74.
[2] *Ibid*.

and agrees with the Draft Report's findings on the importance of electrifying heating and transportation, enhanced load flexibility, improved system planning, streamlined permitting, equitable access to benefits, and support for a robust workforce to the ongoing decarbonization of Maine's economy. We recommend that the final draft of this technical report and the forthcoming Maine Energy Plan continue to emphasize these themes.

ReVision also recognizes that any modeling effort of the scale undertaken in this Draft Report requires the use of simplifying assumptions. We are nonetheless concerned that certain modeling assumptions inappropriately discount the potential contribution of DERs – particularly distributed solar and storage – to the achievement of Maine's policy targets. These "Key Assumptions" relate to timelines for the development of planned renewable generation, including large wind resources, and to the determination of costs and benefits of DERs.[3] We respectfully recommend that the final report better highlight the importance of continued investment in distributed solar and storage to the time timely, cost-effective achievement of Maine's clean energy targets.

II. Ready-to-deploy DERs Complement Larger Renewable Resources

Across all pathways, the Draft Report assumes the successful commissioning of all renewable resources currently under contract or otherwise planned for development in Maine. This "Key Assumption" includes the construction of three gigawatts of offshore wind by 2040 and of an onshore project equivalent to King Pine on a "time frame close to its original schedule."[4] While we agree these wind resources are critical to meeting Maine's energy needs, we are concerned that the report's assumed timelines ignore contrary indicators. Maine has seen attrition in planned large projects, including generators awarded contracts under past procurements of the Maine Public Utilities Commission (the Commission). Beyond Maine, offshore wind development has faced notable hurdles to timely approval and construction. The need for floating turbines and the pending change in presidential administration could pose further delays to project development in Maine. The final draft of the report would benefit from a more nuanced treatment of these timelines and recognition that other resources may be needed to ensure that Maine adheres to its clean energy targets in the years preceding the construction of new wind resources.

DERs can help meet this need, as recent deployment of distributed solar resources in Maine demonstrates. Annual installed capacity of residential, commercial, and community solar projects reached nearly 200 MW in Maine in 2022 and exceeded 300 MW in 2023.[5]

[3] Draft Report at page 31.
[4] *Ibid*.
[5] Governor's Energy Office "Maine Solar Dashboard," accessed November 15, 2024, www.maine.gov/energy/initiatives/renewable-energy/solar-distributed-generation.

Installations from just these two years would meet the "Core" pathway's total modeled growth in distributed solar PV by 2040.[6] In contrast to planned offshore wind development, these installations reflect the deployment of a mature technology by a well-established workforce. We recommend that Section A(1) of the "Key Policy Implications" chapter be amended to include language to the effect of: "Continued investment in distributed solar and storage is appropriate to ensure sustained progress toward Maine's statutory renewable energy targets amidst uncertain timelines for the development of the larger wind projects described in this section." Without this addition, the report could lead policymakers to conclude that further buildout of distributed solar and storage is simply not needed.

III. Determinations of DER Cost-effectiveness Require Assessment of the Full DER Value Stack

In support of this recommendation for continued investment in DERs, ReVision recommends that the final report offer a more holistic assessment of the cost effectiveness of distributed PV and storage. A second "Key Assumption" of the pathway analysis is to rely upon the National Renewable Laboratory's (NREL's) Annual Technology Baseline to forecast the cost of generation technologies, adapted with regional factors.[7] In contrasting the cost of distributed and utility-scale solar, the Draft Report similarly emphasizes a $/watt comparison of installation costs.[8] ReVision does not dispute usefulness of these figures in comparing utility-scale generators. However, DERs' distinct position and operation on the grid warrant the evaluation of the full value stack of those resources, not just the cost of their installation and operation. Various recent studies provide a useful reference for analytical approaches to evaluating DERs in a manner that considers this value, which ranges from the effects of load reduction to enhanced resiliency.[9] Such studies demonstrate that DERs already deliver a cost-effective source of clean generation, including in Maine.[10]

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[6] Draft Report at page 31.
[7] Draft Report at page 19 and 87.
[8] See, for example, Draft Report at pages 54 and 68.
[9] See, for example, Analysis of 2023 Net Benefits of Net Energy Billing Program, prepared for the Maine Public Utilities Commission by Sustainable Energy Advantage, LLC., April 1, 2024, (2023 Net Benefits Analysis) available at www.maine.gov/mpuc/legislative/reports; New Hampshire Value of Distributed Energy Resources Final Report, prepared for the New Hampshire Department of Energy by Dunsky Energy + Climate Advisors, 2022 available at www.energy.nh.gov/value-distributed-energy-resources-study; U.S. Department of Energy, Pathways to Commercial Liftoff: Virtual Power Plants, September 2023 available at liftoff.energy.gov/wp-content/uploads/2023/09/20230911-Pathways-to-Commercial-Liftoff-Virtual-Power-Plants_update.pdf.
[10] 2023 Net Benefits Analysis at page 20.

As the Draft Report acknowledges, the constraints on Maine's distribution grid will become increasingly localized and variable in the coming decades. The cost effectiveness of DERs stands to increase in these conditions, especially as investments in distribution system planning and new tools for DER management unlock greater coordination of distributed generation and storage to serve load. Indeed, the Draft Report notes that rising distribution system peaks are the single largest driver of increases in electricity costs over the study period and that higher adoption of DERs mitigates these peaks.[11] Despite observing that deploying DERs strategically based on the location and timing of system constraints could enhance the value of DERs, the analysis assumes no such targeting occurs.[12] ReVision finds this assumption unrealistic, especially as grid planning efforts and other initiatives stand to deliver increasingly sophisticated tools for leveraging distributed generation to minimize the grid impact of electrification-driven load growth.

Maine has a variety of open proceedings to advance this outcome. The Commission has established priorities for Maine's investor-owned utilities to address in grid plan filings due in early 2026. Several of these priorities relate to improving system visibility and forecasting to enable insight into the locational benefits of DERs and areas of future system constraints.[13] This planning activity complements ongoing efforts to improve the availability and use of hosting capacity information to guide small generator siting and interconnection. The Governors' Energy Office has also undertaken a study of the role of a Distribution System Operator in coordinating system planning and enhancing the contribution of DERs. Additionally, as the Draft Report describes, Maine's established process for identifying non-wires alternatives is a mechanism to maximize the locational value of DERs.

ReVision expects these and other initiatives to lead to increased tailoring of DER operating profiles to the specific *timing* of grid constraints over the course of the study period as well. The Efficiency Maine Trust's Demand Management Program proposed for Triennial Plan VI continues existing load shifting initiatives alongside proposed new programs to align the dispatch of behind-the-meter storage, including storage paired with solar, to periods of system peak.[14] These initiatives can leverage centralized platforms for monitoring and controlling grid-edge devices to deliver benefits well in excess of the value that would result from the passive operation of the same DERs. We also expect existing and future time-varying rate structures to add further incentives for DERs to maximize the alignment of their

[11] Draft Report at pages 37 and 52.
[12] Draft Report at page 54.
[13] Attachment C to Maine Public Utilities Commission Jul 12, 2024 Order in Docket No. 2022-00322, *Proceeding to Identify Priorities for Grid Plan Filings*.
[14] Appendix O-1, Demand Management Program Analysis and Considerations, Efficiency Maine Trust, Triennial Plan VI, as submitted November 13, 2024, in Docket 2024-00311.

operation with specific periods of grid constraint. Both for distributed generation and for distributed loads, these incentives are likely to increase the rate at which storage is installed in conjunction with other DERs.

In sum, ReVision would submit that a scenario in which DER deployment does not reflect more granular targeting should be the outlier case, not the default. We recommend that the presentation of the "Key Observations" for the "High DER + High Flex Pathway" be updated to more fully capture the potential for DERs to alleviate specific locations and times of grid constraint.[15] At minimum, we would suggest that the findings from the "High DER + High Flex Pathway" more fully acknowledge the limitation observed during the November 8, 2024 virtual meeting, as summarized by the GEO, that "the modeling did not have access to robust distribution level data."[16] Such distribution system data is necessary to modeling the full value DERs can offer in meeting Maine's clean energy and GHG reduction goals.

IV. Other Overarching Topics

ReVision agrees that consideration for equity impacts must be central to any analysis of pathways to achieve Maine's clean energy goals. ReVision encourages the Maine Energy Plan to build on this theme in highlighting policies and programs that work proactively to deliver access to benefits of clean energy solutions to all Mainers. The implementation of a Solar for All program offers an important opportunity to design a program that centers benefit to low-income and disadvantaged communities in the deployment of distributed solar and storage solutions.

Having experienced firsthand the growth in soft costs of project development in recent years, ReVision also encourages the Maine Energy Plan to build on the Draft Report's discussion of the need to reduce barriers to distributed solar deployment.[17] We agree that more streamlined permitting is critical. In addition, we would highlight the need for continued improvements to interconnection procedures at both the state and ISO level, including for storage systems. Likewise, the state must take action to address barriers resulting from the tax treatment of renewable resources. We agree with the Draft Report's framing that these areas represent important *opportunities* to reduce the cost of DERs and other renewable resources.[18]

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[15] See Draft Report at pages 52-54.
[16] Governor's Energy Office, November 8, 2024 Pathway to 2040 Meeting Summary, at page 2, www.maine.gov/energy/sites/maine.gov.energy/files/meetings/2040%20Planning%20Meeting%20Summary%2011.08.2024.pdf.
[17] Draft Report at page 68.
[18] Draft Report at page 91.

V. Conclusion

ReVision appreciates the ongoing efforts of the GEO and of the Draft Report authors to solicit feedback on the development of this study. We look forward to continued engagement in support of GEO's development of the Maine Energy Plan.

Respectfully submitted,

/s/NWH

Nat Haslett
Director of Utility & Regulatory Affairs
ReVision Energy Inc.

Dan Burgess
Director
Governor's Energy Office
62 State House Station
Augusta, Maine 04333

November 18, 2024

Subject: Comments on the Draft Maine Pathways to 2040: Analysis and Insights Report

Dear Mr. Burgess,

Maine Conservation Voters (MCV) greatly appreciates the opportunity to comment on the draft technical report "Maine Pathways to 2040: Analysis and Insights" and, more broadly, the leadership the Mills administration has shown in keeping climate policy at the top of the agenda and commissioning studies like this one. On behalf of more than 14,000 members and supporters dedicated to making sure all Maine people have access to a healthy environment, a strong democracy, and a sustainable economy, we are grateful. It is also on behalf of these members and supporters that MCV offers the following comments to help us partner on our shared goals.

Maine has set a goal to decarbonize the electricity sector by 2040, and we could not be more proud to work with an administration that understands that doing so is the only way to protect communities across the state from the worst impacts of the climate crisis. This report offers six pathways to doing so, without prescribing any particular one. At MCV, we believe that now *is* the moment to be prescriptive. It is imperative that we use proven technologies to decarbonize as quickly as possible and ensure that the costs do not fall on those who played little role in causing the problem, namely low-income and working people in Maine.

No matter where we live — whether on the coast or up in the County — people in Maine love the lives we lead in this beautiful place. We work the land, fish abundant waters, and snowmobile, ski, hike, paddle, and swim for recreation. The things we love are at risk because of the greed of a few multinational fossil fuel corporations that have decided their profits are more important than our futures.

This report focuses heavily on the potential "benefits" of clean thermal generation fuels as a "practical and cost-effective approach." If the report is going to make such a definitive claim, it is important that it include the accounting. MCV is concerned that the report does not take into account the very real risks of continuing to support fossil fuel infrastructure while we wait for "clean thermal" resources, marketed by the very industries responsible for the climate crisis, that may never come. As *Maine Won't Wait* lays out, the costs of inaction are far greater than the cost

of solutions.[1] Numerous reports have suggested that renewable natural gas and hydrogen are often used by utilities to trick customers into supporting the very infrastructure that is driving the climate crisis.[2]

We know that we must choose the pathway that is going to genuinely protect communities from the impacts of severe storms, extreme heat, droughts, and climactic change. There may eventually be a need for clean thermal generation, but it should not be the goal when its viability is so uncertain. We applaud the Governor's Energy Office's consideration of impacts on low-income and moderate-income customers, and we believe we can find solutions to the climate crisis and make electricity rates affordable. We know what has to be done, and, therefore, we urge the report authors to think creatively about how it gets paid for. There are many other financing mechanisms available that could offer greater protection for Mainers, and MCV would happily support this administration in realizing those solutions.

Thank you again for the work on this report and the opportunity to comment. We know we are united in our desire for a livable future and look forward to working together to get there.

Sincerely,

Lucy Hochschartner
Climate and Clean Energy Director
Maine Conservation Voters

Nicholas Janzen, Esq.
Partnerships Director
Maine Conservation Voters

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[1] https://www.maine.gov/climateplan/sites/maine.gov.climateplan/files/inline-files/MaineWontWait_December2020_printable_12.1.20.pdf

[2] https://energyandpolicy.org/gas-utilities-greenwashing-to-expand-fossil-fuels-rng-hydrogen/

Maine Governor's Energy Office
62 State House Station
Augusta, ME 04333

Via email: geo@maine.gov

November 14, 2024

Dear Dan and members of the Maine GEO team,

This letter is to provide the requested feedback on the Maine Pathways to 2040 Analysis and Insights Draft dated November 2024. https://www.maine.gov/energy/sites/maine.gov.energy/files/2024-10/Maine%20Pathways%20Report%20Draft%20for%20Comment.pdf

The following are my comments:

1. The Hybrid Heat pathway is one that should be given very serious consideration. The ISO-NE 2050 Transmission Study points out the significantly higher transmission costs that New England ratepayers will need to bear should the winter peak load exceed 51 GW and reach up to 57 GW. It has been broadly discussed elsewhere that one of the means to reduce the chances of exceeding this 51 GW limit is to incorporate hybrid heating as a tool, especially during extended winter peak load situations. As noted in the 2050 Transmission Study, the total cost to serve a 51 GW winter peak load transmission system is estimated to be $16 - $17 billion and the total cost to serve a 57 GW winter peak load transmission system is $23 - $26 billion. 2024_02_14_pac_2050_transmission_study_final.pdf
2. In conjunction with the Hybrid Heat pathway, I am supportive of Maine taking a closer look at carbon-neutral fuels to support hybrid heating. By way of example, within the report it references Rhode Island, Massachusetts and Connecticut having blending requirement for low-emitting fuels.
3. In conjunction with carbon-neutral fuels, I am supportive of Maine taking a closer look at using carbon-neutral fuels to support our in-state thermal energy generation facilities. As noted in the report, having a fleet of dispatchable thermal energy generation facilities will be critical to maintain the reliability/stability of the ISO-NE grid for the foreseeable future. Encouraging the use of carbon-neutral fuels will help to reduce the emissions impact of these facilities when they are prudently dispatched by ISO-NE.
4. In the report there is discussion of Distributed Energy Resources (DER). I would like to see within this subject some discussion of microgrids. The recent Maine Infrastructure Rebuilding and Resilience Commission interim report dated November 2024 (__GOPIF_IRRC_2024_digital_111224.pdf) discusses microgrids and some of the benefits as it relates to resilience. I suspect that microgrids may provide additional benefits that can be explored, such as is discussed in the following link about a Green Mountain microgrid in Panton VT. Green Mountain Power Microgrid in Panton, Vermont Featured on PBS Nova - Green Mountain Power

5. In the report there is a brief discussion of vehicle to home (V2H) and vehicle to grid (V2G) technology. I would encourage Maine to explore how to support this technology, especially in the context of DER's and microgrids.
6. Given the uncertainty of the federal governments continued support for offshore wind (OSW), at least in the near term, I would recommend that the report consider the possibility of OSW not being a substantial contributor to Maine's clean energy sources, especially within the period leading up to 2040. If by example onshore wind were to become a more predominant source than assumed in the report, and with onshore wind generally being recognized as having a lower energy generation capacity, this would presumably impact the assumptions made in this report.
7. Given the recent announcement of the federal governments support of expanding nuclear energy, which is generally considered to be bipartisan support, I would recommend that the report specifically consider the pros/cons of establishing a new small modular reactor (SMR) at the former Maine Yankee site in Wiscasset. The following link discusses the U.S. nuclear energy deployment framework in further detail, and includes reference to utilizing retired nuclear energy sites. https://www.whitehouse.gov/ostp/news-updates/2024/11/12/biden-%E2%81%A0harris-administration-establishes-bold-u-s-government-targets-for-safely-and-responsibly-expanding-u-s-nuclear-energy-and-announces-framework-for-action-to-achieve-these-targets/ and US-Nuclear-Energy-Deployment-Framework.pdf
8. In the report there is no reference to encouraging work from home (WFH) as a means to reduce transportation emissions. The following link provides details as to the reduction in emissions, in the Boston area during the March to May 2020 COVID lockdown, that are correlated with a reduction in vehicle traffic. I would encourage the report to explore the pro/cons of Maine supporting a WFH program, for both the public and private sector, as another tool to help reduce transportation emissions. Reductions in traffic-related black carbon and ultrafine particle number concentrations in an urban neighborhood during the COVID-19 pandemic - PMC
9. I will note that on Page 62 there is a base map illustrating the ISO-NE transmission system and potential OSW points of interconnection (POI). A more recent analysis (see the 2050 Transmission Study results from additional analysis of OSW screening dated August 21, 2024 link below) by ISO-NE which suggests that Orrington is not a preferred POI for OSW. The same report points out concerns related to more than one 1,200 MW OSW POI in Maine. Further NESCOE has recently been exploring the concept of a transmission line(s) that would support on the order of 3,000 MW of energy generation from Northern Maine, which is in contrast to the 1,200 MW that was assumed in the Aroostook Renewable Gateway (ARG) project discussed in the report. https://www.iso-ne.com/static-assets/documents/100014/a07_2050_additional_poi_analysis.pdf and a03_pac_nescoe_rfp_letter.pdf and response_to_stakeholder_comments_2050_additional_analysis_pac_presentations.pdf

Sincerely,

Steven J. Ingalls

Steven Ingalls

Stetson, ME; 617-962-3535; Email: sjiemail@yahoo.com

Comments submitted by the Island Institute, Kate Klibanksy

Good afternoon,

I am writing to provide comment on the draft technical report prepared by Brattle Group. While the presentation briefly

mentioned energy efficiency, it would benefit the state to highlight the importance of energy efficiency and weatherization

programs in an equitable future for meeting our 2040 goals. Energy efficiency and weatherization are especially important for

lower income folks who generally have draftier homes and less disposable income for upgrades. By providing these services,

they have more incentive to make transitions over to electricity as they will not quite literally be blowing heat out the

window.

I appreciate the report and am excited for further updates.

Thank you!

Kate Klibansky

November 19, 2024

Dan Burgess, Director
Maine Governor's Energy Office
62 State House Station
Augusta, ME 04333

Re: Comments on Maine Pathways to 2040: Analysis and Insights

Director Burgess:

We provide this letter in response to the Governor's Energy Office ("GEO") invitation to comment on the draft technical report Maine Pathways to 2040: Analysis and Insights ("draft study"). We appreciate the opportunity to give feedback on this draft.

About Form Energy

Form Energy, Inc. ("Form Energy") is a U.S. energy storage technology and manufacturing company that has developed a rechargeable, iron-air battery capable of continuously discharging electricity for 100 hours at a system cost less than 1/10th the cost of lithium-ion battery technology. Form's multi-day battery will enable a clean electric grid that is reliable and cost-effective year-round, even in the face of multi-day weather events. With nearly 1,000 employees, Form Energy has offices in Somerville, MA; the San Francisco Bay Area; and the Greater Pittsburgh area and has recently completed and launched its first commercial-scale manufacturing facility in Weirton, WV. Form was also part of the Power Up New England initiative that was recently selected for a U.S. Department of Energy Grid Innovation Program grant that will support the deployment of an 85 MW iron-air battery project in Lincoln, Maine by 2028.

In this round of comments, our main focus is on the treatment of long-duration energy storage in the draft study, though we recommend that the treatment of all storage resources should be revisited herein as the draft study suggests there may be a misunderstanding about how storage resources operate. In general, storage should not be treated as "load" to be served by incrementally more renewable energy. Storage is a reservoir that can soak up excess renewable energy that would otherwise be curtailed and shift it to times of higher value (net peaks). The longer the duration, the larger the reservoir and the greater the capacity for covering shortfalls and maintaining reliability during extreme weather events or low renewable availability.

Commercially available 100-hour batteries like Form's iron-air batteries provide non-emitting dispatchable energy that reduces the total buildout of new clean resources that would otherwise be needed to meet state clean energy targets. For an in-dept analysis of the role long duration and multi-day storage can play in New England, see Form's 2023 study: Clean, Reliable, Affordable: The Value of Multi-Day Storage in New England.

Value of Long Duration Energy Storage

Maine's clean energy goals include utilizing 80% renewable electricity by 2030 and procuring 100% clean electricity by 2040. Further, Maine's climate goals require the state to achieve carbon neutrality by 2045. The draft study finds that the lowest-cost way for the state to meet these goals is through the use of thermal generators that run on carbon neutral fuels during periods of low renewable output and/or high demand.[1] The draft study concludes that, absent thermal generating capacity, Maine's goals could be achieved using long-duration energy storage, but that this would be both more challenging and more expensive, and would require additional renewable energy for charging purposes. These findings are in direct contrast to a number of studies that have been done on the impacts of long-duration energy storage (LDES) and multi-day energy storage (MDS), which find that these technologies result in system cost savings by avoiding capital and operating costs associated with substitute resources:

- Sepulveda et al. examined the impact of various LDES design parameters related to cost and performance on the overall economics of decarbonized power systems, finding that known LDES technologies with achievable design parameters can reduce total system cost by up to 40% (Sepulveda, et al. 2018).[2]
- Zhang et al. evaluated LDES in the Western Interconnect, finding that LDES provides a number of system benefits, including: energy arbitrage, reduced startup and shutdown costs, improving generator efficiency, providing ancillary services, managing transmission congestion, providing firm capacity, deferring transmission or distribution investment, and providing resiliency support (Zhang, et al. 2020).[3]
- Modeling done by McKinsey & Company for the US DOE found that pathways that include LDES save $10-20B in total system cost due to reduced renewable curtailment, lower fuel spend, and reduced capital investment for firm, dispatchable generation.[4]
- The US Department of Energy found that the US grid may need 225-460 GW of LDES capacity by 2050, representing $330 billion in cumulative capital requirements. Net-zero

[1] Maine Pathways to 2040. Page x.
[2] Sepulveda, N.A., Jenkins, J.D., Edington, A. *et al.* The design space for long-duration energy storage in decarbonized power systems. *Nat Energy* 6, 506–516 (2021). https://doi.org/10.1038/s41560-021-00796-8
[3] Zhang J, Guerra OJ, Eichman J and Pellow MA (2020) Benefit Analysis of Long-Duration Energy Storage in Power Systems with High Renewable Energy Shares. Front. Energy Res. 8:527910. doi: 10.3389/fenrg.2020.527910
[4] DOE. 2023. Pathways to Commercial Liftoff: Long Duration Energy Storage. https://liftoff.energy.gov/wp-content/uploads/2023/03/20230320-Liftoff-LDES-vPUB-0329-update.pdf.

pathways that deploy LDES result in $10-20 billion in annualized savings from both avoided capital expenditures and operating costs by 2050.[5]

In New England, a recent analysis for Massachusetts' *Charging Forward: Energy Storage in a Net Zero Commonwealth*[6] report found strong evidence of the value of mid- and long-duration storage for achieving the state's climate and clean energy goals and made the following key conclusions:

- Energy storage supports regional reliability, especially as deployment of renewable resources increases.
- LDES can provide nearly a 1:1 replacement of fossil peakers by 2030, offering both critical grid support and emission reductions in communities where these facilities are located.
- New state procurement or incentive programs are needed to close the gap between the costs of emerging LDES resources and the revenues they can receive from existing state programs and wholesale market services.
- From a reliability standpoint, it is a no-regrets investment to cultivate multi-GW-scale markets of LDES resources by 2030 to advance progress to achieving a reliable zero carbon grid in the long-term

Further, the Massachusetts study concludes that "[l]ong duration energy storage has the ability to supplant significant quantities of dispatchable, thermal capacity in futures with high renewable deployment."[7] It found that these resources can provide nearly a 1:1 replacement value for up to 10 GW of fossil peaker capacity by 2030. This suggests a near-term need to deploy these resources in order to reliably reduce emissions, especially in overburdened communities where these peakers are likely to operate.

The Massachusetts study also concludes that multi-day storage significantly boosts the resource adequacy value of New England's planned offshore wind investments – making offshore wind even more valuable as a reliability asset in addition to being clean, renewable energy. And it finds that multi-day storage is essential to maintaining grid reliability in a 2050 net zero future, especially in the winter and during periods of low renewable energy availability.

Key Input Assumptions to the Modeling Analysis are Omitted from the Draft Study

The capital and operating costs of the various modeled generation and storage technologies drive the outcomes and the resource selections of the draft study, as well as the various analyses cited above. **The draft study states that if LDES costs decline more quickly than what**

[5] Pathways to Commercial Liftoff: Long Duration Energy Storage, https://liftoff.energy.gov/long-duration-energy-storage/
[6] *Charging Forward: Energy Storage in a Net Zero Commonwealth* study available at: https://www.masscec.com/sites/default/files/documents/Charging%20Forward%20%282023%29.pdf
[7] *Charging Forward: Energy Storage in a Net Zero Commonwealth* at page 13. Report available at: https://www.mass.gov/doc/charging-forward-energy-storage-in-a-net-zero-commonwealth-report/download

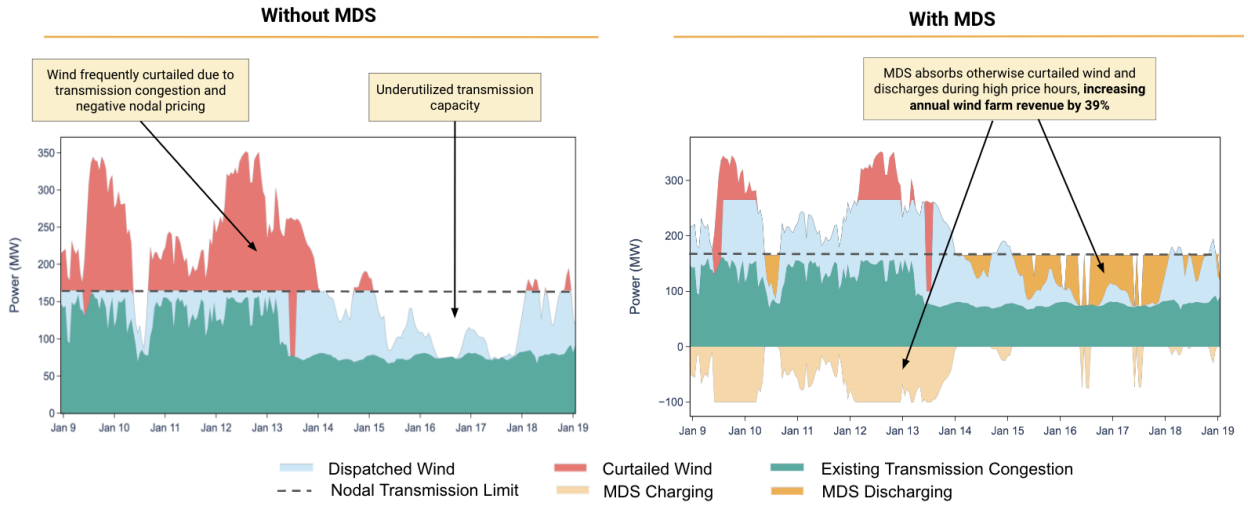
is modeled, these technologies could be more cost-effective than thermal generators running on zero-carbon fuels.[8] And while the draft study cites the National Renewable Energy Laboratory's Annual Technology Baseline as the source of the cost assumptions for various electric generation technologies and storage offered to the RIO model,[9] it does not describe any of the specific LDES or MDS technologies that were included, nor provide the capital and operating cost assumptions used for these technologies. Similarly, none of the cost assumptions related to the retrofits of existing gas-fired combined cycle units or combustion turbines to burn zero-carbon fuels, or the construction of new thermal units were presented in the study for comparison. Notably, these retrofit costs could turn out to be very high and may not even allow for significant additions of hydrogen to displace fossil natural gas[10], even if sufficient amounts of green hydrogen can be obtained. This suggests that the recommended "clean thermals" approach may end up locking Maine into a fossil future in conflict with its clean energy and climate laws. Further, in making this recommendation for maintaining and even expanding the thermal generation fleet in the region, the draft study has not addressed concerns with local air pollution, including NOx, that would continue in the communities where these facilities (and any new ones) are located.

The Draft Study Does Not Examine Specific Use Cases for LDES Related to Transmission Optimization and Winter Reliability

The draft study calls for new transmission but ignores the ability of MDS to optimize existing transmission. Specifically, the analysis demonstrates a need for expanding the transmission system, bolstering capacity on existing lines, and adding new lines to connect new resources in order to ensure adequate supply of clean energy and balance output from variable renewables.[11] This ignores the ability of multi-day storage to both optimize existing transmission, shifting renewable energy from periods of excess to periods in which transmission capacity is underutilized, and defer or avoid investment in new transmission by acting as a non-wires alternative.

[8] Maine Pathways to 2040. Page 58.
[9] Main Pathways to 2040. Page 19-20.
[10] Should power plants burn clean hydrogen to make electricity? February 2, 2024. https://www.canarymedia.com/articles/hydrogen/should-power-plants-burn-clean-hydrogen-to-make-electricity#:~:text=But%20burning%20clean%20hydrogen%20can,gas%20reductions%20at%20considerable%20cost.
[11] Maine Pathways to 2040. Page vii.

Figure 1. Wind farm operations at a transmission-constrained node in New England

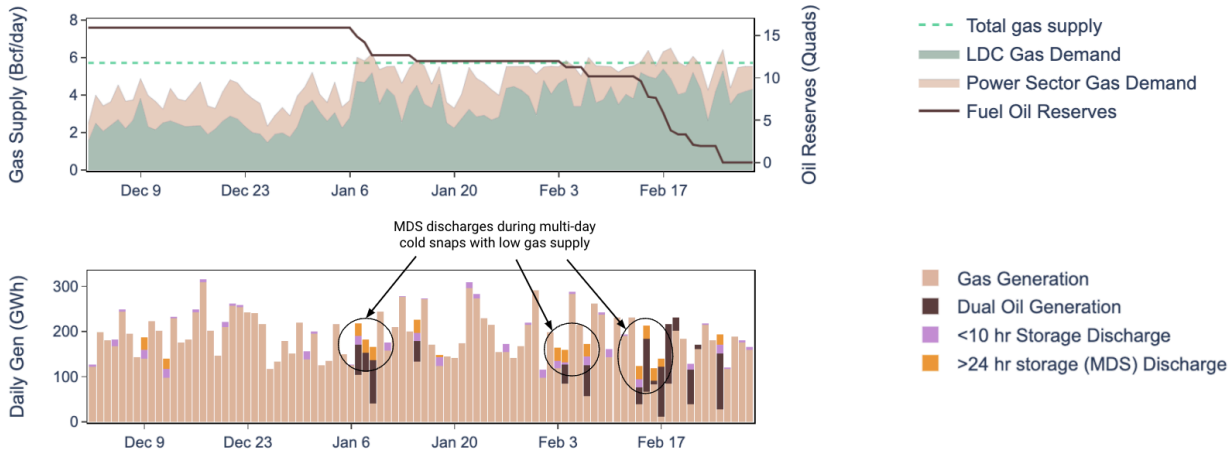


Simulation based on historical weather conditions (wind generation, nodal pricing) across 5 historical weather years, 2018-2022. The displayed operations are from the 2022 weather year.

The draft study also did not analyze the benefits of LDES and MDS resources on near-term winter reliability needs – a use case that shows tremendous value for both Maine and the entirety of New England. An analysis released by Form Energy in September of 2023 found that deploying 3 GW of multi-day storage in New England by 2030 could avoid winter energy shortages at a cost that is 74% lower than deploying short-duration storage alone.[12] Figure 2 examines daily gas and oil availability across a typical winter season, along with corresponding power generation. During periods when gas demand for heating coupled with demand for power generation exceeds gas supply, we see dispatch of both oil and multi-day storage, which is a cost-effective alternative to fossil fuels, maintaining reliability while lowering both cost and emissions. Winter reliability concerns continue to vex state and regional energy planners and temporary solutions have proven costly. Early deployments of LDES technologies can both support grid reliability in the near-term and enable Maine to meet its clean energy goals in the long-term.

[12] See Form Energy, September 2023: *Clean, Reliable, Affordable: The Value of Multi-Day Storage in New England* at 14-18.

Figure 2. Daily fuel availability and corresponding power generation, winter 2029-2030



Scenario based on weather from winter 2014-2015. Dispatch of other grid resources (e.g. nuclear, renewables) is modeled but not shown in figures for clarity.

Conclusion

We are concerned that as it currently stands the draft study seriously undervalues storage resources, especially long duration energy storage, while vastly overestimating the opportunity for "clean thermal" generation. We look forward to continuing to work to improve the draft study and will gladly make ourselves available to the GEO and its consultants to help address concerns about the treatment of energy storage. Many existing models struggle to adequately represent the value long duration storage technologies can deliver, but it is important to have an accurate picture of the available options so that the state can make the best decision when it comes to meeting its climate and clean energy goals.

Thank you,

Sarah Jackson

Sarah Jackson
Policy Manager, Eastern Region
Form Energy

OnwardEnergy

767 Third Avenue
17th Floor
New York, NY 10017
(631) 552-5900
information@onwardenergy.com

600 Seventeenth Street
Suite 2400S
Denver, Colorado 80202
(303) 623-7300
information@onwardenergy.com

7621 Little Avenue
Suite 350
Charlotte, NC 28226
(980) 294-0204
information@onwardenergy.com

onwardenergy.com

November 19, 2024

VIA EMAIL TO GEO@MAINE.GOV

Dan Burgess
Director
Maine Governor's Energy Office
62 State House Station
Augusta, ME 04333

RE: Comments on Maine Pathways to 2040: Analysis and Insights ("Pathways Study")

Director Burgess:

Onward Energy Holdings, LLC and its Maine subsidiaries, Hancock Wind, LLC (Hancock Wind), Evergreen Wind Power II, LLC (Oakfield Wind), Blue Sky West, LLC (Bingham Wind) (collectively, "Onward Energy") respectfully submits the following comments in response to the Governor's Energy Office's ("GEO") invitation to comment on the Pathways Study. Thank you for the opportunity to comment.

Onward Energy is an independent power generator that owns and operates over 6 GW of solar, wind, and gas generation projects in the U.S. with fifty-six projects in 22 states. Onward is currently the largest owner and operator of onshore wind in Maine, including three wind projects with a total installed capacity of 383 MW. As an owner and operator of 4 GW of renewables at 46 solar and wind plants across the country, Onward Energy believes renewable energy is critical to the energy transition and appreciates GEO's efforts toward decarbonization in Maine.

I. COMMENTS

New renewable energy generation will not help Maine reach its objectives if transmission congestion continues to curtail renewable energy providers. New renewable energy generation needs to be met with local and state transmission system upgrades. As discussed below, counterproductive procurement policies pared with insufficient grid capacity are leading to unsustainable levels of transmission congestion and curtailment.

OnwardEnergy
767 Third Avenue
17th Floor
New York, NY 10017
(631) 552-5900
information@onwardenergy.com

600 Seventeenth Street
Suite 2400S
Denver, Colorado 80202
(303) 623-7300
information@onwardenergy.com

7621 Little Avenue
Suite 350
Charlotte, NC 28226
(980) 294-0204
information@onwardenergy.com

onwardenergy.com

A. Maine PUC's Standard Form Power Purchase Agreements (PPAs) Contribute to Grid Congestion

Onward Energy along with the Maine Office of Public Advocate ("OPA") are still awaiting a decision in Docket No. 2023-00054 involving a petition that requests that the MPUC amend its Form PPAs (such as 35-A MRS §§3210-C and 3210-G, 3210-I, 3210-J) to add a negative pricing provision[1] that encourages generators to discontinue the sale of energy at a fixed price when ISO-NE's real-time value of the electricity is less than $0.00/MWh. Onward Energy's comments in Docket No. 2023-00054 provide more detail; however, in short, state-contracted renewable generators in Maine are paid the full PPA rate even at times when the ISO-NE market signal is telling these generators to turn off, and Maine's ratepayers' foot the bill for these generators to congest the transmission system.

Other New England states, including Connecticut, Massachusetts, and Rhode Island, have state-sponsored PPAs that include Negative Pricing Provisions that require the generator to pay when prices are negative. Importantly, these other New England states still see competitive responses to their procurements and Maine will, too, once it makes this necessary change to the Form PPAs.

Onward Energy became familiar with the congestion and curtailment issues caused by the Commission's Form PPAs in late 2020. Prior to December 2020, there were no instances in which the Epping Tap constraint was binding on Onward Energy's Hancock Wind Farm in the Downeast Loop. Ever since Weaver Wind (a 73 MW wind generator with a Maine Form PPA) came online, the Epping Tap constraint has been consistently binding 10% of the time, which has caused significant curtailment for all renewable generators in the Downeast Loop.[2]

The GEO has already concurred that this change to the Form PPAs is necessary. In the GEO's *Assessment of Maine's Renewable Portfolio Standard*, the GEO recommended "[a]dopting negative LMP/congestion provisions in standard contracts that limit compensation to project during some (e.g., bound # of hours) or all times during which energy prices are negative." Onward Energy urges GEO to

[1] Example Negative Pricing Provision: "[i]f the market price at the Delivery Point in the Real-Time or Day-Ahead markets, as applicable, for Energy Delivered by Seller is negative in any hour, the payment to Seller for deliveries of Energy shall be reduced by the difference between the absolute value of the hourly LMP at the Delivery Point and $0.00 per MWh for that Energy for each such hour" (hereafter referred to as "Negative Pricing Provision").
[2] Most generators in the Downeast Loop do not participate in the day ahead market so negative pricing is visible in the real time market.

support Docket No. 2023-00054. GEO should further include the congestion already caused by the MPUC's Form PPAs in any of the Pathways Study's baseline assumptions about congestion. The Form PPAs should be changed to include Negative Pricing Provisions because currently these Form PPAs do not optimize Maine's decarbonization goals and cause unnecessary congestion to the grid, which complicates GEO's ability to reach its 2040 goals.

B. Transmission Upgrades

Onward Energy agrees with GEO that policymakers must continue to modernize transmission and distribution planning to facilitate clean energy goals. Onward Energy recently completed a congestion study and found that not only is the system already congested but that congestion will grow significantly if the state does not take urgent action to facilitate upgrading local and regional transmission infrastructure.

Onward Energy engaged ICF Resources, LLC ("ICF"), a third-party consultant, to quantify the expected curtailment and congestion impacts due to prospective generation growth on Onward Energy's three wind assets in Maine (referred to herein as "ICF Study"). The ICF Study looked at three run years: near term (2024), mid-term (2027), and an out-year (2033) with sensitivities for NECEC and a Prospective Northern Maine Project. Under the Prospective Northern Maine Project sensitivity, congestion, curtailment, and negative prices increase significantly. For Onward Energy's three wind projects, the ICF Study's 2033 Prospective Northern Maine Project sensitivity scenario shows curtailment due will grow to 8.4% for Bingham, 13.1% for Oakfield, and 14.8% for Hancock. If curtailment of renewable energy resources reaches these projected levels, it indicates significant systemwide congestion that will undermine Maine's Pathway 2040 goals and harm the economics of existing renewable energy projects.

To be clear, Onward Energy does not have the information necessary to understand what specific transmission upgrades are necessary in the near term to ease congestion. Generators are only able to speak to the impacts of grid deficiencies on their individual project, either from pricing, reliability, congestion, or curtailment perspectives. However, generators do not know–nor do they have access to—information related to the specific causes of the grid deficiency. One shortcoming of this Pathways Study (and other studies) is external stakeholders' access to critical information about grid deficiencies.

Generally, design issues are internal to the utility and/or ISO-NE and are not available to generators. To efficiently enlist the help of generators and other stakeholders in this and other planning processes, the Legislature, Commission, and GEO should work with utilities and ISO-NE to develop a mechanism for stakeholders, including generators, to cooperate and/or share more detailed information on potential system needs. Only then will generators be able to offer more substantial and useful proposals to be considered to support the Pathways Study.

II. CONCLUSION

As an owner and operator of renewables across the country and in Maine, Onward would like to reiterate that it supports renewable development as it is key to the energy transition. Robust transmission planning is the ultimate long-term solution to increase renewable energy availability; however, we encourage the GEO to support changes to MPUC's Form PPAs to include Negative Pricing Provisions and to actively implement near term upgrades that will prevent congestion from worsening. Thank you for the opportunity to comment.

Courtney Krause

Courtney Krause
Assistant General Counsel, Regulatory
Onward Energy

Acadia Center
Advancing the Clean Energy Future
PO Box 583 • Rockport, ME 04856-0583
207-236-6470 • acadiacenter.org

November 18, 2024

Governor's Energy Office
Via email geo@maine.gov

Re: Acadia Center comments on *Maine Pathways to 2040: Analysis and Insights* Draft Technical Report

To the Governor's Energy Office and report authors:

Acadia Center appreciates the opportunity to provide written comments on the Draft Technical Report for *Maine Pathways to 2040: Analysis and* Insights ("Draft Technical Report"). Acadia Center agrees with the Governor's Energy Office (GEO) that successful development and implementation of Maine's Energy Plan will not be possible without continued public input and engagement. Acadia Center is a Rockport, Maine-based nonprofit that plans, advocates for, and seeks implementation of clean energy solutions across New England and Eastern Canada.

Acadia Center appreciates the extensive work conducted to develop the Draft Technical Report by the Brattle Group and Evolved Energy Research (Consultants). Maine has set ambitious goals for clean electricity deployment and economy-wide decarbonization. It is entirely appropriate and necessary that Maine move forward with all due speed, given that climate change is already fueling storms that have wreaked havoc on Maine communities and devastated Maine businesses. But, the swiftness of the action Maine must take must be grounded in comprehensive analyses, so the Draft Technical Report and the broader 2040 pathways effort are essential to ensuring a sound trajectory for Maine's progress on clean energy, grid investments, and emissions reductions across sectors.

Overall, Acadia Center appreciates the thoroughness and rigor of the Draft Technical Report, which recognizes the importance of clean, renewable energy from resources like solar and wind in reaching Maine's renewable energy goals, and the importance of continuing to promote and implement proven solutions across all sectors of the economy, such as heat pumps, weatherization, and electric vehicles. Acadia Center is heartened by the Draft Technical Report's findings that energy supply costs will decrease in a renewable future, highlighting a major opportunity to deliver savings to ratepayers in the move away from expensive and volatile fossil fuel-based supply. We recognize that Maine ratepayers have suffered in recent years from increasing electricity bills – especially acute in disadvantaged communities. The long-term cost projections do not obviate the urgent need to take action to provide energy burden relief through clean energy solutions and other supports.

The Consultants have been tasked with providing and analyzing options to reach Maine's energy and decarbonization goals. Maine policies and programs to promote renewable energy must be continued and strengthened in light of this report's findings, especially given the projected increases in end-use electrification over the next two decades. At a high-level, we are pleased with and supportive of the "Core" pathway results presented in the Draft Technical Report, although we do have concerns regarding some fuels and approaches included in the Core pathway modeling as well as other scenarios, such as renewable natural gas (RNG), biomass, hydrogen, clean thermal, and hybrid heat. While these options may play limited but meaningful roles in the long-term, they are not likely to provide meaningful

contributions of emissions reductions in the near-term/next decade. All of them require to some extent the development and implementation of unproven, complex and expensive solutions, and none has been demonstrated to lower energy costs. In addition, their environmental benefits are currently unproven, making emissions reductions projections difficult to rely on. Indeed, hybrid heat, which would use heating fuels to mitigate peak electric loads, will require (as recognized in the Draft Technical Report) increased customer equipment costs, changes in customer behavior, and a greater supply of both biofuels and synthetic fuels. Recent Climate Council discussions about the pathway to 2030 have also highlighted these uncertainties. At the same time, targeted reliance on delivered fuels may be preferable to maintaining an extensive natural gas distribution system and associated demand through the 2040 timeframe.

While pursuing long term goals, the GEO should focus on enhancing proven programs and policies that are already producing and procuring over 6,000 GWh of renewable electricity per year in Maine. Acadia Center provides the following recommendations and comments on specific elements of the Draft Technical Report:

Maintain Focus on 80% Reduction in Gross GHG Emissions Below 1990 Levels by 2050

Maine has two, key overarching long-term GHG reduction targets - 38 M.R.S. §576-A established a binding target of an 80% reduction in gross GHG emissions below 1990 levels by 2050, and L.D. 1429 established a binding target of net zero emissions by 2050. In many states, these targets would be roughly comparable – for example, many states aim to achieve an 80%-90% reduction in gross emissions and then "net out" the remaining 10-20% of gross emissions via carbon sequestration or carbon removal strategies. However, due to the immense carbon sequestration potential of Maine relative to its population, and the net GHG accounting the State is currently employing, these two targets (80% gross reduction and net zero) have very different implications for the future gross GHG emissions trajectory of Maine. As the Draft Technical Report highlights, Maine has reduced gross emissions 25% below 1990 levels (as of 2019 GHG Inventory), while, simultaneously, the state is "75% of the way towards achieving carbon neutrality" based on preliminary estimates by DEP (2016 GHG Inventory). In other words, Maine is relatively close to achieving carbon neutrality (according to the accounting methodology the State has chosen to use) but still has much work to do to achieve the 80% by 2050 gross emissions target. As the Draft Technical Report highlights, achieving the 80% gross target will require transformational change across all sectors of the economy. Without transformational change, the State may be able to achieve its net zero target but will not be able to achieve its 80% gross target. For this reason, Acadia Center stresses the importance of continuing to rely on the 80% gross emission target as the "North Star" for energy and climate programs and policies in the state, as the Draft Technical Report modeling has done.

Pathways Reliant on 'Clean Fuels' Face Significant Levels or Risk From Multiple Angles

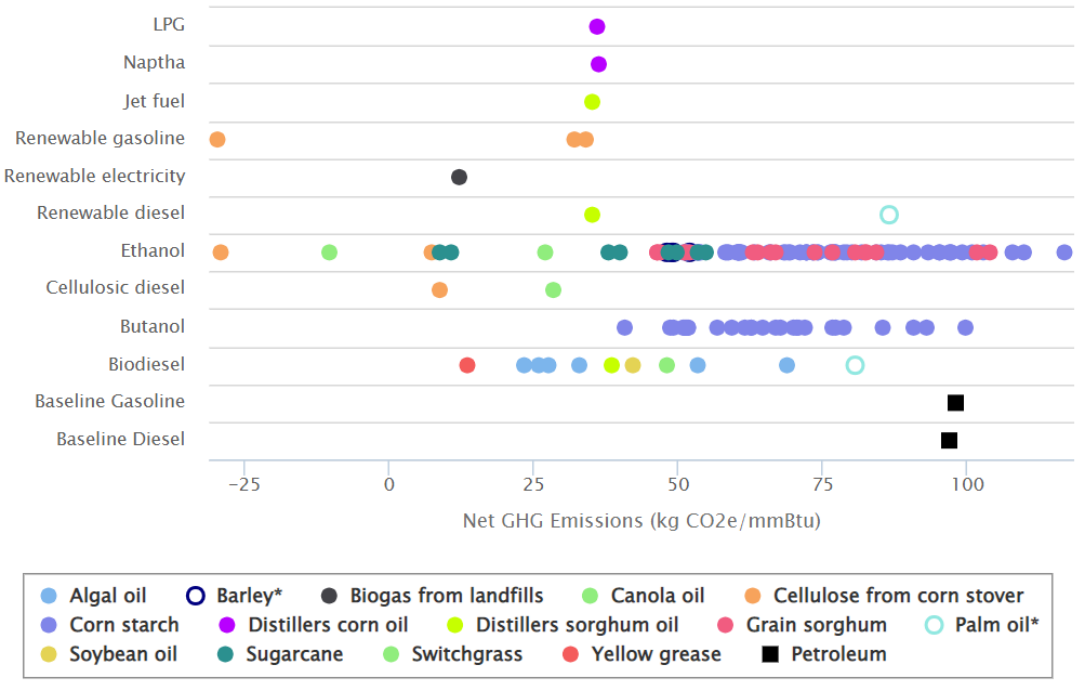
The Draft Technical Report considers the use of "clean fuels" (Acadia Center prefers the umbrella term "alternative fuels") as a decarbonization strategy for power generation, transportation, and building heating sectors. While the Draft Technical Report does address the risks associated with reliance on alternative fuels, the Report would have benefited from more robust discussion of the multitude of risks associated with alternative fuels.

The risks associated with alternative fuels, including renewable natural gas (RNG), is so high that, in Order 20-80-B, the Massachusetts Department of Public Utilities (MA DPU) stated: "The Department rejects the recommendation to change its current gas supply procurement policy to support the addition of renewable natural gas ("RNG") to LDC supply portfolios **due to concerns regarding the costs and availability of RNG as well as its uncertain status as**

zero-emissions fuel." [1] MA DPU expressed equal concerns with hydrogen as a decarbonization strategy, stating, "LDCs may research and assess these technologies [RNG and hydrogen], but **until they prove to be a viable alternative to the business-as-usual model and support the Commonwealth's climate targets**, any infrastructure costs associated with RNG and hydrogen will be the sole responsibility of the utility shareholders and not their customers."

While the MA DPU is narrowly focused on gaseous alternative fuels (RNG, hydrogen), the same high level of risk related to their actual ability to reduce GHG emissions, limited supply, and high costs applies to liquid alternative fuels. The assumption that biofuels are GHG-neutral hinges on ignoring many of the lifecycle emissions from biofuels. One of the key limitations of Maine's GHG Inventory is that lifecycle emissions from biofuels are not included. This is a over -simplification of a complex issue, as the EPA's Renewable Fuel Standard demonstrates (see Figure 1 below).[2] The EPA analyses examined the production of a number of different types of biofuels using various feedstocks. The results vary considerably, but the overwhelming majority of biofuels show some level of positive net GHG emissions, with some biofuels exceeding the lifecycle emissions of conventional fossil fuels like gasoline and diesel.

Figure 1. EPA Renewable Fuel Standard Program Lifecycle GHG Emissions by Feedstock and Fuel Type[3]



[1] Massachusetts Department of Public Utilities 20-80-B, page 1 https://fileservice.eea.comacloud.net/FileService.Api/file/FileRoom/18297602

[2] EPA "Lifecycle Greenhouse Gas Results" https://www.epa.gov/fuels-registration-reporting-and-compliance-help/lifecycle-greenhouse-gas-results

[3] EPA "Lifecycle Greenhouse Gas Results" https://www.epa.gov/fuels-registration-reporting-and-compliance-help/lifecycle-greenhouse-gas-results

The Draft Technical Report acknowledges some of this risk. For example, it states, "*It will be important to understand the extent to which these 'clean' fuels are actually low/zero-carbon, according to a lifecycle analysis that accounts for emissions during production, transportation, and use.*" However, note that the report does not provide specific guidance on what lifecycle analysis methodology should be implemented by the State to effectively verify these fuels have climate benefits and does not outline steps the state should take to ensure hydrogen produced in-state complies with the 'three pillars' of hydrogen production (new clean supply, hourly matching, deliverability). These accounting and verification procedures are not afterthoughts and are essential in ensuring alternative fuels are actually helping the state achieve its overarching climate objectives.

The Draft Technical Report does not effectively address the many pitfalls associated with currently lifecycle accounting methodologies. Many will point to the GREET model or the lifecycle accounting methodology used by EPA to inform the Federal Renewable Fuel Standard (RFS) as reputable lifecycle accounting frameworks, but there is wide disagreement among experts as to the accuracy of both frameworks. For example, the RFS still incentives corn ethanol based on the claim of lifecycle GHG emission benefits despite wide opposition from experts in the field. For more information on Acadia's Center concerns regarding currently lifecycle accounting methodologies for biofuels, please see our Massachusetts Clean Heat Standard Draft Framework comments from December 2023, pages 4-7.

The Draft Technical Report also frames the Rhode Island biodiesel blending law, which requires all delivered heating oil to achieve 50% biodiesel blend levels by 2030, as a potential model policy for Maine. What the Draft Technical Report fails to mention is that there are zero policy guardrails in that Rhode Island policy to ensure those biodiesel blends are actually effective in reducing emissions on a lifecycle basis. Rhode Island 2021-H 5132A, 2021-S 0357A which mandated the 50% biodiesel blending requirement makes no mention of lifecycle accounting, which is highly problematic because Rhode Island, like Maine, still utilizes an outdate GHG Inventory methodology that assumes all biofuels are completely carbon neutral. More recently, in the Rhode Island, the Future of Gas Technical Report summarized the controversy surrounding GHG accounting for biofuels in the state by stating:

> *"Many stakeholders in and outside of Rhode Island have cautioned the current treatment of biogenic emissions as carbon neutral, stating the complexity and uncertainty associated with lifecycle emissions. EPA acknowledges this complexity and notes that "technical, policy and legal contexts may change over time that could lead to revisiting the treatment of biogenic emissions necessary." **In addition, the Rhode Island Department of Environmental Management (RIDEM) in its latest inventory recognizes the ongoing international controversy surrounding GHG accounting for energy generated from biogenic sources and continues to collaborate with stakeholders on a more robust framework**."*[4]

In other words, Rhode Island put the cart (biodiesel blending requirements) before the horse (well-defined lifecycle accounting guardrails), and, as a result, has a policy on the books with highly uncertain climate benefits. It is critical that Maine further evaluate the actual GHG emission reduction benefits, supply constraints, and anticipated costs of

[4] Rhode Island Investigation into the Future of the Regulated Gas Distribution Business, Technical Analysis Report, page 26 https://www.ethree.com/wp-content/uploads/2024/06/Docket-22-01-NG-E3-Technical-Analysis-Report.pdf

alternative fuels before actively pursuing strategies to advance their deployment in any sector (power generation, transportation, building heating).

The 'Core' Pathway Highlights the Urgency of a Future of Gas Proceeding in Maine

Page 26 of the Draft Technical Report mentions that, in the Core pathway, "Pipeline natural gas demand decreases from about 19 trillion BTU in 2023, to 7 trillion BTU in 2040 and 2 trillion BTU in 2050." In other words, the Core pathway envisions the volume of pipeline gas delivered to customers in Maine decreasing approximately 90% over the next ~25 years. On page 38-39, the Draft Technical Report goes on to describe the implications of this sharp decrease in pipeline gas demand:

> *"**Total gas system costs decline only slightly over time as more customers adopt electric heating**, reducing their gas usage or departing the gas system altogether. However, this means that **gas delivery costs, which are largely fixed, will be spread over a declining customer base with falling total sales.** This will likely lead to higher average unit costs and higher bills for remaining customers (gas ratemaking and thus customer bill impacts may change in response to these forces)."*

In a footnote on page 69, the report goes on to state

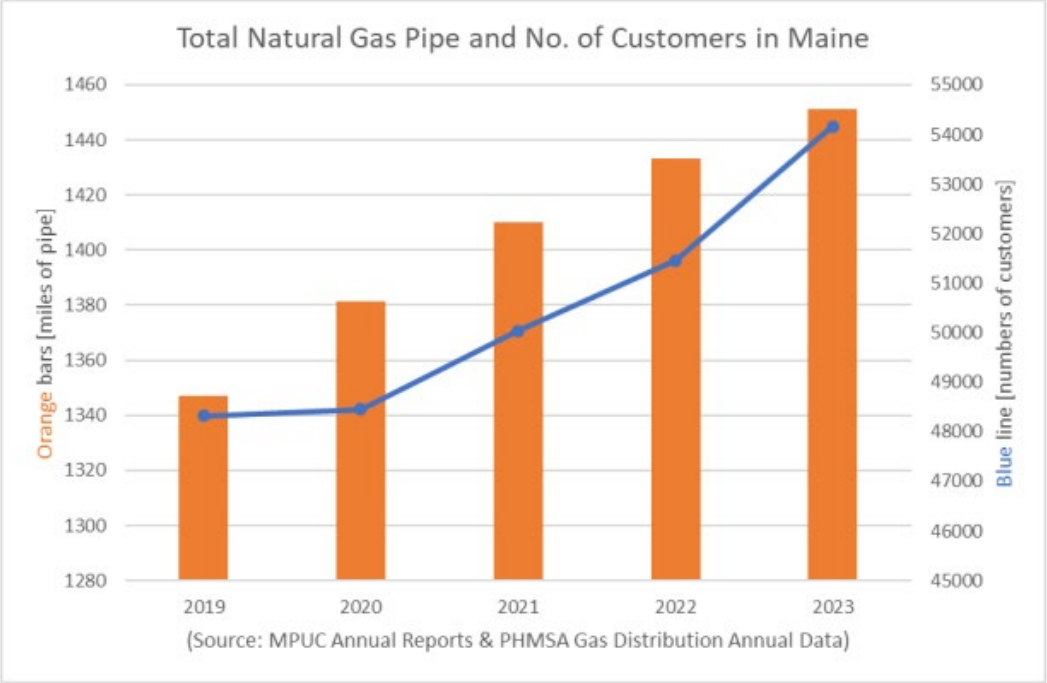
> *"**Further, gas rates may increase, perhaps dramatically, as the largely fixed costs of the gas system are spread across fewer customers and lower gas volumes**. This is less of a problem in Maine than in most other jurisdictions, at least in terms of numbers, because few residential customers in Maine rely on gas; most rely on fuel oil or other delivered fuels. **Still, for affected customers, this may be an important issue as well**."*

Although the Draft Technical Report does not go into any depth emphasizing the importance of this topic, the two excerpts above highlight why a "Future of Gas" proceeding in Maine will be critical to evaluating how the gas distribution system in Maine can be most effectively managed over the coming decades to 1) Comply with the states overarching GHG reduction targets 2) Minimize stranded costs on the system and 3) Minimize the high risk of skyrocketing gas rates negatively impacting residential customers (particularly disadvantaged customers) remaining on the gas system as other gas system customers depart the system. These reasons, among others, are why at least twelves states have ongoing regulatory cases exploring the future of natural gas. The Rhode Island Public Utilities Commission FOG Proceeding Scope document provides an excellent example of the full scope of essential questions that should be addressed in a FOG proceeding and the Technical Analysis Report generated as a result of that proceeding highlights the importance of pivoting away from "business as usual" gas system planning as quickly as possible to mitigate the negative impacts of the transition away from reliance on the gas distribution system.

Relative to other states in the region, given the lack of historic gas system expansion, Maine finds itself in an enviable place regarding the extent of gas system sprawl and the associated future risk of stranded gas system assets. However, this is not a static condition, as the state added 6,000 gas customers over the 2019-2023 time period (12% increase) and installed over 100 miles of new pipe

over the same time period (8% increase), as illustrated in Figure 2 below.[5] The recent expansion of the gas system in Maine further highlights the urgency for the state to establish its own proceeding investigating the future of the gas system.

Figure 2. Maine Natural Gas System Expansion 2019-2023



The Draft Technical Report Highlights the Central Role of the Grid in Unlocking Maine's Clean Energy Future

The Draft Technical Report highlights numerous areas that demonstrate how centrally important the grid will be for Maine's energy pathways. This is true both for the transmission and distribution grids in Maine as well as for how these grids operate as part of a much larger functional grid across ISO-NE and even the Northeast Power Coordinating Council (NPCC). Acadia Center agrees strongly with the report's stated need to situate Maine's planning within the regional and interregional context and encourages further action in this regard: "Continued progress will require coordinating with neighboring states and regional entities."

At a high level, Acadia Center agrees with the report about the importance of upgrading and expanding the capacity of the grid in Maine, including via cost-effective transmission and the use of grid enhancing technologies (GETs). The Draft Technical Report has several recommendations on both in-state and regional transmission development that align with Acadia Center's own research and advocacy. Electrification and the growing demand for renewables will require that renewable energy be movable from where it is generated to where it is needed. There must be a growing emphasis on generation and transmission that will benefit Mainers, as well as others in the region. Acadia Center

[5] Maine Office of the Public Advocate, "Natural Gas Expansion (2019-2023". Source data from MPUC Annual Reports & POHMSA Gas Distribution Annual Data. https://energynews.us/wp-content/uploads/2024/03/Nat-Gas-Expansion-Chart_2024-02-20-1.pdf

agrees with the Draft Technical Report's suggestion that Maine should focus on three transmission priorities in the regional transmission planning process ("LTTP") that is unfolding now, including: 1) the North/South interface near Surowiec; 2) upgrades to unbottle onshore wind and solar from northern Maine; and 3) upgrades to integrate several gigawatts of offshore wind in the Gulf of Maine. We encourage Maine to seek support for these three needs in the current and future LTTP solicitations as opportunities arise, making efforts to consider the cost synergies that the Report notes when considering all three collectively. We also recommend Maine's push for express consideration of and preference for transmission solutions that make use of grid-enhancing technologies (GETs) to address these and other needs. Finally, Acadia Center acknowledges the emphasis the Report places on load flexibility strategies to minimize future peak demand resulting from beneficial electrification, which will minimize the need for future transmission investments.

Other Topics for Consideration:

- **Removing obstacles to solar implementation in Maine**. Solar is a proven technology with decreasing costs that presently encounters unacceptable delays in interconnection. The state should continue programs like "Solar for All" that allow low- income Mainers to reap the benefits of solar power. Solar DERs should be implemented faster and less expensively by the utilities. Solar should not be a peripheral source, relegated to dealing with peaks, but should be central to Maine's energy future.
- **Greatly expanding battery storage.** Without widespread battery storage, there can be no meaningful adoption of wind, water, and solar renewables at scale. Maine has made real progress toward installing two substantial battery storage facilities, including one facility that will provide power for up to four days. Also, Mainers need help in purchasing batteries for rooftop solar, now.
- **Using technology to expand demand management**. Implement TOU, load shifting, and any other flexible system to avoid the necessity of costly system upgrades, as the Draft suggests.
- **Continuing advocacy and support for EV adoption in Maine**. The transportation sector accounts for 51% of Maine's greenhouse gas emissions. EVs can address this problem directly and are particularly promising for load shifting, as vehicle technology makes charging schedules for EVs readily adaptable. EV "ambassadors" should be tasked with reaching out to Mainers to help them adopt EVs, and to combat misinformation. Modern EVs are capable, fun, and far less expensive to operate. Because home charging provides 99% of most EV users needs, the State should aid in purchasing and installing home chargers. "Fast" EV chargers should continue to be installed, with an emphasis on Northern and Western Maine.

Acadia Center applauds the efforts of the Consultants in assisting the GEO to meet both the promise and the challenges of charting Maine's energy future and again appreciates the opportunity to comment here.

Sincerely,

Peter LaFond
Senior Advocate and Maine Program Director
plafond@acadiacenter.org
207-329-4606

Ben Butterworth
Director: Climate, Energy & Equity Analysis
bbutterworth@acadiacenter.org
617-742-0054 x111

Comments submitted by Maine Grid Works, Linda Stathoplos

My name is Linda Stathoplos. I am part of Maine Grid Works, a Maine-based study-action group focused on making Maine's public energy systems cleaner, resilient to climate warming, more reliable and affordable. Our current focus is enabling Community Choice Aggregation (CCA) in Maine, to accelerate use of clean energy and the grid upgrades necessary to deliver that energy. Policies needed to implement CCA in Maine could be included to reach the goals described in "IV. Key Policy Implications, Section 3. Policymakers Must Continue to Modernize Transmission and Distribution Planning to Facilitate Clean Energy Goals."

Community Choice Aggregation **allows local governments** to purchase and/or develop power on behalf of their residents and businesses. CCAs work in partnership with the region's existing utility. Generally, the CCA buys the power, and the utility continues to deliver it, maintain the grid, and provide consolidated billing.

Enabling Community Choice Aggregation in Maine requires legislative modifications to move to an "opt out" structure, so that if a municipality chooses a CCA, municipality consumers and businesses are automatically enrolled, but retain the choice to opt out. The current legislation that needs modification includes:

- Municipality level 35-A MRSA §3203 Retail access; deregulation
- **3. Aggregation permitted; limitation.** When retail access begins, consumers of electricity may aggregate their purchases of generation service in any manner they choose. If a public entity serves as an aggregator, it may not require consumers of electricity within its jurisdiction to purchase generation service from that entity.
- County level 30-A MRSA §903-A Electricity services
- **2. Establishment.** County commissioners may establish a county electricity agency, referred to in this section as an "agency," to serve as a public aggregator for any electricity consumers, public or private, located within a county.
- **3. b. …** An agency may not require any electricity consumer to join or be served by the agency

We should keep the Consumer protections in 30-A MRSA §3203. "Licensing of competitive electricity providers; consumer protections; enforcement," where Sections 4 and 5 include the ability of customers to terminate without penalty.

Central Maine Power
An Avangrid company

November 18, 2024

Dan Burgess, Director
Maine Governor's Energy Office
62 State House Station
Augusta, ME, 04333

Dear Director Burgess:

Central Maine Power Company ("CMP") appreciates this opportunity to provide comments on the Maine Pathways to 2040 draft report (the "Report"), which The Brattle Group and Evolved Energy Research have prepared for the Maine Governor's Energy Office ("GEO"). The Report presents a thoughtful approach to energy planning, and helpfully incorporates various options for meeting the State's climate and energy goals while keeping cost and feasibility in mind.

CMP notes that the Legislature has also tasked CMP and Versant with developing integrated grid plans, which are 10-year plans for system reliability and resiliency and to support achievement of the State's greenhouse gas reduction obligations and climate policies. Although plans are not due until January 12, 2026, at this time CMP anticipates that its plan will largely complement the pathways identified in the Report. With regard to modeling, in Docket 2022-322, the Maine Public Utilities Commission ordered the utilities to use undertake CMP-specific modeling after developing inputs with stakeholder participation and based upon certain CELT forecasts issued by ISO-NE; the outcomes may differ from projections resulting from the EnergyPATHWAYS and Regional Investment and Operations models used in the Report, however the degree of difference between these approaches is, at this time, not known.

CMP appreciates the Report's acknowledgments around potential cost impacts to customers and the analysis of overall supply costs in a transition to electrification. As the Report indicates, building out the transmission and distribution systems is necessary to serve demand and enable customer adoption of electrified heating and transportation. However, the Report's indication that electric distribution costs will increase "from about $1 billion in 2025 to $1.74 billion in 2050" is difficult to verify without further context. Information about what the $1 billion represents and what is included in the additional $740 million would be necessary to evaluate the accuracy of that estimate, but CMP's initial response is that this amount doesn't even capture current levels of annual investment. Moreover, costs of required maintenance, beneficial electrification upgrades, and the types of reliability and resiliency measures expected or required by the Commission, the State, and our customers will overlap to some extent but likely represent a broader investment than the more limited scope included in the Report. Costs for additional vegetation management or storm response, for example, may affect overall tolerance for other initiatives. Nonetheless, CMP supports the Report's analysis of potential cost savers.

Central Maine Power
An Avangrid company

CMP looks forward to continued partnership with the GEO and the State on energy planning. At a time of rapid change, the Report provides a useful roadmap and strong options for the path forward.

Sincerely,

/s/ Craig Nale

Craig T. Nale
Director, Regulatory Affairs

83 Edison Drive / Augusta, ME 04330 / 123.456.7890 / cmpco.com

Comments of CTC Global Corporation
to the Maine Governor's Energy Office
on the
Draft Main Pathways to 2040: Analysis and Insights Report

I. Introduction

CTC Global Corporation ("CTC Global") is submitting these comments to the Maine Governor's Energy Office in response to the November 8, 2024, invitation for comments[1] on the Maine Pathways to 2040: Analysis and Insights, prepared by the Brattle Group ("Draft Report").[2]

The Draft Report engages in a review of various pathways and examines a range of factors that potentially impact possible scenarios to meet the State of Maine's energy goals. In doing so, themes emerge in the Draft Report that provide clarity regarding key challenges. Notable among these is the need for significant expansion of the transmission system[3] and the call for cost-effective, least-regret planning practices.

These comments highlight that despite identifying the need for significant new transmission in Maine to address longstanding and growing energy transfer limitations, the Draft Report does not focus on the key role that advanced conductors must play to meet the objectives of the Maine energy plan in the timeframes contemplated, *i.e.*, growing procurement and interconnection of new energy resources between now and 2040.

Advanced conductors[4] double the capacity of transmission lines at the same voltage, while *simultaneously* reducing line losses by up to 30% or more while also reducing line sag. Because of these improvements at the same voltage, rights of way can carry twice the power without new siting needed for a higher voltage and the attendant higher towers and/or wider rights of way. Reconductoring can double grid capacity in 12-24 months, while rebuilds can move at the pace of structure replacement. In the case of new circuits, advanced conductors lower project costs and siting risks by carrying the same power as traditional steel-core

[1] https://www.maine.gov/energy/sites/maine.gov.energy/files/inline-files/2040%20Planning%20Meeting%20Summary%2011.08.2024.pdf
[2] https://www.maine.gov/energy/sites/maine.gov.energy/files/2024-10/Maine%20Pathways%20Report%20Draft%20for%20Comment.pdf
[3] *See e.g.*, Draft Report at p. 49 discussing just the increase in international transfer capability: "In aggregate, the electric transmission capacity between Canada and New England must increase from 2 GW at present to 12.3 GW in 2050 in the Core pathway; the 100% Renewable Generation Pathway, this capacity must increase to 16.5 GW by 2050."
[4] CTC Global is the world's leading manufacturer of advanced conductors, with over 120,000 miles of CTC Global's ACCC® deployed around the world. A U.S. company with five global factories, CTC has deployed over 10 times the number of advanced conductors of all other advanced conductor manufacturers combined.

conductors on fewer and/or shorter towers at a given voltage level and in narrower rights of way than required to go up a voltage class, reducing siting risks.

II. Incorporation of Advanced Conductors as a Key Solution into the Draft Report for Reconductoring, Line Rebuilds, and New Transmission Circuits

A. Overview of Advanced Conductors

Advanced conductors utilize carbon-based cores in place of steel cores to *simultaneously* double power transfer capability while reducing electric losses by up to 30% or more over legacy conductors.[5] Advanced conductors do this at the same voltage as existing lines, meaning they do not require wider rights of way or taller towers for rebuilds (structures and lines) of existing circuits.[6] Because advanced conductors do not weigh more than the existing legacy conductors they replace, this doubling of capacity can occur on existing towers for wire reconductoring where structures are in good shape. In both the cases of rebuilds and reconductoring, new siting is avoided, unlike expansions of rights of way or increases in tower height, which may trigger review and delay objections in the siting process. As a result, advanced conductor reconductoring can double line capacity and improve efficiency in as little as 12-24 months, while rebuilds can be done as allowed by the pace of same-height structure replacement.

In addition, because carbon core does not sag because of high temperatures – a limiting factor of steel core conductors – advanced conductors like ACCC© mitigate the risk of wildfire ignition and other vegetation contacts and withstand damage from intense wildfire heat far better than traditional steel conductors. They can also transfer significant amounts of additional power under various N-1, N-1-1, etc. contingency cases with emergency ratings that can be utilized not for a period of hours but over a year, further improving power system reliability by increasing the options available to system operators to flow power to load. These attributes also make advanced conductors the best choice for new line builds where shorter structures and narrower rights of way than a higher voltage would require may be used to move the same amount of power, reducing siting risk from objections to view shed impacts and environmental concerns.

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[5] The U.S. Department of Energy defines “advanced conductors” as: “Conductors that increase line capacity by >1.5x (at a similar weight per foot); advanced conductors use composite core (instead of traditional steel cores) to improve efficiency and increase capacity with limited sag." *Pathways to Commercial Liftoff, Innovative Grid Deployment*, US Dept. of Energy, April 2024 (“DOE Liftoff Report”), at p. 12. https://liftoff.energy.gov/wp-content/uploads/2024/04/Liftoff_Innovative-Grid-Deployment_Final_4.15.pdf

[6] Line rebuilds that include both structures and lines often occur with what are known as Asset Condition projects in the New England region, i.e. transmission lines that are replaced due to age and physical condition.

B. State Support for Ensuring Much Wider Use of Advanced Conductors in the United States, Including in Maine

A recent University of California Berkeley Study, performed in conjunction with GridLab, and recently published in the *Proceedings of the National Academy of Sciences*, found that advanced conductors could quickly address 80% of the needed interregional transfer needs.[7] Recognizing these attributes and the challenges of integrating new resources,[8] serving new loads,[9] improving system reliability, and reducing consumer costs over transmission planning and construction horizons that may last 10 years or longer, the National Association of Regulatory Utility Commissioners, or "NARUC", recently passed a resolution at its November 2024 meeting.[10] The resolution noted the U.S. Department of Energy's finding that the use of advanced conductors could meet the NERC 10-year peak load growth projections, while further noting "the federal government, States, and industry can work together to accelerate the use of these … technologies to affordably expand the transmission capacity needed to maintain reliability and meet growing electricity demand…" and that there are "…benefits to ratepayers of the holistic deployment of [advanced conductors][11] across their systems… ."

The Draft Report highlights barriers to cost-effective transmission solutions but does not mention advanced conductors or describe the approaches other states are putting forward to more rapidly and widely deploy advanced conductors across transmission and distribution systems. The Draft Report states:

> Barriers may arise for both customer end-use technologies (heat pumps, EVs, electric water heaters) and supply-side technologies (renewable generation, storage, transmission, carbon-neutral fuels). Some types of barriers that may impede adoption/transition include:
> - Simple inertia—even willing customers may not adopt as quickly as anticipated…

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[7] Emilia Chojkiewicz, et al. *Accelerating transmission capacity expansion by using advanced conductors in existing right-of-way*, Journal of the Proceedings of the National Academy of Sciences, September 23, 2024. https://www.pnas.org/doi/10.1073/pnas.2411207121 This and other work have been highlighted in recent articles, *See e.g.*, Brad Plumer, *The U.S. Urgently Needs a Bigger Grid, Here's a Fast Solution,* New York Times, April 9, 2024. https://www.nytimes.com/2024/04/09/climate/electric-grid-more-power.html

[8] Lawrence Berkeley National Laboratory, Grid connection backlog grows by 30% in 2023, dominated by requests for solar, wind, and energy storage, April 10, 2024. https://emp.lbl.gov/news/grid-connection-backlog-grows-30-2023-dominated-requests-solar-wind-and-energy-storage

[9] Load growth without the ability to integrate new generation resources is causing significant power market price spikes. In the PJM region, a mismatch between new resources and growing load caused the addition of $12.5 billion in capacity market costs for a single annual auction. *See e.g.*, Ethan Howland, PJM capacity prices hit record highs, sending build signal to generators, Utility Dive, July 31, 2024. https://www.utilitydive.com/news/pjm-interconnection-capacity-auction-vistra-constellation/722872/

[10] *Resolutions Passed by the NARUC Board of Directors at the November 10-13, 2024NARUC Annual Meeting and Education Conference in Anaheim, California* https://pubs.naruc.org/pub/812873F4-E348-B77F-4D75-E513FF13A86D?_gl=1*d4pke9*_ga*NTUxOTg3Mjk0LjE3MzEzNjUxNzM.*_ga_QLH1N3Q1NF*MTczMTk0NjQyNC4xNC4xLjE3MzE5NDY0MzEuMC4wLjA at pp. 9 and 10.

[11] The NARUC resolution uses the term "high performance conductors".

- Land use, siting, and permitting delays and barriers. (Permitting processes will be considered by the Governor's Energy Office in developing the Maine Energy Plan)[12]

As noted above, advanced conductors can effectively address such land use issues through reconductoring, and complete line rebuilds. In each of these cases, advanced conductors can double capacity and simultaneously improve efficiency without new siting for expanded or new rights or ways and mitigate such risks for new line builds. The Draft Report would be improved by adding that discussion.

Elsewhere, the Draft Report highlights ensuring that planning improvements are made to help realize the objectives of Maine in a timely and cost-effective manner:

> Maine should encourage ISO-NE and in-state transmission owners to incorporate lower-cost and higher-capacity alternatives into their planning processes. ISO-NE can build on the experience of other RTOs that have incorporated grid enhancing technologies (GETs) into their planning and operational processes to provide lower-cost and shorter-timeframe solutions, compared with building new transmission infrastructure.[13]

However, only GETs are referenced here in the report.[14] ISO New England does not capture the significant implication of advanced conductors in its 2050 study as cited in the Draft Report,[15] which simply notes that there is an opportunity to rebuild higher voltage lines in existing rights of way, which while better than underutilizing limited rights of way, requires higher, more robust structures and/or wider rights of way. In contrast, rebuilds with advanced conductors save money with shorter and potentially fewer structures while negating the need for new siting approvals due to the view impacts and wider, dedicated use clearings required to go up a voltage class.

The Draft Report instead should discuss efforts by other states to remove barriers,[16] create new incentives for advanced conductor use, and ensure that it is clear – as set out in the

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[12] Draft Report at p. 74.

[13] Draft Report at p. 65.

[14] While the report notes that Grid Enhancing Technologies (or "GETs") can be an important tool to provide lower-cost and shorter-timeframe solutions, GETs are most commonly operational tools like dynamic line ratings. While sometimes lumped together, advanced conductors are planning solutions where capacity increases may be relied on in system models. With over 120,000 miles deployed around the world over the past two decades, the vast majority of that being CTC Global's ACCC©, which has 10x more miles of conductor deployed than all other advanced conductor manufacturers combined.

[15] Draft Report at fn. 123. "Since a significant portion of New England's transmission system was developed in the mid-20th century, many transmission lines are beginning to reach the end of their life and must be replaced. During such an asset condition replacement project, the incremental cost of upgrading a transmission line to larger conductor size and stronger structures is relatively low." ISO New England, Inc. 2050 Transmission Study, February 12, 2024, p. 18.

[16] GridLab produced a report on removing barriers to advanced conductors in April of 2024. *See* M. O'Boyle, et al., *Supporting Advanced Conductor Deployment: Barriers and Policy Solutions, A companion report to "The 2035 Report: Reconductoring with advanced conductors can accelerate the rapid transmission expansion required for a clean grid"* https://www.2035report.com/wp-content/uploads/2024/05/5.3-Reconductoring-policy-report.pdf

NARUC resolution above – that the use of advanced conductors is supported by the State of Maine.

As an example, the Draft report could point to recent California legislation requiring utilities to look at all distribution and transmission lines for replacement with advanced conductors. California SB 1006[17] requires transmission and distribution utilities on or before January 1, 2026, and at least every four years thereafter to:

- complete an evaluation of both transmission lines and distribution lines
- determine which can be reconductored with advanced conductors to "cost-effectively achieve one or more" of the following:

(A) Increase transmission or distribution capacity.
(B) Reduce transmission or distribution system congestion.
(C) Reduce curtailment of renewable and zero-carbon resources.
(D) Increase reliability.
(E) Reduce the risk of igniting wildfire.
(F) Increase capacity to connect new renewable energy and zero-carbon resources.
(G) Reduce line losses.
(H) Increase the ability to quickly energize new customers or serve increased customer load.

The final plans are to be submitted to the California Public Utilities Commission and will be publicly available. The CPUC is to request that the California ISO consider the plans as part of the ISO planning process.

Last year, by a unanimous vote of the legislature, Montana specifically made it clear that advanced conductors meeting the definitions set out in the statute could be included in utility rates.[18]

At the federal level, the U.S. Department of Energy has highlighted the role that advanced conductors can play in quickly and cost-effectively building out the nation's transmission system,[19] while Maine's Senator Angus King has specifically called out the need for advanced conductors in Senate energy hearings.[20]

Maine could similarly take steps that would address real or perceived barriers to advanced conductor use and optimize utility investments in existing rights of way. For example, directing that rebuilds or reconductoring of existing circuits at the same voltage as lines being

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[17] https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202320240SB1006

[18] Montana House Bill No. 729, AN ACT PROVIDING FOR ADVANCED CONDUCTOR COST-EFFECTIVENESS CRITERIA; ALLOWING ADVANCED CONDUCTOR RATE BASING; PROVIDING A DEFINITION; AMENDING SECTION 69-3-702, MCA; AND PROVIDING AN IMMEDIATE EFFECTIVE DATE.
https://archive.legmt.gov/bills/2023/HB0799/HB0729_2.pdf

[19] *See generally,* DOE Liftoff Report.

[20] *See* United States Senate Committee on Energy and Natural Resources, March 21, 2024 at time stamp 1:43:30.
https://www.energy.senate.gov/hearings/2024/3/full-committee-hearing-to-consider-ferc-nominations

replaced should utilize conductors that increase capacity by 80 to 100% or more while *simultaneously* improving efficiency by 10 to 20% or more and reducing line sag.

This would comport with the Draft Report's recommendation in its Key Takeaway section. However, as noted above this recommendation should be revised not to focus on upsizing existing rights of way by a voltage class to double capacity. Instead, the recommendation should focus on rebuilding the circuit with an advanced conductor that will not alter the right of way, exposing the project to siting delays, and will not only increase capacity but also efficiency, while saving project costs with smaller and potentially fewer structures. This language from the Draft Report can be built on:

> Identify Opportunities to Upgrade Aging Infrastructure: Maine's infrastructure was built primarily during a period of high load growth in the mid-to-late 20th Century. Many of the existing high-voltage lines in Maine will need to be replaced in the next 10–20 years. The 2050 Transmission Study identified rebuilding aging transmission lines as a cost-effective approach to increasing system capacity while limiting impacts on land use. Maximizing the use of existing rights of way will be crucial to achieving clean energy goals. Maine should work with its electric utilities to identify aging infrastructure in the regional corridors identified in recent ISO-NE studies (including the 2050 Transmission Study and earlier Maine Resource Integration Studies) and near potential points of interconnection for offshore wind. Doing so now will ensure that when aging lines need to be addressed, ISO-NE and the Maine electric utilities consider the opportunity to cost-effectively upsize those facilities to create headroom for serving higher future demand and generation.[21]

Further, Maine could direct that conductors with those simultaneous characteristics of capacity, efficiency, and low sag are the preferred solution for state RFPs multi-state RFPs, or state-triggered efforts such as the ISO New England Long Term Planning Process.[22]

C. The Draft Report Should Add Advanced Conductors as a Key Transmission Takeaway and Include a Discussion of Advanced Conductors in the "Key Energy Technologies" in Appendix B, section B.1.i "Transmission and Distribution."

The Draft Report contains a section of key transmission takeaways. As discussed above, the use of advanced conductors for 1) line plus structure rebuilds, 2) for advanced reconductoring on existing structures where possible, and 3) for new line builds carries with it the ability to cost-effectively and more timely address the factors raised in the Draft Report.

[21] Draft Report at p. 64.

[22] For example, under the ISO New England tariff, which sets out an expressly non-exclusive list of project evaluation criteria, Maine and cooperating New England states could request that ISO New England provide higher project evaluation scores to projects that can be completed faster, do not require expansions of existing or new rights of way, and increase energy efficiency of the transmission corridor.

Given this, the use of advanced conductors should be a key transmission takeaway from the final report.

Similarly, advanced conductors are not highlighted in Key Energy Technologies under Appendix B, Section B.1.i section "Transmission and Distribution." Given the role that advanced conductors can uniquely play as potentially the only path to enable transmission capacity and efficiency gains in a matter of a couple of years vs. 8, 10, or more years, advanced conductors are not simply one possible solution, but perhaps the only viable solution in a plan that requires significant additional generation year-after-year starting now through 2024. As the Draft Report states, timing is imperative:

> **Policymakers Must Continue to Modernize Transmission and Distribution Planning to Facilitate Clean Energy Goals.** Maine's clean energy transition (and that of other New England states) will require more efficient use of the existing system and significant expansion of the regional electric power system, including transmission and distribution infrastructure. This expansion is driven by increased peak electricity demand and the location and type of new (largely renewable) generation resources. ***Delays in developing this grid infrastructure could limit access to low-cost generation, delay clean energy development, slow the adoption of electrified heating and transportation, and cause reliability issues.*** Policymakers and grid planners in Maine must collaborate and with other entities across the region on proactive planning processes to ensure timely and cost-effective upgrades and expansion to achieve Maine's clean electricity goals. (emphasis added)[23]

Further, some of those technologies like offshore wind will not make significant and costly interconnection decisions to move energy to Maine versus plans for radial export to Boston until it is certain that there is transmission infrastructure that can deliver its product to market with known and *economically feasible interconnection upgrade costs* to what must be a robust, and certain, onshore grid.

[23] Draft Report at Executive Summary Page x.

III. Conclusion

CTC Global appreciates the opportunity to provide these comments on the Draft Report to the Maine Governor's Office and the Brattle Group authors. CTC Global further appreciates the thoughtful consideration of these comments and requests that the Draft Report be updated to reflect the points made above.

Respectfully submitted,

_/s/ Theodore J. Paradise_____

Theodore J. Paradise
Chief Policy and Grid Strategy Officer
CTC Global
2026 McGaw Avenue
Irvine, CA. 92614

Dated: November 18, 2024

ConnectDER

11/15/2024

To the Governor's Energy Office of Maine,

We appreciate the opportunity to provide comments on the Pathway to 2040 draft technical report. The report identifies transportation and heating electrification as key strategies for achieving the state's climate goals. As a manufacturer of meter socket adapters (MSAs), ConnectDER offers a solution that simplifies residential interconnections for distributed energy resources (DERs).[1] MSAs are an effective tool for enabling households to connect devices such as electric vehicle supply equipment (EVSE), heat pumps, solar arrays, and battery energy storage systems (BESS). We would like to take this opportunity to highlight barriers that may hinder the adoption of electrification retrofits, such as heat pumps and EV chargers, and to demonstrate how MSAs can help mitigate these challenges.

Many electricians and homeowners believe that increasing electric service size to 200 amps is necessary to accommodate new loads such as EVSE and heat pumps. The most basic service upsizing and breaker panel replacements cost between $4k-$7k. Additional costs for refinishing inside the home and trenching for underground wires can bring costs over $10k. If a customer is made responsible for transformer upgrades as a result of their service upsizing, this can cost up to $30k.[2] For a homeowner faced with these costs, they would likely prefer to keep their existing fuel sources for transportation and heating rather than electrify. While newer homes are built with 200-amp services, approximately 40% of homes in New England have services between 100 and 150 amps. This means hundreds of thousands of Mainers could be facing cost barriers that halt their switch to electrification.

However, service increases may not be as necessary as commonly believed. Recent studies have found that most homes with a 100 amp service or above have the service capacity to add large new loads such as EVSE or heat pump. In 2024, multiple studies have addressed the issue of residential service capacity. A study of data from Home Energy Analytics showed that 80% of homes with 100-125A services used less than 50% of their available service capacity.[3] Similarly, a study by SPUR of California residents' electrical usage found that "The vast majority of homes—including single-family homes with 100-amp panels and multifamily dwellings with panels under 100 amps—use less than 50% of their panel's electric capacity. That means there's plenty of opportunity to electrify equipment without upsizing the panel. A SPUR analysis of TECH Clean California program data showed that of 1,764 homes with a 100-amp panel, 96% could add a heat pump water heater, heat pump HVAC, or both without

[1] See www.connectder.com for additional product details.
[2] NV5 and Redwood Energy, "Service Upgrades for Electrification Retrofits Study Final Report." May 27, 2022. https://www.redwoodenergy.net/research/service-upgrades-for-electrification-retrofits-study-final-report-2
[3] Home Energy Analytics (HEA). "Dataset on Residential Panel Capacity and Utilization." Steven Schmidt, October 13, 2022.

upsizing the panel.[4]" By using high efficiency appliances, they find that homes can electrify all major end uses, including EV charging, on any service of at least 100 amps. Contrary to the conventional wisdom, there are alternate options to panel replacement and service upsizing even when a main panel is full.

MSAs offer a cost-effective alternative to service upsizing, potentially saving homeowners thousands of dollars. MSAs keep electrical work outside the home, utilizing the meter socket rather than requiring extensive modifications to the main electrical panel. The savings from avoiding service upsizing are substantial for homeowners, but they also benefit ratepayers and utilities by reducing the need for costly transformer upgrades or other distribution system enhancements that typically result from service upgrades. Currently, different MSA manufacturers offer models designed for specific applications, including EVSE, heat pumps, solar arrays, and microgrid islanding for homes with BESS. Future models will allow multiple electrification and generation retrofits without requiring service upsizing.

MSAs have been approved or are in the process of being approved in several other New England states. Unfortunately, despite their numerous benefits, Maine customers are currently unable to utilize MSAs due to the lack of procedures for their approval by electric distribution companies. Since the MSA is attached to the electric utility's meter, utilities must explicitly permit their use. Although ConnectDER has not identified any formal regulations preventing the installation of devices between the meter and meter socket, no Maine utilities have adopted rules that explicitly allow the use of MSAs. We urge the Energy Office to recognize the potential benefits of MSAs and to encourage utilities to approve their use and integrate them into residential electrification programs.

We commend Maine for adopting a 100% clean electricity target by 2040 and find the technical report comprehensive. We believe that affordable, low-cost technologies like MSAs will play a critical role in enabling all Maine residents to participate in the clean energy transition. By facilitating the use of MSAs, Maine can make electrification and DER adoption more accessible, paving the way for a more equitable and cost-effective energy future.

Respectfully Submitted,

Jonathan Knauer

Jonathan Knauer
VP, Policy & Market Strategy
ConnectDER
jknauer@connectder.com

[4] SPUR. (May 2024) Solving the Panel Puzzle.
https://www.spur.org/sites/default/files/2024-05/SPUR_Solving_the_Panel_Puzzle.pdf

PO Box 383
Email: fpullaro@renew-ne.org
Web: renew-ne.org

November 18, 2024

By email to geo@maine.gov

Dan Burgess, Director
Maine Governor's Energy Office
62 State House Station
Augusta, ME 04333

Subject: Comments on *Maine Pathways to 2040: Analysis and Insights*

Director Burgess:

RENEW Northeast, Inc. ("RENEW")[1] submits this letter in response to the Governor's Energy Office ("GEO") invitation to comment on the draft technical report *Maine Pathways to 2040: Analysis and Insights* ("study"). Thank you for the opportunity to provide feedback. RENEW appreciates GEO for having commissioned this study to gain an understanding of the different approaches for the clean energy build-out that will enable Maine to attain its greenhouse gas reduction requirements in the most cost-effective manner.

I. The Study Must Consider the Potential Risks for the Erosion of the Baseline of Clean Energy Resources

RENEW agrees with the study that Maine will need both its existing and planned resources to meet its climate, renewable energy, and economic development objectives. The study, though, does not adequately consider the multitude of threats to existing clean energy resources. Rather, it assumes today's baseline will always be available. According to the study, "Existing renewable energy resources representing Maine's current RPS compliance (51%) are assumed to continue to be available in the same quantities going forward to illustrate how incremental planned resources compare to incremental clean energy requirements."[2] The state has a recent troubling history of adding extra risks and costs to clean energy resources that should be given full consideration in the study in addition to those policies will bring more clean energy resources to the grid.

The study should acknowledge the following threats to the existing Maine clean energy fleet:

[1] The comments expressed herein represent the views of RENEW and not necessarily those of any particular member of RENEW.
[2] Study at viii.

- Maine's continued policy of having state-directed energy contracts for new renewable energy projects place negative price risks on consumers and existing generators. This is a threat to the viability of existing uncontracted renewable energy resources and those whose contracts require them to assume the negative price risks. States like Connecticut and Massachusetts, which are likely to partner with Maine in future procurements, have structured their clean energy RFPs so that the seller assumes the risk of negative prices.
- Punitive state policies, such as requiring the large, low-cost generators to pay massive increases in station service costs (some as much as 2400%) to support state policy program.
- Frequent threats to lower Alternative Compliance ("ACP") rates, such as the recent lowering of the Class II ACP from $50 to $5, that add uncertainty for the long-term economic viability of uncontracted renewable energy resources.
- Frequent changes to state siting laws that single out clean energy generation and electric transmission creating significant uncertainty for developers, which adds costs to projects if they can be permitted at all.

II. The Study Must Acknowledge Energy Storage Resources Can Be Stand-Alone

The study points out the benefits of energy storage, from today's pumped hydropower to the battery energy storage and emerging long-duration technologies now being developed in Maine, for addressing the variability of electric demand and renewable energy output.[3] RENEW suggests the study be amended to characterize accurately how large battery energy storage projects can be effectively deployed on the grid helping to contain costs and reduce costly grid investments in targeted areas. The study, in stating that these batteries "can be paired with solar generation, charging, and discharging on a daily cycle," implies stand-alone energy storage has no role.[4] The study should examine how consumers will benefit from allowing storage developers the flexibility to offer proposals that are standalone or paired with renewable energy systems. Research has confirmed the operational and locational flexibility benefits of stand-alone storage systems over paired ones.[5]

III. The Study Recognizes the Importance of Upgrading Region's Transmission System and the Need to Include Gulf of Maine Offshore Wind Interconnections in the Planning and Procurement Efforts

Expanding Maine's high-voltage transmission system is pivotal for the state to unlock its clean energy development opportunities.[6] RENEW strongly supports major transmission upgrades for the Maine/Boston section of the region transmission system using the state-led effort under the New England States Committee on Electricity ("NESCOE"). The need for

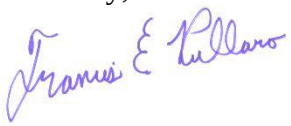
[3] *Id.* at 33.
[4] *Id.* at 95.
[5] *See* e.g., Will Gorman, Cristina Crespo Montañés, Andrew Mills, James Hyungkwan Kim, Dev Millstein, Ryan Wiser, *Are coupled renewable-battery power plants more valuable than independently sited installations?* ENERGY ECONOMICS, 107, (2022), https://www.sciencedirect.com/science/article/pii/S0140988322000226
[6] Study at 58.

transmission upgrades has been well known in Northern Maine for years and is quickly becoming apparent for delivery of forthcoming renewable energy projects throughout Maine and the rest of New England. Existing renewables in Northern Maine have experienced higher levels of congestion and curtailment than those in the rest of the region due to transmission limitations and the archaic operating procedures that render energy imports, such as those from New Brunswick, largely inflexible in the real time energy market.

Missing from the October 16, 2024, NESCOE letter to the ISO New England Planning Advisory Committee in its set of four transmission solutions is consideration of future offshore wind interconnections from the Gulf of Maine that will have an impact on the Maine/Boston upgrades. The study appropriately recommends Maine collaborate with the other New England states to examine "upgrades to interconnect up to 3 GW of offshore wind in the Gulf of Maine. Considering all three collectively will result in lower cost solutions compared to evaluating each need separately."[7] RENEW urges Maine to advocate for including offshore wind interconnections among the set of needs requiring solutions in any transmission solicitation.

Thank you for considering RENEW's views on the study.

Sincerely,



Francis Pullaro
President

[7] *Id.* at 60.

Natural Resources Council of Maine
3 Wade Street • Augusta, Maine 04330 • (207) 622-3101 • Fax: (207) 622-4343 • www.nrcm.org

November 18, 2024

Submitted via E-mail: geo@maine.gov

Dan Burgess, Director
Maine Governor's Energy Office
62 State House Station
Augusta, ME 04333

Re: Natural Resources Council of Maine Comments on Draft Maine Pathways to 2040 Analysis

Director Burgess,

The Natural Resources Council of Maine (NRCM) appreciates the opportunity to comment on the draft Maine Pathways to 2040 report. NRCM has been working for more than 60 years to protect, restore, and conserve Maine's environment, on behalf of our 30,000 members and supporters. Today, we recognize that we cannot meaningfully do that work without addressing climate change, one of the biggest threats to Maine's woods, waters, wildlife, coasts, and communities.

The draft Pathways report is an important analysis illuminating the policy choices the state has in implementing Governor Mills' goal to achieve 100% clean energy by 2040. Continuing Governor Mills' leadership on climate and clean energy, and the progress Maine has made to address climate change, reduce emissions, reduce our dependence on out of state fossil fuels, and build new sources of local, reliable, and affordable clean energy is more important now than ever.

Broadly, we appreciate the level of detail and multiple scenarios considered in this analysis, especially the insight that there are multiple pathways that can achieve this goal, even while lowering electricity costs over time, in addition to the benefits Maine's Renewable Portfolio Standard (RPS) has already provided to Maine ratepayers over time. An extensive analysis of Maine's existing RPS done earlier this year ("the RPS report") shows that Maine's tentpole clean energy policies are already bringing significant benefits to the state and its residents. The RPS report shows:

> *"The RPS has supported renewable development and operation resulting in over $100 million in direct investment, approximately $900 million in operations and maintenance spending, and over 1,000 full-time equivalent jobs yielding over $1 billion in worker income between 2008 and 2022. For*

electric ratepayers, the net annual average benefit has been approximately $21.5 million between 2011 and 2022."[1]

We commend the Governor's Energy Office (GEO) for your efforts to continue this work, and those of the consultants on this important analysis, and we offer the following constructive comments and suggestions for consideration for inclusion or refinement in the final report.

Cost implications

It is well known that Mainers suffer from higher energy burdens on average than residents of many other states, much of which we can trace back to our state and our region's overreliance on fossil fuels. So we are heartened to see in this report confirmation of what many previous analyses have shown – that clean energy technologies are expected to lower consumer costs over time in Maine. In the core pathway:

> *"The total cost of serving the energy needs of an average Maine household falls by about 20% from 2023 to 2050 (just over $1,300 per-year), relative to 2023 costs. Both home and transportation energy costs are projected to fall as end uses powered by fossil fuels are transitioned to lower cost renewable electricity."*

Given the public debate around energy costs and their causes, this result deserves to be emphasized, perhaps through a direct mention in the executive summary.

Quantification

The report frequently provides qualitative comparisons of the costs between pathways, (for example, noting the High DER + High Flex pathway is "somewhat more costly overall" than the High Flexible Load pathway). While relative costs are helpful, a clearer quantitative comparison of the cost implications of the various pathways would be extremely helpful for policymakers and the public to better understand the costs and benefits of different policy choices. For another example, the analysis shows electricity costs declining in the core pathway in figure III-13, but not the stacked cost changes in other pathways, which would be helpful to have for comparison. We recommend including an appendix with full quantification in the final version.

Clean Thermal

The study determines that total costs across scenarios are sensitive to the resources used to meet reliability needs during infrequent events of high demand-low renewable energy supply periods, such as extended periods of low wind generation during the winter. The report concludes that a significant amount of clean thermal generating capacity is preferable to long duration energy storage on the basis of cost, notwithstanding the high degree of uncertainty around currently unavailable technology solutions, supply chains, and the actual lifecycle emissions of the fuels analyzed.

With regard to hydrogen, outside of technological availability, there are major prerequisites that must be met for hydrogen to be considered clean, and good reason to proceed with extreme caution in

[1] Sustainable Energy Advantage. "An Assessment of Maine's Renewable Portfolio Standard." March 31, 2024. https://www.maine.gov/energy/sites/maine.gov.energy/files/inline-files/Maine-RPS-Impacts-and-Procurement-Policy-Options-Report-Master-FINAL.pdf

considering hydrogen a clean fuel. Many of these are detailed in NRCM's testimony on 2023's LD 1775, An Act to Establish A Clean Hydrogen Pilot Program.[2] In summary:

- Leaked hydrogen is not a direct greenhouse gas, but is not benign from a climate perspective, having a significant global warming impact through chain reactions in the atmosphere, up to 33 times higher than carbon dioxide over 20 years.
- Hydrogen combustion leads to Nitrogen Oxide (NOx) pollution, a pre-cursor to ground level ozone and a significant health hazard.
- Hydrogen is energy intensive to produce, and it must be produced with renewable energy to be considered clean. If the energy used does not meet the criteria of Additionality, deliverability, and hourly matching, hydrogen production could cannibalize existing renewable resources, resulting in higher emissions overall. Final rules defining green hydrogen for the purposes of the new 45V tax credit are not yet final.

Availability of alternative fuels, like biomethane as well as hydrogen, is also a major feasibility concern. In addition, there are significant disagreement about the report's stated assumption that biofuels are carbon neutral. While the analysis mentions this a few times, it deserves to be elevated.

While the complexity or cost of retrofitting natural gas plants to burn hydrogen or blended fuels may be insurmountable in the plant itself, the cost and public acceptance of building or retrofitting significant hydrogen infrastructure could be a formidable barrier. Further, a regulatory framework that could ensure these plants reserved only for infrequent late-scenario reliability events but otherwise phased out of regular use is far from straightforward. This analysis would benefit from a discussion of the complexity of regulatory and market interventions that could allow the existing fleet to be utilized in this limited way.

Path dependence on fossil fuels has formidable and pervasive force. Staking a climate protective future on the continued use of fossil infrastructure bears considerable risk of continued investments in infrastructure and fuel supply that would perpetuate gas use, with consequences for consumer cost volatility and greenhouse gas and air pollution emissions, including down stream of generators. Further challenges and concerns related to a gas-oriented approach to reducing power plant emissions are described in helpful detail in a recent report from the Union of Concerned Scientists, "Beyond the Smokestack."[3] We urge the authors to include a meaningful discussion of these implications and challenges at the national, regional, and state levels.

With respect to building out the Maine RPS program to support its 2040 clean electricity goals based on the insights of this study, energy policy makers must be careful not to put in place policies and incentives today that reinforce our dependence on gas and lock in a fate for high-cost high-risk hydrogen gas, biomethane, or other alternative fuels. This is especially true when the modeling shows that this thermal capacity is only needed for the very last few percent of forecasted needs, more than a

[2] https://www.mainelegislature.org/legis/bills/getTestimonyDoc.asp?id=173835
[3] Union of Concerned Scientists. Beyond the Smokestack: Assessing the Impacts of Approaches to Cutting Gas Plant Pollution. October 15, 2024. https://www.ucsusa.org/resources/beyond-smokestack

decade in the future. Prematurely extending eligibility for gas-based solutions could divert and derail critical investments, incentives and planning support for renewable energy, demand-side solutions, and grid flexibility that can offer longer-terms solutions with a layer cake of benefits.

Procurement

The analysis notes the importance of following through on the state's clean energy procurement commitments to meet the 2040 goals, and notes the extensive discussion of procurement history and policy in the RPS report. However, the policy discussion in this analysis would benefits from highlighting some of the policies suggested for consideration to ensure that Maine does efficiently and effectively follow through on these procurement commitments, and/or potentially expand them to include other crucial resources like energy efficiency, cost-effective distributed energy resources, and load flexibility. These could include a summary of policy choices to rationalize Maine's renewable energy procurement framework across relevant entities, reduce risk and attrition, and increase competition and project pipelines, for example by:

- Establishing a framework by which a regularly updated reoccurring analysis generates targets for energy efficiency, large scale renewables (including offshore wind), medium/small distributed resources (including ongoing solar and solar-storage procurements pursuant to LD 1986, LD 1591), energy storage, and behind-the-meter load flexibility, including Efficiency Maine Trust (EMT) capacity contracts proposed in the demand management programs proposed in the sixth Triennial Plan (TPVI).
- Ensuring relevant entities (including GEO, the Maine Public Utilities Commission (MPUC), EMT, and OPA) coordinate to consider locational premiums or prices to reduce congestion; storage and solar-storage value propositions; land-use preferences; impacts on low- and moderate-income households and disadvantaged communities; ratepayer beneficial terms; public and industry input on these and other environmental, labor, equity, or other public policy issues; regional collaboration; the establishment of "walk-up" programs, as appropriate; and mechanisms for achieving desired outcomes, e.g. eligibility, bid selection preferences/credits, contract terms, etc., with discretion given to MPUC/EMT as appropriate.
- Conducting regular procurements for needed resources, including contract milestones for development and construction timelines that result in forfeit if not met.

Vehicle Miles Traveled

Maine Won't Wait, Maine's Climate Action Plan, includes a goal of reducing Vehicle Miles Traveled (VMT) by 20% by 2030.[4] This goal is included in the modeling supporting the development of Maine Won't Wait 2.0, due in the coming weeks.[5] Reducing VMT – in other words meeting Mainers transportation and mobility needs in other ways besides individual vehicle use – immediately lowers emissions, but in the context of achieving 100% clean electricity, also lowers electricity demand needs, as well as reduces or defers needed distribution system upgrades, lowering overall system transition costs. A

[4] https://www.maine.gov/future/sites/maine.gov.future/files/inline-files/MaineWontWait_December2020.pdf
[5] https://www.maine.gov/future/sites/maine.gov.future/files/2024-10/MCC%20Emissions%20Study%20-%20Maine%20Climate%20Council%2010-15-24_0.pdf

discussion of the impacts reducing VMT would likely have on the results of this analysis would be helpful.

Load Flexibility
We appreciate the strong case made for load flexibility, especially the discussion that early investment and adoption of load flexibility has increasing benefits over time. Load flexibility can significantly reduce peak loads, and thus reduce system costs and emissions. The analysis includes a very brief discussion of possible avenues for securing the benefits of load flexibility, however a more in-depth discussion of what policies, frameworks, and systems must be put in place, and by which entities in Maine to achieve these benefits would be helpful for policymakers and readers to understand.

Grid Planning
The report appropriately discusses the importance of transmission and distribution planning as being crucial to meeting Maine's clean energy and climate goals in a more cost-effective manner. The report specifically discusses the Integrated Distribution Planning docket underway at the MPUC, noting that the "docket will result in the MPUC specifying the expected content of utilities' future grid plans." The MPUC issued their planning order on July 12, 2024.[6] The draft report should be updated to reflect the contents of the order.

Vehicle-to-grid technology
Electric vehicle batteries are often significantly larger than stand-alone residential battery storage installations, often having enough capacity to meet a home's energy needs for multiple days. As vehicle electrification advances, the potential for vehicle-to-grid (V2G) technology to constitute a significant amount of distributed energy storage advances as well. This technology is briefly mentioned in the report, noting that V2G programs are evolving. As V2G resources would be located on the distribution system near load, and would require limited incremental cost (as the vehicles will have already been purchased), a lengthier discussion of the potential advantages or disadvantages of the potential for V2G applications would be beneficial.

Thank you again for the opportunity to provide input into this important analysis.

Respectfully,

Jack Shapiro
Climate & Clean Energy Program Director
Natural Resources Council of Maine

[6] Maine Public Utilities Commission. Docket 2022-00322. Item 108. https://mpuc-cms.maine.gov/CQM.Public.WebUI/Common/CaseMaster.aspx?CaseNumber=2022-00322

Maine Governor's Energy Office
62 State House Station
Augusta, Maine 04333
geo@maine.gov

November 18, 2024

re: Comments in response to the Maine Energy Plan Pathway to 2040 Draft Technical Report

Dear Maine GEO team,

Thank you for investing in the Maine Energy Plan Pathway to 2040 Draft Technical Report. The consultants did an admirable job in documenting the current state and high-level recommendations for possible pathways to accommodate beneficial electrification and associated load growth amidst decarbonization goals.

Solect Energy develops, finances, installs and services solar and energy storage projects on the distribution system, and has experience with over 800 commercial scale projects with public and private entities in the northeast United States. We have a Maine based team and would like to continue to invest in growing our staff as well the volume of work for our local installation, construction, and service partners.

The comments we offer are intended to help Maine GEO consider how Distributed Solar and Energy Storage can become effective market solutions when considering investment and operational decisions. These proven, reliable, and beneficial technologies can play a key role to help Maine assure a cost effective and just transition to 100% Clean electricity by 2040.

1. The generation resources charts in Figure ES-2 show solar capacity as a very small, seemingly insignificant Distributed Energy Resource with no growth over the fifteen years forward and includes "NEB" in the description. We agree that the NEB program by its current design is insufficient to motivate, compensate, and contribute growth to the renewable energy mix. A new program is needed to support solar and storage to help reach 2040 goals. There certainly is risk associated with the hockey stick impact the graphic depicts associated with new offshore wind generation and it's onshoring infrastructure needs.

2. During the Q&A section of the review meeting held on November 8, 2024, the consultants noted that they had not conducted a "Benefits and Cost Analysis" of Solar PV and distributed storage, but did indicate that the location of new DER installations can impact value to the system. Solect Energy urges MPO and policy makers to consider the value that solar and energy storage can deliver when generating renewable electricity at the load site especially with Behind the Meter installations. At buildings powered exclusively by grid-delivered electricity, the load demand can strain the grid and over time require upgrades. When that building and its load demands are met or have significant contribution from onsite solar and storage, the grid does not need to work as hard to serve that load. A well designed solar support program that incentivizes behind the meter projects can bring long lasting benefits to all stakeholders: The customer can avoid cost of supply and related risk of volatility, reduce demand charges by managing their load, and participate in energy programs that pay for those grid benefits. Ratepayers won't have to upgrade the grid to the

extent that would be necessary due to expected load growth from electrification. Developers and customers can leverage existing infrastructure and avoid costly upgrades. Load sited projects are installed at pre-developed sites, such as rooftops, parking lots, and adjacent land, which helps maintain the valuable and beautiful natural open spaces that make Maine such a beautiful place.

3. Other states have models that can inform Maine GEO and policy makers to consider establishing a more effective solar program for public entities, commercial business and building owners. While Maine is unique, each of the other states where a cost-effective solar program has been successful all have their unique and special attributes as well. The New York VDER program offers one example of how that market's stakeholders came together to make an informed decision about benefits and costs in the near- and medium-term future and has resulted in a balanced cost benefit that supports solar and storage deployments. We encourage Maine to undertake a similar investigation to quantify such benefits and costs of the locational value of Solar and energy storage can have for Maine, and use that information to inform a supportive solar program that can deliver savings for customers and minimize costs to ratepayers.

Thank you for your consideration of these comments, and the ability to continue to participate as a stakeholder in Maine's pathways to 2040. As a stakeholder, the team at Solect Energy and our partners appreciate your continued leadership and engagement.

Sincerely,

Matt Shortsleeve

Matt Shortsleeve
Senior Vice President

Comments submitted by Don Tardie

Dan,

Although I haven't been a participant of the Climate Change Council and resulting discussions, I've followed the process and kept myself informed of the potential outcomes. I'm a retired Forester and have been involved in Maine's Forest Economy since my late teens. My passion has always been to promote economic development in my areas of responsibility that included the jurisdictions of Maine, New Brunswick, Quebec, New Hampshire and Wisconsin. I am currently engaged in economic development for Ashland. As it relates to Pathway 2040, I offer my concerns and suggestions that hopefully will be given serious consideration.

1. My first and foremost concern is related to this draft is future costs to the ratepayers that will have to be absorb if this policy is enacted. Undoubtedly the best example of recent energy policy that has been detrimental to the rate payers is Net Energy Billing. All rate payers are required to pay a disproportional "Public Policy Charge" and conservation fees for 20 years to benefit out of state investors for the contract term. <u>If a policy is to be sustainable, shouldn't it be affordable too?</u> We all have horror stories on how NEB is affecting our regional economies to include working families, retirees on fixed income, small business, retailers, the services sector to include hospitals and nursing homes and most importantly our industrial base. <u>Before we embark on Pathway 2040, shouldn't NEB be fundamentally fixed beyond a band aid approach?</u>

   Having been in the Forest Sector for over 55 years, I have knowledge of how modeling works and how the assumptions that go into a model are often biased to generate the desired outcomes. Reading Pathway 2040 does not allow for objective assumptions, rather a reaffirmation of the current strategy without really looking into the options. For example, converting a grid to more intermittent generation brings a tremendous amount of Grid Reliability Risks in the form of costs for storage, capacity

plus transmission and distribution investments. Pathway 2040 attempts to identify some of these costs however never models the true 2025 costs to the consumer in total. Before this policy is adopted, shouldn't all costs be identified to make sure we are making an informed decision and shouldn't the people of Maine vote on it before adoption? Absent an accurate Cost Benefit Analysis is conducted, Maine will be making a blind decision to adopt Pathway 2040. If adopted in its current draft, one could argue that Maine's current Motto "Maine Can't Wait" should also include "At Any Cost".

2. My next concern is why doesn't the Pathway promote more of the cheapest and most reliable renewable energy supply to the consumers. In today's energy chain, Hydro, Combined Heat and Power are the cheapest and most reliable options for the ratepayers. The MPUC has recently approved a contract for 15 MW of net generating capacity for the Northern Maine Grid. This generation contract is at a $.10/kWh fixed for 20 years. This project will enable a Renewable Energy Campus to be developed and provide thermal heat plus electricity behind the meter for interested bolt on industrial players in our region. The cost of this electricity will most definitely be at more competitive costs that $.225/ kWh for supply absent all the other costs for Transmission, Distribution, Stranded Costs, Public Policy Charge and Conservation Fee. Both Hydro and CHP costs are known today and will probably change very little over the next 20 years however, in the Pathway 2040, the trend line for supply is fixed from these cheaper generation sources going out in the future (pg 8). Although Thermal Energy is identified as a future initiative Pathway 2040, no cost saving examples are identified that could compete favorably with CHP. With known costs, why doesn't Pathway 2040 promote Hydro and CHP as a strategic initiative as other New England states have adopted in their strategy for renewables? These sources of supply would also present more reliability to the grid as they are base loadable and thus reduce exposure to future cost for

storage, capacity, plus T&D modifications to the Grid. Maine is rich in wood waste that produces methane while decomposing in the forest. That wood waste could fuel CHP platforms all over the state, producing steam and electricity. Not promoting more Hydro and CHP for our future energy requirements is a major lost opportunity for Maine and its rural economy.

3. Maine is very dependent on its rural economy. We have abundant resources in fisheries, forestry and agriculture. The challenged is to be able to commercialize these resources within the State to enhance economic development and provide a quality of life for all. Today, Maine's businesses small and large are finding it increasingly difficult to compete to market products against stiff competition from regional players. Because of our high conversion costs, Maine timber will find its way to regional competitors in Quebec and New Brunswick to be processed. Our friends across the border have significantly lower conversion costs especially for electricity. Quebec Hydro rates currently for small and large industrials are at .12 -.15/kWh $C. In the Wood Products Sector, this gap is a significant disadvantage when conversion costs to manufacture lumber is 25-35% electrical. With the risk for additional energy cost on the horizon promoted in Pathway 2040, capital for investments will be at a premium risk as Maine mills will not be able to compete for capital and wood supply to sustain their operations. The majority of Maine's timber will be exported to more competitive regions around Maine. This model will be eventually repeated for agriculture and our fishing industry. Our energy supply must be affordable and provide us with a regional competitive edge if we are to sustain our quality of life.

4. Finally, if Maine is to have a vibrant future economy, it must have the population to support it. Raising the cost of living for working families with electrical cost coupled with inflation is a doomed policy. Currently

no young family can afford to borrow money to build a home let alone even adequately provide for the basics. With Maine now having the dubious distinction of being the 4th highest taxed state in the nation, how long will it take for us to observe an exodus of our working class to other more competitive regions. This exodus will leave a residual population on fixed incomes to carry the burden of taxes, inflation and energy costs. We need to take a serious look in the mirror before we embark on Pathway 2040. And remember, Maine can't afford it new Motto "Maine Can't Wait at any Cost".

Don Tardie

Comments submitted by Paul Towle

Dan,

I joined your Pathway to 2040 webinar last week and have some input I believe is important to incorporate into the plan. I've retired from Aroostook Partnership but I still keep involved with the Partnership on a few things, and continue pushing for economic success in rural Maine. Here are my concerns and suggestions:

1. With two recent setbacks for offshore wind (federal grant denied and new anti-offshore wind administration in DC), I'm concerned that 3GW of offshore wind is too large of a component of the overall solution to achieve the 2040 goals. Northern Maine has been trying to build utility scale wind for more than 20 years and you're aware of the latest delays in that process, largely due to transmission costs. The economic feasibility of 3GW of offshore wind needs to be reassessed and scaled back appropriately in light of these new developments. If not, Maine ratepayers will end up footing another enormous electric increase to compensate for the lack of federal funding.
2. I heard and read little mention of biomass and CHP in the study. This continues to concern me because new technologies have enabled systems with higher efficiency, and burning Maine forest residues and logging slash plays a critical role in the forest value chain. CHP investments employ easily 10x more people in long-term well-paying jobs than do similar output solar and wind investments. Jobs in those industries largely leave town (as do the profits) once the wind/solar farms are built. It's exciting to see new outlets for wood residues, like Timber HP and potentially a new OSB mill, but all mill residues cannot be absorbed by them alone. CHP is also less than half the cost of current net energy billed solar ($.10 KWHr vs. $.24 KWHr. This report needs to better align with, and support, our legacy industries like forestry and CHP because so much of rural Maine's economy and sustainability is tied directly to the health of those industries.
3. I am very concerned about energy costs for our large manufacturers when you combine the already high rates with the cost of NEB through the Public Policy Charge on electric bills. These escalating energy costs are dramatically impacting those industries' ability to compete on the national scale. Many of rural Maine's manufacturers are national and international companies with many options where they operate, and high energy costs in Maine are gaining negative attention in board rooms everywhere. Rural Maine's economy is reliant on these industries to sustain

their communities and would be devastated if manufacturers shift operations to other states to keep their production costs under control. In reference to the potential of continued cost increases to achieve the 2040 plan, Dean from the Brattle Group mentioned in the webinar that it will be several decades before Maine achieves cost savings from the draft strategy. Several decades is not a balanced energy/economic strategy. If we continue increasing energy costs in Maine for several more decades I assure you we will have gone through a mass exodus of manufacturing jobs and population. More emphasis needs to be placed on the cost of energy in the plan, not solely the reduction of net carbon output, and it must also include a candid economic impact assessment of the overall strategy.

4. Eliminating heating oil, propane, diesel, gasoline and all other fossil fuels in Maine in such a short window, given our current negligible carbon impact globally, would be far more harmful to Maine than most Mainers realize. The loss of GDP, long term jobs, and population would be significant. Maine should approach this from the middle of the pack, not from the front of the pack, because we need to compete with the states in the middle and below (toward 100% green adoption). I know this is currently “policy” but we need to think about the potential adverse effects the current policy will have on Maine’s ability to attract and retain industry and population.

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For a thriving New England

CLF Maine 53 Exchange Street, Suite 200
Portland, ME 04101
P: 207.210.6439
www.clf.org

November 18, 2024

Submitted via E-mail: geo@maine.gov

Dan Burgess, Director
Maine Governor's Energy Office
62 State House Station
Augusta, ME 04333

Re: Conservation Law Foundation's Comments on Draft "Maine Pathways to 2040: Analysis and Insights"

Director Burgess:

As Maine seeks to comply with its climate and clean energy requirements, it is essential that the state transitions to an energy system that is clean, affordable, reliable and equitable. The Governor's Energy Office's (GEO) November 2024 draft "Maine Pathways to 2040: Analysis and Insights" report is an important step in that transition and should be used by legislators, regulators, policymakers and stakeholders to inform and guide energy law and policy in Maine.[1] Conservation Law Foundation (CLF) commends the GEO and its consultants for their work on the report and provides the following comments for consideration.

CLF is a public-interest advocacy organization focused on protecting New England's environment and safeguarding the health of our communities. CLF advocates for laws, policies and projects that advance clean energy and reduce energy demand, while saving families and businesses money and creating jobs. CLF works to reduce the region's reliance on fossil fuels and to modernize the region's electricity grid to better serve the needs of our changing society. CLF participated in the GEO's stakeholder meetings related to the report.

I. The "Pathways to 2040" report identifies and assesses many of the opportunities and challenges associated with achieving Maine's clean energy and climate requirements.

As a threshold matter, the draft report explicitly recognizes, as it must, the state's legal obligations to reduce greenhouse gas (GHG) emissions and increase renewable energy supply, making the analyses contained in the report sounder and more useful. The pathways explored in the report provide a helpful starting point for discussions on how the state can and should go about meeting those obligations. Further, the consideration of equity impacts in the report ensures a focus on protecting low- to moderate-income customers and vulnerable populations.

[1] GEO, Maine Pathways to 2040: Analysis and Insights, Draft for Public Comment, November 2024, https://www.maine.gov/energy/sites/maine.gov.energy/files/2024-10/Maine%20Pathways%20Report%20Draft%20for%20Comment.pdf.

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A. The report outlines the legal framework for clean energy and climate action in Maine and begins to lay the groundwork for how to meet the state's requirements.

Aside from Maine's climate action plan, the "Pathways to 2024" report is arguably the most comprehensive analysis to date of how the state could meet its clean energy and climate requirements. As indicated in the report, Maine has committed to increase the required share of the state's electricity obtained from renewable resources (the Renewable Portfolio Standard, or RPS) to 80% by 2030 and 100% by 2050.[2] The state is also required to curb GHG emissions by 45% from 1990 levels by 2030 and 80% by 2050.[3] The pathways analyses in the report appropriately assess several supply-side and demand-side issues associated with satisfying these statutory requirements, but should be revised in several respects, as discussed below.

The draft report indicates that it will be used "to inform an updated state energy plan that will ensure affordable, reliable, and clean energy that supports the growth of Maine's economy while meeting GHG emissions reduction requirements."[4] This is consistent with the GEO's statutory obligation to, within the state energy plan, among other things:

> recommend appropriate actions to lower the total cost of energy to consumers in this State and facilitate the development and integration of new renewable energy generation within the State and support the State's renewable resource portfolio requirements specified in Title 35-A, section 3210 and wind energy development goals specified in Title 35-A, section 3404.[5]

It is also consistent with the GEO's stated objective of developing a new, comprehensive, integrated energy plan consistent with Maine law to meet the Governor's 100% clean electricity by 2040 directive and identify economy-wide decarbonization options looking beyond 2040.[6]

B. The pathways assessed in the report provide a valuable starting point in developing policies for meeting the state's climate and clean energy requirements.

Given the economic and environmental uncertainties associated with climate and clean energy planning and policy development, it is imperative to analyze multiple future scenarios. The pathways assessed in the draft report represent several future scenarios, which provide a good starting point for an initial report. The pathways should be revised before the report is finalized, as discussed below. In future versions of the report, the GEO should consider additional scenario analyses for additional years, including 2035 and 2050, to provide more context for the results of assessments concerning 2040.

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[2] 35-A M.R.S. § 3210, https://legislature.maine.gov/statutes/35-A/title35-Asec3210.html.
[3] 38 M.R.S. § 576-A, https://legislature.maine.gov/statutes/38/title38sec576-A.html.
[4] Maine Pathways to 2024, November 2024, at vi.
[5] 2 M.R.S. § 9(3)(C), https://www.mainelegislature.org/legis/statutes/2/title2sec9.html (emphases added).
[6] GEO, "Maine Energy Plan: Pathway to 2040," https://www.maine.gov/energy/studies-reports-working-groups/current-studies-working-groups/energyplan2040.

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C. Equity and regional cooperation are foundational elements of clean energy and climate action in Maine, and the report recognizes their importance.

As indicated in the draft report, equity considerations and regional cooperation are overarching topics that must inform all clean energy and climate planning. The report appropriately highlights the work of the Maine Climate Council and its Equity Subcommittee, including its identification of equity as a "core goal."[7] Further, the report appropriately highlights the need to consider the cost implications of the conversions discussed in the report, in particular costs that will be borne by low- and moderate-income customers and highlights the importance of other factors that require consideration, including the siting of new facilities and impacts on vulnerable populations. The report also properly highlights the clean energy transition as an opportunity to "undo some of the legacy of traditional energy infrastructure, which was often sited nearer to and had a greater impact on vulnerable communities."[8]

The draft report properly recognizes that for Maine to meet its clean energy and climate requirements, it must continue to engage in regional cooperation on energy issues. Most recently, Maine's participation in the New England States Committee on Electricity (NESCOE) effort to co-develop a procurement phase to the regional Longer-Term Transmission Planning process (LTTP Phase 2) has meant that the process is unanimous, which has been critical in developing the process with ISO New England and receiving approval from the Federal Energy Regulatory Commission (FERC).[9] Another recent example of regional cooperation is Maine's engagement with Massachusetts for the development of the Aroostook Renewable Gateway transmission line project to deliver onshore wind from Northern Maine to the grid.[10] Although the project was canceled, the multi-state deal provides a clear and viable example of cooperating to create cost-effective ways to meet clean energy and climate requirements and serves as a model for future clean energy procurements, including offshore wind.

D. The report confirms the importance of electrification, expanded grid capacity and increased load flexibility in achieving a cost-effective clean energy transition.

It is significant that the draft report makes several key findings with respect to the clean energy transition in Maine, and these findings should inform the final report and related energy system planning processes in Maine, including the Maine Climate Council's climate action plan

[7] Maine Pathways to 2024, November 2024, at xi.
[8] *Id.* at 70.
[9] NESCOE, "Potential Transmission Needs for a Longer-term Transmission Planning RFP," October 16, 2024, https://nescoe.com/wp-content/uploads/2024/10/NESCOE-RFP-Letter.pdf; Howland, E., "FERC approves ISO New England's long-range transmission planning process," July 24, 2024, https://www.utilitydive.com/news/ferc-approves-iso-new-england-long-range-transmission-process/721191/.
[10] Maine Public Utilities Commission, Request for Proposals for Renewable Energy Generation and Transmission Projects Pursuant to the Northern Maine Renewable Energy Development Program, Docket No. 2021-00369, Order Regarding Massachusetts Determination, February 3, 2023, https://mpuc-cms.maine.gov/CQM.Public.WebUI/Common/ViewDoc.aspx?DocRefId=%7bC3CA24FF-27B1-4496-B4A7-1924B5425EE9%7d&DocExt=pdf&DocName=%7bC3CA24FF-27B1-4496-B4A7-1924B5425EE9%7d.pdf.

and the Maine Public Utilities Commission's integrated grid planning. Some of the key findings concerning electrification are that:

> "Electrifying end uses that currently rely on fossil fuels is a key strategy for achieving Maine's clean energy and climate goals: over the coming decades, most furnaces and boilers will need to be replaced over time with efficient electric heat pumps and the number of light-duty electric vehicles must grow considerably by 2040."[11]
>
> "Electric vehicles (EVs) will lead to significant fuel cost savings and will help integrate intermittent renewable energy and manage electric grid expansion by providing flexible load management."[12]
>
> "As the electrification of transportation and buildings progresses, raising electricity demand, it will be essential to decarbonize the electricity supply."[13]

And some of the key findings in the draft report concerning grid expansion are that:

> "Maine will need to expand its transmission system, bolstering capacity on existing transmission lines, utilizing grid enhancing technologies, and adding new lines to connect new resources."[14]
>
> "Upgrades to the Maine and New England distribution and transmission systems will be a key enabler for achieving Maine's clean energy and greenhouse gas reduction goals."[15]
>
> "While overall expenditures on electric generation, transmission, and distribution will increase to serve higher demand from electrified end uses, these higher electricity costs are largely offset by savings from decreased reliance on costly fossil fuels."[16]
>
> "Load flexibility, particularly for flexible EV charging loads, will play a key role, helping to limit infrastructure needs for supply, transmission, and distribution resources, and therefore keeping costs down."[17]

These are significant findings that can and should inform the final report and related energy system planning processes in Maine, including the Maine Climate Council's climate action plan and the Maine Public Utilities Commission's integrated grid planning.

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[11] Maine Pathways to 2024, November 2024, at vi-vii.
[12] *Id.* at xi.
[13] *Id.* at vii.
[14] *Id.*
[15] *Id.* at 35.
[16] *Id.* at ix.
[17] *Id.* at 74.

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II. The "Maine Pathways to 2040" report should be revised to more fully and accurately assess the energy system and the implications of the proposed energy pathways.

To enable Maine to fully and accurately plan for a cost-effective clean energy transition, the draft report should be modified in several ways. Of particular concern are the use of old emissions data, the lack of detailed cost-benefit analyses, the lack of detail around "clean fuels," "carbon-neutral fuels" and "clean thermal resources" and similar terms used in the draft report, the lack of connection between this report and other related planning initiatives, including integrated grid planning at the Maine Public Utilities Commission and long-term grid planning by ISO-New England and the lack of emphasis on key technologies, including, among others, grid-enhancing technologies and long-duration energy storage.

A. The report should include more complete cost-benefit analyses of various pathways.

Many of the reports key findings are based on assessments of future costs, but there is insufficient cost-benefit data and analyses in the report. The cost analyses depicted in Figures ES-3 and III-13 ("Energy Supply Costs and Average Societal Electricity Costs for Maine") and described in Section III-3 ("Cost Implications") are informative and help the reader understand the cost implications of the Core Pathway.[18] The report should be revised to include such cost analyses for the other pathways. In the discussion of the other pathways, there is reference to the associated costs, in a relative sense as compared to the Core Pathway, but no quantitative analyses of those costs. Without more complete cost-benefit analyses of the pathways, it will be difficult for policymakers and lawmakers to make informed judgments about how to achieve Maine's climate and clean energy requirements. [19]

To make the findings in the report with respect to the costs of the various pathways, the GEO and its consultants presumably developed cost assessments, and those should be included in the final version of the report. For example, the report finds that the 100% Renewable Generation Pathway would result in "materially higher energy supply costs," but does not quantify those costs and does not define what "materially higher" means.[20] According to the report, while this pathway "shows that meeting the state's goals without any thermal generation is probably possible, it would be more challenging and more costly."[21] Without any description of how much "more" costly it would be, it is hard to justify findings about this pathway. Similarly, the report finds that the High DER + High Flexible Load Pathway would be "somewhat more costly overall than the High Flexible Load pathway," but does not quantify that difference or explain what "somewhat more" means.[22]

[18] Maine Pathways to 2024, November 2024, at viii, 37-39.
[19] Because Maine's climate and clean energy obligations are statutory, as discussed in the report, all references to climate and clean energy "goals" should be changed to "requirements" or "obligations."
[20] Maine Pathways to 2024, November 2024, at 41.
[21] *Id.* at 57.
[22] *Id.* at 54.

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B. The report should more fully assess the implications of "clean" fuels and resources.

Throughout the draft report, there is discussion of "clean fuels" and similar terms, including "low-carbon fuels," "carbon-neutral fuels" and "clean thermal resources." The report indicates that these may include renewable natural gas (RNG), synthetic natural gas (SNG), hydrogen, or biodiesel, and discusses the use of such fuels to potentially meet Maine's climate and clean energy requirements, including in the Core Pathway. Further, the report states that "[i]t will be important to ensure that these advanced fuels are truly low-emission and sustainable, or at least to clearly understand and offset any emissions."[23] But the report fails to assess those emissions, or the offset thereof. Given the central role these fuels play in the report, the report should be modified to better define the terms and to more comprehensively assess the cost and environmental implications, including emissions profiles, of these fuels.[24] This report will shape energy law and policy in Maine for years to come, and it is essential that the full implications of these fuels are assessed and reported.

The draft report includes preliminary discussion of defining "clean resources," and suggests that Maine will need to define that term "relatively soon, to ensure that there is time to plan and develop these resources in an orderly fashion."[25] While the task of defining clean resources will ultimately fall on the Maine Legislature, the report should be revised to include additional discussion and guidance on the options for, and implications of various definitions. The report begins to do this, but the discussion is incomplete and one-sided: "A broad definition of what qualifies as 'clean' will facilitate the use of the most effective technology."[26] There is no explanation of what "broad" means, or of what "effective" means. To better inform lawmakers and policymakers, the report should be revised to include additional discussion and guidance on the options for, and implications of, various definitions.

C. The report should include additional analyses on key technologies and programs.

Long-duration energy storage (LDES) is discussed in various parts of the draft report, particularly as a key component of the 100% Renewable Generation Pathway, but the report should be revised to include additional analysis on the likely value of the technology in contributing significantly to Maine's ability to cost-effectively achieve its climate and clean energy requirements. In the section on system reliability, the report assesses energy shortfalls during extended cold periods in the winter, and indicates that:

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[23] *Id.* at 36.
[24] In a footnote, the report indicates that "[i]t will be important to understand the extent to which these 'clean' fuels are actually low/zero-carbon, according to a lifecycle analysis that accounts for emissions during production, transportation, and use." Maine Pathways to 2024, November 2024, at 57. The second-to-last section of report also mentions lifecycle emissions in a section on blended fuels. *Id.* at 64. The final report should include additional analysis and greater visibility and emphasis on the emissions profiles of these so-called "clean" fuels.
[25] *Id.* at x, 56, 74.
[26] *Id.* at 74.

> While load flexibility, hydropower, and battery resources do help in these periods, they are not sufficient to cover the extended winter shortfalls that can occur.
> …
> Storage plays a relatively small role due to its limited capacity (it would not be economical to build additional storage capacity, since it is costly and would be utilized only rarely).[27]

In this section, the draft report only mentions shorter duration batteries and overlooks the role of LDES in these scenarios. But as the draft report recognizes, the technology for 100-hour, multi-day LDES currently exists.[28] An example of that technology is currently being developed for implementation in Lincoln, Maine.[29] The report suggests that storage is "costly," but fails to quantify that assertion. The report should be revised to more fully evaluate the role that LDES can and will play, including but not limited to in these shortfall scenarios.

Further, the draft report indicates that additional storage in the 100% Renewable Generation Pathway "results in considerably higher costs than the thermal resources in the Core [Pathway], leading to higher overall energy supply costs."[30] The draft report fails to define or quantify these "higher" costs, and later indicates that LDES costs "might decline more quickly than anticipated, and these technologies could conceivably overtake dispatchable clean thermal generation in the marketplace."[31] To better inform policymakers and lawmakers about the cost and emissions implications of LDES, the draft report should be revised to account for, and assess, these likely outcome where battery storage is longer duration and less costly.

Similarly, the draft report mentions grid enhancing technologies (GETs), particularly as part of the recommendation to continue to modernize transmission and distribution planning to facilitate clean energy goals, but the report should be revised to more fully evaluate the cost and environmental advantages associated with GETs. The report recommends that "Maine should encourage ISO-NE and in-state transmission owners to incorporate lower-cost and higher-capacity alternatives into their planning processes."[32] Given the many advantages associated with GETs, the report should be revised to provide expanded analysis of these technologies, and to prioritize them as tools that policymakers and lawmakers can and should deploy to help Maine cost-effectively achieve meet its climate and clean energy requirements.

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[27] *Id.* at 33-34.
[28] *Id.* at 43; *see also* Wilson, R., Raman, K., and Burger, S., "Clean, Reliable, Affordable: The Value of Multi-Day Storage in New England," September 27, 2023, https://formenergy.com/wp-content/uploads/2023/09/Form-ISO-New-England-whitepaper-09.27.23.pdf.
[29] Office of Governor Mills, "Governor Mills, Senators Collins & King, and Congresswoman Pingree Announce Nearly $150 Million Federal Grant to Develop World's Largest Multi-Day Energy Storage Facility in Lincoln, Maine" August 6, 2024, https://www.maine.gov/governor/mills/news/governor-mills-senators-collins-king-and-congresswoman-pingree-announce-nearly-150-million.
[30] Maine Pathways to 2024, November 2024, at 45.
[31] *Id.* at 58.
[32] *Id.* at 61.

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Load flexibility is an element of the pathways, and time-of-use (TOU) rates and demand response (DR) are mentioned as possible mechanisms for advancing load flexibility, but the report should be revised to evaluate TOU rates and DR as tools for reducing peak demand for electricity, and thereby reducing system costs and system emissions. The draft report notes at a very high level the role that TOU rates might play, and makes just two passing references to DR as a tool for advancing load flexibility.[33] To better understand how Maine could increase load flexibility, the report should be revised to assess TOU rates more broadly and DR as drivers of load flexibility, and thus as drivers of cost and emissions reductions.

In the appendix, the draft report indicates that energy efficiency has long been an important tool for managing greenhouse emissions in Maine, and that, "[g]iven the overall magnitude of Maine's clean energy needs, efficiency improvements can make it easier to achieve them, sooner, and ultimately at lower cost to customers."[34] Like time-of-use rates and demand response, energy efficiency will be an essential element of Maine's clean energy transition, and should be highlighted in the report as such, and further analyzed.

D. The report should rely on the latest accounting of GHG emissions in Maine.

The draft report relies throughout on the Maine Department of Environmental Protection's "Ninth Biennial Report on Progress toward Greenhouse Gas Reduction Goals," published in July 2022, which has since been updated. Therefore, the draft report should be revised to rely on the more recent "Tenth Biennial Report on Progress toward Greenhouse Gas Reduction Goals, published in June 2024, which has two years of additional emissions data.[35] This updating will require some additional analytical and drafting work, but the costs will outweigh the benefits because the final report will be more accurate. Indeed, in the absence of an accurate accounting of greenhouse gas emissions, findings made with respect to Maine's achievement of its statutory climate and clean energy requirements will be incomplete.

E. The report should include increased coordination with other energy planning.

The draft report should be revised to include a description of, and plan for, how it will be coordinated with other energy system planning processes in Maine and New England. The report should be coordinated with the Integrated Grid Planning (IGP) and Climate Change Protection Planning (CCPP) processes currently underway at the Maine Public Utilities Commission, the Climate Action Planning (CAP) process at the Maine Climate Council and the energy burden analysis underway at the Maine Office of Public Advocate. It should also be coordinated with the transmission and economic planning processes at ISO New England, including the Longer-Term

[33] *Id.* at xi, 63, 66, 68.
[34] Id. at 98-99.
[35] Maine Department of Environmental Protection, "Tenth Biennial Report on Progress toward Greenhouse Gas Reduction Goals," June 2024, https://www.maine.gov/tools/whatsnew/attach.php?id=12796425&an=1.

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Transmission Planning (LTTP)[36] and the Economic Planning for the Clean Energy Transition (EPCET).[37] As part of this coordination with other energy system planning processes in Maine and New England, the report should be updated regularly. As the draft report points out, there is uncertainty around the costs and viability of technologies, and the analyses need to be updated often to reflect those changes.

Respectfully,

Phelps Turner
Senior Attorney
Conservation Law Foundation

[36] ISO New England Longer-Term Transmission Planning, https://www.iso-ne.com/committees/key-projects/extended-term-transmission-planning-key-project, including Order Accepting LTTP Phase 2, July 9, 2024, https://www.iso-ne.com/static-assets/documents/100013/er24-1978-000.pdf, and ISO New England Longer-Term Transmission Studies, https://www.iso-ne.com/system-planning/transmission-planning/longer-term-transmission-studies, including 2050 Transmission Study, February 12, 2024, https://www.iso-ne.com/static-assets/documents/100008/2024_02_14_pac_2050_transmission_study_final.pdf.

[37] ISO New England Economic Planning for the Clean Energy Transition, October 24, 2024, https://www.iso-ne.com/static-assets/documents/100016/2024-epcet-report.pdf. Regulation of the energy system is achieved through carefully balanced federalism and, without disrupting jurisdictional boundaries, Maine should coordinate this current planning effort with regional planning efforts. The draft report mentions leveraging regional transmission planning, but it should also include proactive coordination.

Comments on "Maine Pathways to 2040: Analysis and Insights"
comments due by 5 PM, Nov. 18
send comments to geo@maine.gov

David von Seggern (vonseg1@sbcglobal.net)
Westbrook, ME 04092

Note: Page numbers in these comments are those printed at the bottom of the issued report.

I am a retired earth scientist (seismology) now living in Maine. Having moved here three years ago, I was pleased to find that the Governor and agencies in Maine are strongly engaged with the climate crisis. If the rest of the states in the nation had goals similar to those of Maine to thwart climate change, we would all be better off. The 2040 goal of the Governor to reach 100% clean energy in the electrical sector is ambitious but doable. The report commissioned by the Governor's Energy Office is overall an excellent assessment of where Maine stands relative to that goal and a roadmap of how the state can achieve it. Those who assembled this report clearly have a thorough grasp of energy issues and they nicely layered Maine's particular aspects onto those issues. Their predictive modeling, using several pathways in addition to a core pathway seems to meet the planning needs well. As the authors state, it remains for stakeholders and policymakers to blend together the best pathway for Maine.

p. vii: I appreciate that the authors are sanguine about meeting Maine's 100% clean electricity goal by 2040, suggesting that just need some tweaks need to be made.

p. ix: They suggest some economies of scale for electricity cost due to higher sales volume. This seems intuitive; but, given that we are at the beginning of the electrification of energy use and have little experience with economy of scale for increasing electricity supply, might the report hedge its conclusion on this? Are there any real situations in which this has been shown to be true?

p. x: The Thermal Electricity Generation paragraph seems to overlook how carbon-neutral fuels are to be produced. The emissions at point-of-use, in the case of hydrogen, are zero-carbon; but the production must be accounted for in carbon-neutrality. Even if the production is done entirely with renewable energy, the efficiency rate for thermal generation versus direct generation via sun or wind requires substantially more renewable capacity just to produce the carbon-neutral fuel. This certainly adds to the overall cost of the total system while at the same time taking up more land space. The report "Battery Storage for Fossil-Fueled Peaker Plant Replacement: A Maine Case Study" has shown that Maine can meet its goals without thermal generation using battery storage to meet peak demands at a similar or lower overall cost than thermal generation.

Perhaps the authors should consult that report before making a final pronouncement on thermal generation.

p. x: The emphasis on grid planning to accommodate much larger electrical demands is well stated.

p. xii: The recognition of barriers to the energy transition for LMI customers is appropriate and must be treated. This is done to some extent in the appendices, but should be given more emphasis here. LMI energy users often lack the time, the resources, and the funds to contemplate new technologies.

p. 2: Here it states (1st paragraph) that 91% of GHG emissions in Maine are from the "energy sector". I believe that this category of emissions is usually described as "anthropocentric" and it would be good for the authors to use that term here.

p. 7: How exactly do RECs enter into the resource base?

p. 9: Figure I-5 is badly out-of-date (2019 cutoff). EIA has data through 2022 at least. Maine's dependence on oil for heating is highest of NE states.

p. 12: Again, the graphs are cut off at 2019 data and should be updated.

p. 19: The "High Distributed Energy Resources (DER) + High Flex" pathway seems to be a desirable path, especially if combined with eliminating hybrid heating systems. This puts a lot of responsibility on individuals to be proactive in the energy transition, but it would send the right signals that we are all together in this.

p. 23: The 100% Renewable Pathway is assumed to have higher cost, but can we afford to not be making a total conversion to renewables, in terms of climate chaos and resultant costs from continued use of fossil fuels?

p. 24: The authors make an excellent case for enabling flexible load; primarily it is very important for reducing costs due to more electrification.

p. 24: DERs have more initial costs than large solar and wind resources, but save on transmission infrastructure. DERs plus storage provide many benefits to the grid and should be emphasized more.

p. 25: This points out the very important benefit of electrification: although the service needs are the same, less primary energy is actually required to provide those services. However, the terminology chosen by the authors is confusing. To me, "primary energy" is all the energy used to enable modern society's functions. Therefore, it should include accounting for the heat loss in thermal electricity generation. Might rewording here be appropriate?

p. 26: Will “clean” fuels actually be needed for industry transport by heavy-duty trucking? The assumption made here is that batteries will not be adapted to heavy-duty trucking, but there is plenty of reasons to think they will be? Many analysts believe the crossover for fleet owners to realize that going electric provides a competitive edge will come within five years. I believe the authors are far too dismissive of a transition to battery power in heavy-duty trucks.

p. 28: Might it be better to bank any excess generation from renewables into battery storage rather than using it to generate alternative fuels? What is the true energy cost of these alternative fuels versus their actual end-use performance?

p. 28: Figure III-5 is difficult to understand. It tells me that, for every joule of energy in the end use, only about 1/3 joule is needed in production of the end-use fuel. I don’t believe this is true in, for instance, electrolysis to produce hydrogen for industrial use.

p. 30: The authors make a good case for the need to keep thermal generation (gas) resources in Maine. From an emissions viewpoint, batteries are the preferred way by which “base” loads can be delivered to the grid; yet peaker thermal plants have a flexibility that is not achievable with renewables + batteries. For instance, what happens when a series of cloudy days, or windless days, occurs? Perhaps the authors can search historical meteorological records and give a firm example of when this occurred in Maine.

p. 35: The modeling prediction is that thermal peaker plants would only generate about 2% of their total capacity on an annual basis. The authors should point out that this is almost in the noise of our uncertainty on the net carbon budget for Maine and is therefore trivial.

pp. 35-36: No mention is made of increasing efficiency of current appliances nor of energy demand reduction through lifestyle changes. Although it is reasonable that the authors have not dealt with the later, it seems prudent to include in the pathways some measure of how more efficient appliances could reduce demand. In the case of heat pumps, for instance, what is the ultimate COP ratio? We know that vehicle ICEs have continued to make significant efficiency gains even in the past couple decades.

p. 38: Figure III-13 indicates an important cost factor for electrification. The model predicts cost of electricity to decline from about $0.23/kWh in 2025 to about $0.17/kWh in 2050 (inflation adjusted I presume, so a true decrease). Cost of fossil fuel (not shown here) will certainly rise though. This needs to be emphasized.

p. 44: Figure III-16 nicely shows the difference in looking at things from a capacity (GW) perspective versus an actual generation (TWh) perspective where some

resources run much below capacity. Note that the *Core* capacity is substantially less than the *100% Renewable* capacity.

p. 47: Wouldn't it make sense to increase insulation and take other means to reduce heat-pump-caused peaks in demand rather than to retain thermal heating appliances as backup? In fact, EMT has urged this by formerly only rebating whole-house heat-pump installations in conjunction with removing the thermal furnaces.

p. 50: The problem with Hybrid Heat pathway is its complexity, for homeowner and for grid operator. It makes more sense to introduce truly cold-weather heat pumps and move away from traditional thermal heating entirely.

p. 50 and prior: This report does not mention geothermal heat pumps for single residences, for community heating, or for business quarters. Geothermal heat pumps would avoid much of the large electricity demands of regular heat pumps in extreme cold and would therefore be a reasonable alternative to normal air-source heat pumps. In any new construction where ground parameters are suitable, geothermal heat pumps should be considered.

p. 51: The *No Flexible Load* pathway has no benefits and several detractions and is not desirable. The *Higher Flexible Load* pathway is quite desirable if it can be attained without changing culture too much. EV charging, for instance, could become highly flexible, especially if monetary incentives are used. Electricity metering in Maine through the large utilities is set up already to utilize time-of-use plans and similar, so why not employ them.

p. 52: There will be an overall cost penalty for DERs (Distributed Energy Resources), but strategically placing them, such as in remote areas, will be beneficial in terms of overall infrastructure costs. DERs are assumed to include generous storage capability and should be operated in a High Flex environment.

p. 54: Note that widespread adoption of DERs will require real cooperation of the utility companies in planning buildout for the electrified society. This goes against their desire to maximize their profits through increasing the infrastructure they build. It is incumbent upon policymakers to create, largely through Maine PUC, the structure that is most advantageous to the public and not to the for-profit utilities.

p. 56: I note that the authors emphasize that "clean" energy needs better statute definition. This is an important undertaking that will affect the choice of pathway to 2040.

p. 57: How exactly do RECs play into the 2040 goal?

p. 61: Here the authors advise that Grid-Enhancing Technologies (GETs) be given serious consideration. I completely agree.

p. 64: It is important to ensure that the fuels used in blending are truly carbon-neutral. If new biomass (forest) reserves need to be cut to produce such fuels, can such fuels really be carbon-neutral? There is clear evidence to show that managed forests do not store as much carbon as natural ones, and this point should be made here.

p. 65: The fuel economy of EVs is grossly misrepresented. I have gotten an overall average of 4.6 miles/kWh in a 2023 Chevrolet Bolt EUV model. This translates to about $540 in fuel to drive 10,000 miles at $0.25/kWh.

p. 87: I don't understand why the authors choose one particular year (2011) as a model year. Why shouldn't they take an average of many weather years prior to, say 2020, and then apply the global warming effects. Why was 2011 chosen, and is it really representative?

p. 88-89: The table here rightly points out those difficulties that result in uncertainty in how the pathways can actually move forward and is a valuable addition to this report.

p. 91: It is stated that 91% of GHG emissions in Maine are from the energy sector (meaning anthropogenic). What is the reference for this number?

The following comments were submitted to the Governor's Energy Office in reference to the draft *Maine Energy Plan*.

Acadia Center
Advancing the Clean Energy Future
PO Box 583 • Rockport, ME 04856-0583
207-236-6470 • acadiacenter.org

December 30, 2024

Governor's Energy Office
Via email geo@maine.gov

Re: Acadia Center Comments on the draft Maine Energy Plan

To the Governor's Energy Office:

Acadia Center appreciates the opportunity to provide written comments on the draft Maine Energy Plan ("MEP"). Acadia Center is a Rockport, Maine-based nonprofit that plans, advocates for, and seeks implementation of clean energy solutions across New England and Eastern Canada. We appreciate the extensive work done to develop the draft MEP. To meet Maine's ambitious climate and energy goals Maine must deploy clean electricity to achieve economy-wide decarbonization, lessen the energy burden on Mainers, and take prompt action to move away from fossil fuels. Acadia Center applauds many of the measures outlined in the draft MEP, but hopes the GEO finds the following comments helpful.

Maine Must Focus on Gross GHG Reduction to Meet Its Climate Goals

The draft MEP recites that Maine is 75% of the way toward achieving carbon neutrality and that currently Maine has reduced GHG by 25% below 1990 levels (as of 2019 GHG inventory). However, these measurements "net out" existing and increasing GHG emissions in Maine with the immense carbon sequestration provided by Maine's forests. To meet its goals, Maine should maintain its focus on the statutorily required 80% reduction in gross GHG below 1990 levels by 2050.

Remove Obstacles to Solar and Wind Implementation in Maine and Expand Battery Storage

Solar is a proven technology with decreasing costs that presently encounters disappointing delays in interconnection. Maine should continue programs like "Solar for All" that allow low-income Mainers to reap the benefits of solar power. Also, solar DERs should be implemented faster and less expensively by the utilities. Solar should not be a peripheral source, relegated to dealing with peaks, but should be central to Maine's energy future. In addition, Acadia Center has been active in promoting Maine's offshore wind resources and as the draft MEP emphatically notes, Maine's offshore wind resources must be implemented with a goal of at least 3,000 MW of clean wind power. Maine must also continue to expand its battery storage capacity, including long duration battery storage. Without widespread battery storage implementation, there can be no meaningful adoption of wind, water, and solar renewables at scale. Maine has made real progress recently, including installing two substantial battery storage facilities, and it must continue to implement battery storage apace. Moreover, Mainers need help in purchasing batteries for rooftop solar, now.

Continue Advocacy and Support for EV Adoption in Maine and for Charging Infrastructure

Mainers should be able to take advantage of the cost savings, convenience, and lowered emissions that EVs offer. The draft MEP correctly notes that the majority of Maine's GHG emissions come from transportation, and Maine has taken meaningful steps toward promoting EVs. However, much needs to be done to realize the GHG reduction potential of EVs. The EV market has evolved and now has affordable EVs with an impressive range that can operate efficiently in all weather. Increased State support at all levels will be critical to the widespread adoption of EVs in Maine. Moreover, Maine has made strides toward expanding fast charging, but as many EV owners know, they use home charging 99% of the time. Financial support for installing Level 2 chargers in homes, apartment buildings and businesses is critical.

The Draft MEP Highlights the Central Role of the Grid in Unlocking Maine's Clean Energy Future

The draft MEP highlights numerous areas that demonstrate how centrally important transmission and distribution grids will be for Maine's energy future. Acadia Center agrees that Maine must "coordinate with neighboring jurisdictions to implement cost-effective energy procurements that benefit Maine ratepayers, including Northern Maine Renewables . . .", draft MEP, p. 38. This is true both for the transmission and distribution grids in Maine as well as for how those grids operate as a part of a much larger functional grid across ISO-NE and the Northeast Power Coordinating Council (NPCC). Acadia Center strongly endorses the draft MEP's stated need to situate Maine planning with the regional and interregional context and encourages further action. Acadia Center also agrees with the importance of upgrading and expanding the capacity of the grid in Maine, including cost-effective transmission and the use of grid enhancing technologies (GETs). Electrification and the growing demand for renewables will require that renewable energy be moveable from where it is generated to where it is needed, including home-grown renewable energy that benefits Mainers.

Pathways Reliant on 'Clean Fuels' Face Significant Levels of Risk from Multiple Angles

Some of the aspects of the draft MEP suggest scenarios such as renewable natural gas (RNG), biomass, hydrogen clean thermal, and hybrid heat that are not likely to provide meaningful, efficient reductions of emissions in the next decade. All these strategies require to some extent the development and implementation of unproven, complex, and expensive solutions, and none has been demonstrated to lower energy costs. In addition, their environmental benefits are currently unproven, making emissions reduction estimates unduly speculative. By way of example, hybrid heat, which would use heating fuels to mitigate peak loads, will require (as recognized in the draft Technical Report) increased customer equipment costs, changes in customer behavior and a greater supply of both synthetic fuels and biofuels. Recent Climate Council discussions have highlighted these concerns. As outlined in the Acadia Center comments to the draft technical report, these fuels are not going to provide any short-term relief to one of the pressing problems noted in the draft MEP- that Mainers are struggling to pay their energy bills. Moreover, the use of nuclear energy has already proven too expensive, and many decades after nuclear power was implemented, there simply is no long-term storage for nuclear waste currently available.

Natural Gas is a Price Volatile Fossil Fuel That Will Continue to Expose Struggling Mainers to High Electricity Costs and a Future of Gas Proceeding in Maine Is Indicated

The draft MEP catalogs the economic and environmental costs of natural gas. While natural gas has served as a transition fuel for a limited number of Maine customers, using natural gas in the future will only subject Mainers to the uncertainties of natural gas price volatility and environmental pollution. The Pathways report predicts pipeline gas use will decrease dramatically, as much as 90% over the next 25 years and as the Pathways report explains "Gas rates may increase, perhaps dramatically, as the largely fixed costs of the gas system are spread across fewer customers and lower gas volumes." , p.26. Moreover, when this occurs gas utilities will seek to have their customers pay for the "stranded costs" of building and operating the gas system. Maine does not presently have extensive gas pipelines, so the opportunity to address these problems is now, when it can be done responsibly. "Future of Gas" proceedings should be pursued in Maine, as they are in at least twelve other states.

Sincerely,

Peter LaFond
Senior Advocate and Maine Program Director
plafond@acadiacenter.org
207-329-4606

Ben Butterworth
Director: Climate, Energy & Equity Analysis
bbutterworth@acadiacenter.org
617-742-0054 x111

Comments submitted by David Gibson

GEO Team,

I want to start by commending this excellent report. I haven't read it word-for-word, but I have reviewed it at length, and am impressed by both the thorough approach and readability of the plan. I have several comments and suggestions that I wanted to share.

It appears that the report assumes a 30% average reduction statewide due to envelope improvements, based on the graph on page 99 and accompanying description in Appendix B: *"Figure B-2 shows the projected energy demand of several major end use categories for an average household in Maine. Over the study period [2025 to 2050], primary demand of space heating energy falls by approximately 30% due to envelope efficiency improvements."* This is viable, but requires significant investment in the building performance sector. I would encourage adding this statement of 30% reduction in space heating due to envelope efficiency to the body of the report on page 63, where the report says simply*, "Proper planning for heating electrification will require consideration of historical and future weather conditions, and the heating demands that will occur during the coldest periods, while accounting for building efficiency improvements*."

Envelope improvements are essential for occupant comfort, safety, and achieving the long-term clean energy goals for the state. With ~650,000 housing units in Maine, this will require re-insulating ~25,000 homes/year for each of the next 26 years to meet the 2050 goal. I want to highlight that this is roughly 10- fold the current rate of weatherization and insulation implementation. Currently there are no rebates through Efficiency Maine for small businesses to make envelope efficiency improvements, and there is no tracking of pre- and post-retrofit energy consumption to verify whether improvements are saving 30% (or any energy at all).

I would encourage you to add specific recommendation(s) to the report relating to energy efficiency. Rather than making an assumption that residential heating energy use will decline by 30%, this should be called out as a recommendation of the report. Business as usual will not achieve this steep (but necessary) improvement to the building stock.

While efficiency is mentioned sporadically throughout the report, there is only one mention of 'insulation' and no use of the term 'weatherization'. This excerpt from page 98 highlights the importance of efficiency*: "Improved energy efficiency by itself cannot achieve the level of GHG reduction needed to reach Maine's goals, though it can reduce emissions to make progress toward those goals. More importantly, it can serve as an enabling technology that makes it easier to adopt other solutions. For instance, a more efficient building shell can facilitate electrification (it can be challenging for a heat pump to keep a drafty, poorly*

insulated building comfortable). It can also reduce the size and cost of the heat pump system required to electrify the building. Using energy more efficiently means that less primary energy is required, which means less infrastructure is needed to produce renewable electricity, clean fuels, and the intermediate infrastructure (energy storage, transmission, and distribution systems, etc.) that is required to deliver it to end users. Given the overall magnitude of Maine's clean energy needs, efficiency improvements can make it easier to achieve them, sooner, and ultimately at lower cost to customers."

Setting the goal of 100% clean energy by 2040 changes all of the cost-effectiveness calculations used by the PUC. 'Low-hanging fruit', like LED light bulbs and high-efficiency (1.5 gallon/minute) shower heads, become essential to prevent billions of dollars in infrastructure to power the existing inefficient fixtures. It should be underscored in the report that efficiency is critical to achieving the 2040 goal. While the report is correct that we cannot efficiency our way to 100% clean energy; we also cannot produce clean energy to offset massive inefficiencies and energy waste, without significant cost increases for everyone.

In the recommendations on page 72, the report highlights, *"A systematized approach may help to speed and coordinate customer adoption."* It goes on to describe the systematized approach as geographically targeted and coordinated. This is true, but the systematized approach needs to go a step further, and include comprehensive home energy audits so that each home receives ALL of the necessary improvements to transition off of fossil fuels. Each home (and business) will not only need a heat pump and heat pump water heater, but also LED lighting, high-efficiency showerheads, envelope improvements (air sealing and insulation), vapor barrier, health and safety improvements (to address radon, mold, rot, carbon monoxide, indoor air quality, etc), and any structural improvements necessary to facilitate the energy improvements. It will be essential to provide each resident and business a customized road map for their home, to achieve the full depth of energy improvements needed in a timely manner. With funding from the DOE Buildings Upgrade Prize, College of the Atlantic is facilitating a pilot program to demonstrate this approach, conducting comprehensive energy audits and providing community members with information on rebates, tax credits and incentives, and we plan to coordinate contractors to implement improvements on bundles of homes at a time. More details on our program can be found at www.Maineup.org. Our two pilot communities include the Cranberry Isles and the Passamaquoddy Tribe at Sipayik. We have developed a 10-step process for transitioning homes off of fossil fuels, starting with the most cost-effective measures first: https://docs.google.com/document/d/1MtBRmvYsPNVvsz9cJdGiaWeOFV2hqQ2v5Pn9UHeeILc/edit?usp=sharing

I would encourage you to add a recommendation relating to K-12 education. The type of statewide energy systems change proposed in the report requires participation by every single individual and business in Maine. Every student needs to be engaged in understanding the importance of the transition off fossil fuels, and they can provide an important conduit for reaching community members across the state. In addition to early workforce development, the K-12 school system provides an opportunity to engage youth in helping their families, neighbors, and relatives to participate in this monumental transition.

On Page 105, Appendix C states: *"Building electrification requires significant capital investment in homes and businesses. The initial purchase and installation costs may represent a barrier to adoption, especially for low-income populations."* What programs or financing will help to address this? I would encourage expansion of the Maine Green Bank and replication of programs offered by the Connecticut Green Bank to improve loan offerings.

Finally, I want to highlight that not all electric vehicles are equivalent. On page 65, the report describes electric SUVs as having an efficiency of 2-3 miles/kWh. However, electric vehicles range from more than 4 miles/kWh to less than 1.5 miles/kWh (https://cdn.motor1.com/images/custom/20240221-bev-uscomparison-energy-consumption.png). As Maine offers electric vehicle incentives, there is an opportunity to encourage only the most efficient vehicles. Just like Efficiency Maine restricts heat pump rebates to only models that exceed minimum efficiency requirements, I would encourage the state to restrict EV rebates to only those models that exceed 2.5 miles/kWh. This will help incentivize the use of the most efficient electric vehicles, reducing the need (and expense) for additional long-term grid buildout. If other states follow suit, this could drive manufacturers to prioritize vehicle efficiency.

Thank you for your time and consideration.

David

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David Gibson, he/him

CEM, LEED AP BD+C, BPI Building Analyst

Director of Energy + fossil fuel eliminator

College of the Atlantic

Dan Burgess
Director
Governor's Energy Office
62 State House Station
Augusta, Maine 04333

December 30, 2024

Subject: Comments on the Draft Maine Energy Plan

Dear Mr. Burgess,

Maine Conservation Voters (MCV) greatly appreciates the opportunity to comment on the draft "Maine Energy Plan." On behalf of more than 14,000 members and supporters dedicated to making sure all Maine people have access to a healthy environment, a strong democracy, and a sustainable economy, we are grateful for the opportunity to be a partner in planning for Maine's energy future. Building on our comments to the "Pathways to 2040: Draft Technical Report," we offer the following thoughts and recommendations.

First, we applaud the Governor's Energy Office in their choice of objectives. We especially appreciate the inclusion of objectives A and B: "Deliver affordable energy for Maine people and businesses" and "Ensure Maine's energy systems are reliable and resilient in the face of growing challenges." Affordability and resilience are two areas that MCV is particularly focused on in the upcoming legislative session, as Maine has had the fastest rising electricity prices in the nation over the past five years[1] and experienced tens of millions of dollars in storm damage[2] last winter alone. We also appreciate the focus on creating good, family-sustaining jobs and finding creative ways to meet our energy needs through efficiency and beneficial electrification. Finally, we would like to once again thank the Mills administration for your commitment and foresight in setting a goal to reach 100% clean electricity by 2040.

When finalizing this plan, we recommend that the Governor's Energy Office consider moving from an affordability framework toward a right-to-electricity framework, consider additional and more clearly defined key actions for Objective A, and ensure that the state is not chasing false solutions when transitioning to 100% clean energy in Objective C.

"Objective A: Deliver affordable energy for Maine people and businesses" is a laudable goal. Maine Conservation Voters recommends strengthening this language to be in line with the rights

[1] https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/rising-us-power-prices-reflect-new-reality-for-utilities-in-warming-world-82591284
[2] https://www.pressherald.com/2024/11/12/commission-urges-maine-to-prepare-for-next-round-of-severe-winter-storms/

frameworks used by the Mills administration in other policy areas. This would mean setting a goal to ensure that *all* people have access to electricity – which will become even more critical for heating, cooling, and transportation moving forward – rather than just seeking to make energy *affordable*. This is not without precedent in Maine. For instance, in 2021, the Maine legislature and Maine voters overwhelmingly approved amending the state constitution to add a "right to food."[3] Since then, the Governor's Office for Policy Innovation and the Future has worked diligently to pass bills and create a roadmap to end hunger by 2030.[4] Just like food insecurity, energy insecurity is a serious problem. In 2023, Maine utilities sent out 440,000 disconnection notices,[5] and low-income households had an energy burden more than twice what is considered affordable.[6] The Maine Energy Plan is an ideal opportunity for the Governor's Energy Office to begin moving from a goal of affordable energy toward a goal of universal access to electricity or ending energy poverty.

In order to achieve such a bold goal, the Governor's Energy Office could also consider an expanded list of key actions. MCV is in full support of the actions mentioned under Objective A and recommends additional options and further detail. For instance, the Mills administration could consider expanding the utility disconnection ban to protect vulnerable populations such as the elderly, those with serious illnesses, and infants as Massachusetts does,[7] requiring competitive electricity providers to verify a rate reduction with the PUC prior to enrolling low-income customers as New York does,[8] preventing the recovery of line items such as legal fees and excessive executive compensation in customer rates as Connecticut does,[9] and supporting the Public Utilities Commission in setting a return on equity that accurately reflects the utilities' cost of capital. Extensive research from the Energy Institute at Haas at UC Berkeley has suggested that typical returns on equity for utilities across the country vastly exceed multiple measures of their cost of capital.[10] Across the country, these researchers estimate that inflated returns on equity result in customers being overcharged as much as $7 billion per year.

Finally, the Maine Energy Plan builds off the *Pathways to 2040* report in focusing heavily on "clean" thermal generation fuels like nuclear, large-scale hydro, and low-carbon fuels. While the Plan anticipates these technologies playing a relatively small role in Maine's energy portfolio, any level of reliance could require ongoing investment in fossil fuel infrastructure. Continued support for the very industries responsible for the climate crisis is particularly problematic given

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[3] https://www.maine.gov/governor/mills/official_documents/proclamations/2022-08-resolution-proposing-amendment-constitution-maine
[4] https://www.maine.gov/future/hunger
[5] https://www.maine.gov/meopa/about/news/maine-public-advocate-urges-low-income-electric-customers-seek-help-bills
[6] https://www.maine.gov/meopa/sites/maine.gov.meopa/files/inline-files/ERAC%20Report%20with%20Consultants%20Reports%20Embedded.pdf
[7] https://www.mass.gov/files/220_cmr_25.00_2_6_09_tel._corr._5_14_12.pdf
[8] https://drive.google.com/file/d/1vHuP7AXVJtf8eJTdhzOY5wvDAgpMcil5/view?usp=sharing
[9] https://legiscan.com/CT/text/SB00007/2023
[10] https://haas.berkeley.edu/wp-content/uploads/WP329.pdf

that many of these "clean thermal" resources have not yet been tested at a large scale. In fact, numerous reports have suggested that renewable natural gas and hydrogen are often used by utilities to trick customers into continuing to support fossil fuel infrastructure.[11] MCV is concerned that the Maine Energy Plan glosses over the very real risks of this path, including the opportunity costs of delayed investment in truly clean technologies. As *Maine Won't Wait* lays out, the costs of inaction are far greater than the cost of solutions.[12] MCV strongly supports the development of a clean energy standard to complement the existing renewable portfolio standard. However, we strongly oppose setting technology-specific procurement requirements for clean thermal generation, any standard that does not include methods for rigorously accounting for whether a resource is in fact clean, and any standard that may delay the transition from fossil energy to renewables through continued dependence on fossil fuel infrastructure.

Thank you again for the work on this report and the opportunity to comment. We know we are united in our desire for a livable future and look forward to working together to get there.

Sincerely,

Lucy Hochschartner
Climate and Clean Energy Director
Maine Conservation Voters

[11] https://energyandpolicy.org/gas-utilities-greenwashing-to-expand-fossil-fuels-rng-hydrogen/
[12] https://www.maine.gov/climateplan/sites/maine.gov.climateplan/files/inline-files/MaineWontWait_December2020_printable_12.1.20.pdf

53 Baxter Boulevard, Suite 202 | Portland, ME 04101
Phone: 866-554-5380 | TTY: 877-434-7598
aarp.org/me | me@aarp.org | twitter: aarpmaine
facebook.com/aarpmaine | instagram.com/aarp

AARP MAINE COMMENTS ON THE GOVERNOR'S ENERGY OFFICE DRAFT MAINE ENERGY PLAN

January 3, 2025

AARP Maine appreciates the opportunity to submit comments on the Draft Energy Plan issued by the Governor's Energy Office in December 2024. AARP is a non-profit, non-partisan social mission organization with 200,000 members across the state. We engage on a range of energy issues at the state level. The core principles we approach this work with include affordability and reliability.

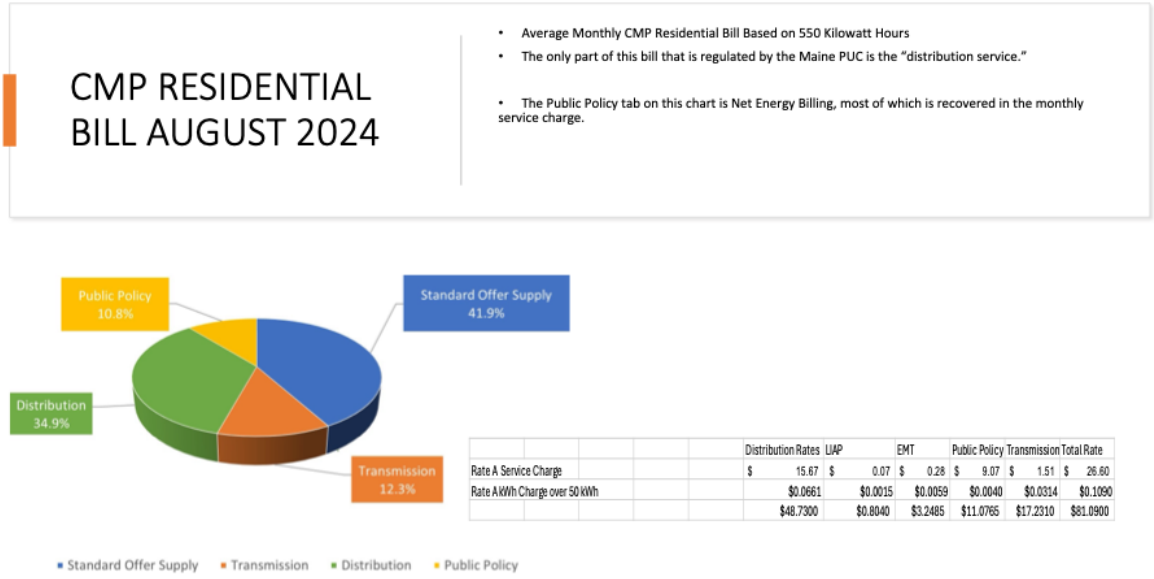
Our comments are directed to Objective A of this draft report, "Deliver affordable energy for Maine people and businesses." AARP agrees with the statement in this draft Report that, "Access to affordable, reliable and increasingly clean energy is critical to the wellbeing of Maine's people, communities, and economy." However, upon review of the proposed commitments and policies that accompany this section of the draft Report, we would recommend several amendments.

The Report relies on a concept of "long term energy cost suppression benefits" to make a statement that energy supply costs are unlikely to increase significantly and may decrease somewhat due to the impact of savings due to reduced use of fossil fuels and that increased revenues from electrification will offset the higher costs to meet this demand. Furthermore, the draft Report relies on predicted and estimated "societal electricity costs." The draft Report's approach to ensuring affordability is to promote the electrification benefits to supplant the use of fossil fuels with cleaner resources to generate electricity.

These assumptions and predictions are insufficient in AARP's opinion to respond to the objective of ensuring affordability for essential energy and electricity cost burdens to Maine's residential customers. The draft Report does not promote the need to measure and respond to the energy burden of Maine's residential households, particularly lower income and older customers on fixed incomes. The draft Report's assumptions fail to identify the risks associated with mandating current or short-term costs that may or may not result in customer acceptance or purchases of alternatives to home heating and transportation, thus resulting in higher costs without the expected increased revenues. Nor does this Report emphasize the importance of funding the full scope of low-income assistance for fuel oil or electricity purchases to ensure the health and safety of Maine's most vulnerable citizens. Since Maine does not allow our public utilities to invest, manage, or own generation, the statutory mandates to procure cleaner energy resources must be paid for through distribution rates.

The draft Report does not properly emphasize the recent cost drivers for Maine's electricity prices, namely "stranded costs" which are primarily composed of solar subsidies that should be more directly

explained and identified for policymakers, as well as federally imposed regional transmission costs. Any additional mandates to invest in renewable energy resources will only increase the public policy mandate portion of the electric bill. Any presentation of the sources of Maine's electricity prices should emphasize that Maine regulates the distribution service of Maine's electric utilities, and any additional costs associated with mandates for renewable energy must be borne by Maine ratepayers, a very regressive manner of cost recovery for statutory or public policies that seek to impact the supply side of the electricity bill. This concern is particularly important in light of the necessary and expensive investments that electric utilities must make to respond to the impact of climate change on weather and more extensive damage due to severe outages.



	Distribution Rates	UAP	EMT	Public Policy	Transmission	Total Rate
Rate A Service Charge	$ 15.67	$ 0.07	$ 0.28	$ 9.07	$ 1.51	$ 26.60
Rate A kWh Charge over 50 kWh	$0.0661	$0.0015	$0.0059	$0.0040	$0.0314	$0.1090
	$48.7300	$0.8040	$3.2485	$11.0765	$17.2310	$81.0900

With regard to the Key Actions, those listed as part of Strategy A, "Reduce Maine's dependence on imported fossil fuels for heating and electricity" fail to describe specific actions or identify the costs of implementing any of these actions. While AARP supports "responsible investments" that maximize benefits and protect ratepayers (page 25, third bullet), the draft Report does not identify such actions or discuss how ratepayers can be "protected."

With regard to the Key Actions identified in Strategy B, "Reduce energy burden for low- and moderate-income households," (page 26) AARP supports this overall objective. However, the actions must identify and call for specific funding or programs to achieve this objective. The OPA's Report referenced in the second bullet calls for increased funding, yet the GEO's Draft Report does not appear to support that action step to reduce the energy burden of Maine's vulnerable households.

With regard to the Key Actions identified in Strategy C, "Review existing approach to identify additional electricity cost control opportunities," (page 27) AARP is concerned that several of these "key actions" are not documented or justified by the content of the draft Report and do not appear to relate to the discussion of affordability of basic energy or electricity service. We would suggest the following

alternative “key actions.”

- With regard to rate design, AARP recommends the exploration of rate designs that reflect well designed pilots and evaluation of bill impacts to participating customers.

- With regard to the procurement of the standard offer, AARP supports reform and has consistently sought to reform the PUC’s current standard offer procurement practice of purchasing 100% of the residential and small user load at one point in time. See Resolve 2023, Ch. 39 [Chapter 39], which directs the MPUC to initiate a proceeding that addresses the procurement strategies used to obtain electricity for residential customers receiving default service. Chapter 39 requires that the Commission develop a procurement strategy that could increase rate stability for residential SOS customers. It also specifically directs the MPUC to evaluate the use of varied contract lengths and terms as a means to reduce price volatility. The PUC has yet to implement this important reform.

- The GEO’s report should highlight the negative impacts the retail energy market has had on affordability of service for residential customers. If the retail market were ended, Maine could avoid higher electricity bills that have cost Maine consumers $135 million or more from paying CEPs more than the standard offer. There is no basis for ensuring “benefits” when being served by a CEP that charges more than the standard offer.

- With regard to “review of renewable energy projects,” the description of this “action” does not contribute to any meaningful change or reform in current public policy. To the extent this proposal relates to the ongoing costs of over $150 million annually to Maine electricity consumers for the current solar subsidies (Net Energy Billing), AARP suggests that the Report should explicitly call for reform to this expensive statutory mandate.

AARP appreciates the opportunity to comment on this important matter. If you have questions for us, please contact Alf Anderson at aanderson@aarp.org or at 207-330-1147.

Noël Bonam

State Director
AARP Maine

Comments submitted by Richy Ainsworth

Good afternoon,

First of all thanks to the team at GEO for putting this together and for helping Maine to lead the way in the

energy transition. I would like to provide the following feedback from my perspective:

- The introduction mentions 750MW of distributed solar. This is the only metric without a target date, should there be one?
- Page 18 specifically mentions NEB, if this specific program is to be mentioned can it be given the context of how much this costs concerning other stranded costs? Even better could this be an opportunity to highlight why NEB is necessary to meet Maine's goals?
- Throughout the report and specifically in the Energy Plan Objectives section starting on page 19, the term clean energy is used frequently - I didn't see a definition of what is meant by this. I would be concerned that at a later date, this term could be twisted to include natural gas or propane. Also at the start of this section, it mentions the gigawatt of new clean energy deployed in recent years. Is it possible to break this down into types of generation? I think it would be useful here and to also better understand the later Figure 26 with "existing renewable energy supply"
- Under objective B strategy D, a key action is to decrease community dependency on centralized power. Could it be noted here that this is already happening with the deployment of distributed solar and possibly include some statistics?
- Objective C does not specifically mention solar at all and the section in the graph indicates this is not expected to increase as part of Maine's generation portfolio. Is this correct? Seems odd given that it is the most affordable method of renewable generation to us.
- Additionally, Objective C seems to specifically rely on offshore wind to increase over half of the renewable generation by 2050 (it is also noted as essential on page 36). It would be fantastic if this is achieved but is there not a risk that this is perceived that without offshore wind Maine will not be able to meet these clean energy targets? If we ended up in a situation like in New Jersey where there has been significant opposition to offshore wind is there a risk that this would undermine the energy plan? I may be misinterpreting but I read this as an all-eggs-in-one-basket scenario and could be open to scrutiny.
- P34 I may also be reading this wrong but this graph does not seem to reflect Maine's target of 80%

Thanks again for this work, this feedback is not intended to be critical but rather a view of someone reading this who is relatively new to Maine and excited about our energy transition.

Kind Regards

--

Richy Ainsworth (He/Him)

Central Maine Power
An Avangrid company

December 30, 2024

Dan Burgess, Director
Maine Governor's Energy Office
62 State House Station
Augusta, ME, 04333

Dear Director Burgess:

Central Maine Power Company ("CMP") previously submitted comments on the GEO's Pathway to 2040 report, which we said was "a thoughtful approach to energy planning, and helpfully incorporates various options for meeting the State's climate and energy goals while keeping cost and feasibility in mind." CMP appreciates this opportunity to provide these comments on the draft Maine Energy Plan (the "Plan"), which was released on December 16. Objectives and strategies for which CMP has prepared comments are referenced below.

Regarding Objective A, Strategy A (reduce dependence on imported fossil fuels), CMP supports the Plan's proposed action to advance regional collaboration through implementation of the New England State's Vision for a Clean, Affordable and Reliable 21st Century Electric Grid (the "Vision Statement") to meet policy goals and address grid constraints in Maine. Achieving the Vision Statement's objective of building necessary transmission infrastructure to meet regional demand, including as envisioned through the New England States Council on Energy's December 13, 2024 letter to ISO-NE regarding the long-term transmission planning process, will reduce costs for Maine and enable investments in other priority areas where regional cost sharing is not available. We also recommend that the State consider potential obstacles to transmission development that will be essential to interconnecting large new generation sources, such as the legislative approval requirement for all new high voltage electric transmission lines.

Regarding Objective A, Strategy B (reduce energy burdens for low- and moderate-income households), CMP supports reducing energy burdens for low- and moderate-income households and will continue to work to find ways to achieve that outcome along with the Office of the Public Advocate and the Electric Ratepayer Advisory Council. The Plan includes a reference to "expanded financing options," however, which may include some form of tariff on-bill financing program as mentioned in the updated Maine Won't Wait climate plan released in November. CMP supports greater accessibility to energy efficiency and beneficial electrification technologies for low- and moderate-income households, but cautions that on-bill financing would *increase* the energy burden for those households by adding to those customers' electric bills. Grant programs or other financing options better tailored to low- and moderate-income customers through entities that traditionally administer those types of programs may be better suited for successful adoption of these technologies with these customers.

Central Maine Power
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Regarding Objective A, Strategy C (review existing programs to identify cost control opportunities), CMP notes that one of the key actions in the Plan is to "review costs of new renewable energy projects in Maine . . . ." CMP effectively administers the net energy billing and other renewable energy incentive programs' billing, and we are able to provide stranded costs data to the GEO to help quantify costs in support of this strategy.

Regarding Objective B, Strategy A (establish targets for energy resilience), the Plan describes a key action of collecting "data on grid performance metrics" and "equip[ping] communities with these tools and collaborative opportunities to understand their energy vulnerabilities and develop targets for resiliency." CMP collects and reports system performance data for regulatory reporting compliance, and CMP also generally prioritizes worst-performing circuits when establishing capital spending plans. CMP's distribution automation program installs hundreds of automation devices across circuits with more frequent outages to improve reliability and resiliency. We look forward to further opportunities to educate stakeholders about our performance metrics and cost-effective options for reducing outages.

Regarding Objective B, Strategy C (advance innovative resilience solutions), CMP supports investment in modern resilience solutions, but notes that technologies such as microgrids, as the Plan indicates, depend upon strong underlying systems. Foundational investments in the system not only provide reliability and resiliency benefits in their own right, but can also enable use of further technologies that may be effective at meeting specific system needs – such as isolating an area to function as a microgrid. CMP is proud to have received two US Department of Energy Grid Resilience and Innovation Partnership (GRIP) awards since 2023 that help fund investments in some of those foundational investments. In 2023, CMP received a $30 million award to deploy smart grid technology such as "self-healing" devices to reduce the frequency and duration of outages, particularly in disadvantaged communities. In 2024, CMP – with the GEO and Versant Power – received another $60 million grant to further deploy software and hardware to enhance grid stability, regulate voltage, and increase transmission capacity.

Regarding Objective B, Strategy E (strengthen utility planning and engagement), CMP welcomes coordination with the GEO and stakeholders as we develop our integrated grid plan and implement our Climate Change Protection Plan. The integrated grid plan requires regular coordination with stakeholders, including at three distinct milestones in 2025. We have hosted several meetings centered on these topics in 2024 and welcome the GEO's and all stakeholders' participation in 2025.

Regarding Objective C, Strategy D (modernize Maine's energy systems), CMP reiterates its comments on the Pathways to 2040 study, which similarly acknowledged that significant investments in the transmission and distribution system will be necessary to meet the demands of growing load due to beneficial electrification and due to climate and storm impacts. Much of the State's electric infrastructure is aging and will require investment, but systematic "no-regrets" investments will provide daily reliability benefits as well as storm resilience and serve as the foundation for a stronger, smarter, more resilient grid into the future.

Regarding Objective D, Strategy A (advance beneficial electrification to reduce energy costs), CMP again supports efforts to make investments in the grid while reducing the overall energy burden of customers. Efficiency Maine's programs can be very effective at achieving this outcome. However, we also express some concern over the growing number of programs financed through the electric

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bill. A full accounting of those programs and costs may be warranted so that policymakers, ratepayers, and the State can best evaluate the effectiveness of all programs, their costs, and the allocation of those costs.

Finally, regarding Objective E (expand clean energy career opportunities), CMP strongly supports growing career opportunities for individuals working in both the narrower clean energy economy but also the broader energy and utility economy. CMP proudly partners with the Maine Community College system to develop talent and interest in good-paying jobs at CMP, but individuals with the skills to meet the objectives of the State Energy Plan will be in demand for many years to come. We look forward to partnering the GEO on the strategies indicated for expanding career opportunities and awareness of those opportunities.

Sincerely,

/s/ Craig Nale

Craig T. Nale
Director, Regulatory Affairs

Comments submitted by Tanya Blanchard

I appreciate the opportunity to provide comments on the draft Maine Energy Plan. After reviewing the document, I have several concerns I would like to bring to your attention.

1. **Uncertainty of Long-Duration Energy Storage**
   There is an assumption in the plan that Long-Duration Energy Storage (LDES) will be cost-effective and capable of providing meaningful quantities of energy. However, this technology remains unproven, and its long-term cost-effectiveness is still uncertain. Relying on such unproven technology could have negative implications for the residents of Maine, especially if the technology does not meet expectations.
2. **Cost Predictions vs. Reality**
   While the technical analysis suggests a reduction in energy costs, data from ISO-NE paints a different picture. According to their recent reports, the cost to load per MWh of energy could increase substantially, with projections showing a near fivefold rise by 2045 (ISO-NE Report). As the grid is designed to accommodate peak demand, there will likely be significant curtailment of energy during periods of low demand, which could lead to higher overall energy costs rather than the anticipated reductions.
3. **Human Factor and Public Participation**
   The plan does not appear to sufficiently address the "human" factor–specifically, how many Mainers will be able to afford electric vehicles (EVs) or participate in flexible load programs. For these programs to succeed, there must be a critical mass of participants. It is unclear how many people will be willing and able to participate in such initiatives, and what the minimum threshold is for these programs to function effectively.
4. **Land Use Challenges**
   The siting of both transmission lines and renewable energy generation facilities presents several land-use challenges. These challenges could result in higher costs for both generation and transmission infrastructure. While streamlining the permitting process might expedite project timelines, it is important to note that rushing these processes often leads to suboptimal outcomes.
5. **Offshore Wind Development Challenges**
   Offshore wind is critical to meeting Maine's energy goals; however, there are significant challenges to its development. In a recent lease sale, only four out of eight available offshore wind lease areas received bids. Issues such as turbine blade failures and the high costs associated with offshore wind construction and operations may hinder its viability. Additionally, the incoming federal administration

could change the economic landscape for offshore wind, which adds further uncertainty.

I hope these concerns are taken into account as the Maine Energy Plan moves forward. Thank you for your time and consideration of these points. I look forward to hearing how these issues will be addressed in future iterations of the plan.

Tanya Blanchard

Brookfield

Brookfield Renewable
150 Main Street
Lewiston, ME 04240

Tel 207.755.5600
Fax 207.755.5655
www.brookfieldrenewable.com

December 30, 2024

By email: geo@maine.gov

Dan Burgess, Director
Maine Governors Energy Office
62 State House Station
Augusta, Maine 04333

Re: Comments on Draft Maine Energy Plan

Brookfield Renewable greatly appreciates the work of the Governor's Energy Office (GEO) in considering future policies to support Maine's path to 100% clean energy by 2040. Thoughtful and proactive analysis from the GEO is critical to achieving Maine's goals over a time horizon that is anticipated to include significant changes in the energy system and consumer behaviors. While there are many important considerations outlined in the Draft Maine Energy Plan (Draft Plan), Brookfield Renewable has focused its comments on the consideration and role of existing renewable resources.

Notably, the Draft Plan and supporting technical analysis assumes existing renewable energy supply, including existing hydropower, will remain available to support Maine's policy goals through 2050 in the same quantities as today (Figure 26 at pg. 33). While we appreciate the interest in policy decisions that build upon and supplement the existing renewable fleet, the continued availability of existing renewable resources – and the corresponding renewable and reliability attributes – cannot be assumed as a given without a holistic consideration of the opportunities available to the existing fleet in comparison to limitations embedded in Maine's current energy policies. Absent this analysis, existing renewable resource supply will pursue opportunities outside of Maine that will reduce the State's ability to rely on this baseline of existing resources into the future.

RPS Class IA and Class II Considerations

Existing renewable energy supply available to Maine is at risk of decreasing through 2040 through a mix of i) Class II-eligible resources pursuing opportunities to realize higher RECs value and long-term contracting opportunities outside of Maine, ii) resource refurbishments or policy changes that may qualify certain Class II-eligible resources as eligible under other premium RECs programs, iii) resources experiencing reductions in

generation associated with new and expanded environmental licensing requirements and iv) resource retirements.

Although some of this attrition will occur independent of policy considerations, current policy limitations have indeed already resulted in supply moving to other markets. This includes the Class II market cap of $5/REC for resources otherwise not eligible for the Class IA program. While Brookfield Renewable does not dispute the merits of a price cap, the current level is notably lower than the price cap implemented in other comparable markets that many of the resources eligible for Class II may participate in. This has resulted in suppliers seeking opportunities outside of the Maine market, including long-term contracting arrangements that remove Class II-eligible RECs from the market through 2040. The price cap has also motivated suppliers to explore opportunities to qualify resources in more premium RECs markets throughout New England and even adjacent regions. To counter the continued loss of existing renewable supply available to Maine, Brookfield Renewable recommends that the GEO consider targeted policy adjustments that address Class II program constraints and transition certain in-state hydropower resources to the Class I/IA market.

One such change to support retention of resources critical to Maine's energy transition would be through a limited expansion of the Qualified Hydroelectric Output provision of the RPS. The existing Qualified Hydroelectric Output provision was endorsed by Governor Mills as part of An Act to Reform Maine's Renewable Portfolio Standard (LD 1494, 2019), and established Class IA eligibility of in-state hydropower larger than 25MW located outside of the historic freshwater range of Atlantic salmon. By implementing this new category of the RPS, Maine has ensured continued availability of two large in-state hydropower resources as a significant backstop to expanding the Class IA requirements that serve as the backbone of Maine's 2040 supply goals. In addition, this change has provided a meaningful cost mitigant for the benefit of ratepayers by limiting the potential that demand for Class IA RECs could otherwise outstrip supply. This has proven prescient given the continued challenges to new resource buildout due to supply chain disruptions, siting limitations and transmission constraints.

As Maine considers its policy priorities through 2040, including its continued reliance on existing hydropower, the GEO should consider a limited expansion of the Qualified Hydroelectric Output provision to include in-state hydropower resources larger than 25MW located outside *critical habitat* of Atlantic salmon. This change would expand eligibility to a very limited subset of Maine hydropower; however, it would include meaningful contributors to Maine's electricity system and reliability needs, including Wyman Hydro.

It is worth noting that this distinction was initially supported by the GEO during the drafting process for what would become the enacted version of LD 1494; and, indeed, the GEO even inadvertently reflected this as current statute in the 2023 report to the Legislature authored by Sustainable Energy Advantage:

> *"LD 1494 also created a new category of 'Qualified Hydroelectric Output,' which is defined as the output from FERC licensed hydroelectric generators with a commercial operation date (COD) prior to January 1,2019 that are at least 25 MW, interconnected to an electric distribution system located in the state, and not located in a critical habitat for Atlantic salmon."* (SEA report at pg. 7).

By adopting this limited change Maine ratepayers and Maine policymakers would be provided an important hedge (and cost mitigation mechanism) as northeast State's collectively expand renewable energy requirements alongside anticipated increased demand driven by electrification and economic growth throughout the GEO's planning horizon. As challenges to new build persist, including expected delays to offshore wind deployment due to shifting federal policies and priorities, existing in-state resources – particularly those resources with dispatchable capabilities like Wyman Hydro, can provide a necessary policy and reliability backstop. This change would also support facilities that provide critical contributions to the Maine electricity grid but are exposed to price suppression in the ISO-NE markets from out of market procurements.

It would also be appropriate to consider adjustments to the Class II program in tandem with a limited expansion of the Qualified Hydroelectric Output provision, including changes to the annual Class II demand requirements as well as reconsideration of the current Class II program price cap to better align with regional markets.

Conclusion

Brookfield Renewable recommends the GEO consider a packaged proposal to address retention of existing resources that includes 1) shifting high-producing, high value Maine hydropower to the Class IA program through a limited expansion of the Qualified Hydroelectric Output eligibility provision, 2) increasing the Class II price cap to better reflect regional market dynamics and 3) adjusting downward the Class II annual requirement to avoid over-reliance on a Class II market that may otherwise realize demand in excess of supply as load growth occurs and as Class II-eligible supply transitions to Class IA and markets outside of Maine. These policy considerations would also represent a sensible complement to the GEO's consideration of a Clean Energy Standard.

Thank you again for the GEO's leadership on these issues and for the opportunity to comment. Please reach out directly if you any questions.

Sincerely,

Steve Zuretti
Senior Director, Origination and Policy
Brookfield Renewable
steven.zuretti@brookfieldrenewable.com
323-400-9715

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Conservation
Law Foundation

For a thriving New England

CLF Maine 53 Exchange Street, Suite 200
Portland, ME 04101
P: 207.210.6439
www.clf.org

December 30, 2024

Submitted via E-mail: geo@maine.gov

Dan Burgess, Director
Maine Governor's Energy Office
62 State House Station
Augusta, ME 04333

Re: Conservation Law Foundation's Comments on the "Draft Maine Energy Plan"

Director Burgess:

Maine is at a critical point on its path toward compliance with its climate and clean energy requirements, and it is essential that the state do everything within its authority to develop and implement a modernized energy system that is clean, affordable, reliable and equitable. The Governor's Energy Office's (GEO) December 2024 "Draft Maine Energy Plan" marks a key opportunity for ensuring that the state's energy objectives are achieved in a timely and cost-effective manner.[1] Conservation Law Foundation (CLF) commends the GEO for its work on the draft plan and provides the following comments for consideration.

CLF is a public-interest advocacy organization focused on protecting New England's environment and safeguarding the health of our communities. CLF advocates for laws, policies and projects that advance clean energy and reduce energy demand, while saving families and businesses money and creating jobs. CLF works to reduce the region's reliance on fossil fuels and to modernize the region's electricity grid to better serve the needs of our changing society. CLF submitted comments on the GEO draft "Maine Pathways to 2040: Analysis and Insights" report, which are hereby incorporated by reference and included as Attachment A.

I. The "Draft Maine Energy Plan" and the transition from fossil fuels to clean energy.

From the outset, the draft plan appropriately identifies the cost and climate impacts of the fossil fuels that power much of Maine's energy system. It is important to acknowledge, as the draft plan does, that increases in, and the volatility of, energy prices in Maine are attributable to the state's over-dependence on imported fossil fuels. Likewise, it is important that the draft plan recognizes that grid investments will improve energy security and help Maine transition to a

[1] GEO, Draft Maine Energy Plan: Advancing affordable, reliable and clean energy for Maine people and businesses, Draft for Public Comment, December 2024, https://www.maine.gov/energy/sites/maine.gov.energy/files/2024-12/Draft%20Maine%20Energy%20Plan%20for%20public%20comment%20Dec%202024.pdf.

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clean energy future, thereby "reducing the state's dependence on imported fossil fuels and cutting harmful emissions that contribute to climate change."[2]

Despite these important findings, the draft plan unjustifiably defers discussion of the state's statutory greenhouse gas emissions reduction requirements until nearly halfway through the plan. Given the central role these emissions and the resulting climate change play in determining the reliability and resiliency of our energy system, and the role that energy system planning and design can and should play in achieving emissions reductions, the draft plan should include more focus, detail and analysis on greenhouse gas emissions, climate change and the relevant legal requirements. The very first sentence of "Maine Pathways to 2040" states:

> The Maine Governor's Energy Office (GEO) has commissioned The Brattle Group and Evolved Energy Research (EER) to develop this report to inform an updated State Energy Plan that will ensure affordable, reliable, and clean energy that supports the growth of Maine's economy while meeting greenhouse gas (GHG) emissions reduction requirements and supporting communities across Maine.[3]

The "Maine Pathways to 2040" report also indicates that its pathways analysis incorporates Maine's greenhouse gas emissions reductions targets, and it highlights policies needed to achieve those reductions throughout.[4] Because the Draft Maine Energy Plan expressly states that the "Maine Pathways to 2040" is one of its two foundational elements, the final plan should better reflect the centrality of greenhouse gas emissions reductions in Maine's energy planning process.

Maine's work to meet its climate and clean energy requirements must be conducted in a cost-effective manner, and the draft plan properly emphasizes the importance of energy affordability throughout. As the draft plan highlights, the energy burden for low-income households is nearly three times higher than the statewide average energy burden, and Objective A appropriately focuses on delivering affordable energy for Maine people.[5] Further, the draft plan correctly recommends continued efforts to reduce fossil fuel dependence across the economy to ensure energy affordability for Maine.[6]

II. Assessment of the objectives, strategies and actions in the "Draft Maine Energy Plan."

The draft energy plan includes five objectives and related strategies and actions, which outline the "critical future steps that GEO, as well as other entities, should take to achieve a more

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[2] *Id.* at 3, 17-19.
[3] GEO, Maine Pathways to 2040: Analysis and Insights, Draft for Public Comment, November 2024, https://www.maine.gov/energy/sites/maine.gov.energy/files/2024-10/Maine%20Pathways%20Report%20Draft%20for%20Comment.pdf, at vi (emphasis added).
[4] *Id.* at 1-2, 9-14, 30-33, 68-69.
[5] GEO, Draft Maine Energy Plan, December 2024, at 26.
[6] *Id.* at 24.

affordable, reliable, and clean energy system while meeting Maine's statutory requirements."[7] The draft plan also identifies five key themes throughout the objectives. The five objectives and five themes reflect a necessary focus on advancing a clean, affordable and reliable energy system. But as discussed below, they are not sufficiently specific or actionable. Further, aside from one brief mention, they also fail to convey that the consideration of equity impacts must be a core component of Maine's energy planning, as the draft "Maine Pathways to 2040" report indicated.[8] The energy plan should be revised to reflect equity as a foundational principle, and to highlight, as the draft "Maine Pathways to 2040" report did, that the clean energy transition is an opportunity to "undo some of the legacy of traditional energy infrastructure, which was often sited nearer to and had a greater impact on vulnerable communities."[9]

Most of the objectives, strategies and actions in the draft plan are too high level and qualitative to guide concrete action and implementation of the objectives, and need be modified to include quantifiable targets/metrics and specific, actionable recommendations on how to implement the objectives outlined in the plan. Without revising the draft plan to include clear and actionable steps, the "path to a more reliable, affordable, and cleaner energy future for Maine"[10] described in the draft plan will remain unmarked and difficult to follow.

A. <u>Objective A: Deliver affordable energy for Maine people and businesses</u>.

The draft energy plan appropriately finds that Maine can help ensure energy affordability through continued efforts to reduce fossil fuel dependence and increase beneficial electrification, and that the state must address the issue of high energy burden for low- and moderate-income families.[11] As described below, however, the strategies and actions proposed to meet Objective A need to be revised to be more actionable.

Under Strategy A, the proposed actions are too vague and lack quantitative targets and metrics that would allow for measuring progress. It is sensible to "[d]iversify Maine's energy resources, enhance regional collaboration, and support cost-effective energy efficiency and beneficial electrification investments,"[12] but without additional specificity, this action provides little guidance on what actions need to be taken, how and to what extent to diversify resources and who will be supporting investments and what that support will look like. Further, prioritizing the deployment of federal funding in clean energy development, energy efficiency and grid modernization is likely to be less fruitful in the near term, given the recent federal election.

Similarly, the actions outlined under Strategy B need to be revised to include quantitative targets and metrics concerning energy burden. For instance, the final energy plan should include

[7] *Id.* at 22.
[8] GEO, Maine Pathways to 2040, November 2024, at 69.
[9] *Id.* at 70.
[10] GEO, Draft Maine Energy Plan, December 2024, at 8.
[11] *Id.* at 24-25.
[12] *Id.*

recommendations on how often energy burden will be analyzed, and on how the state can set targets concerning reductions in energy burden, both in terms of the size of reductions that should be achieved and the timeframes in which those reductions should occur.

Under Strategy C, the actions proposed are too high level and do not ensure that action is taken, and progress is made, on taking advantage of additional cost control opportunities. The actions should be revised to indicate what types of innovative mechanisms can enable customers to save money and what types of rate design could achieve that end. The actions should also be revised to specify what work needs to be done on standard offer procurement and Competitive Electricity Providers, and what types of cost-benefit analyses can be conducted to review energy projects in Maine.

B. <u>Objective B: Ensure Maine's energy systems are reliable and resilient in the face of growing challenges</u>.

The draft plan properly highlights that to "mitigate the impacts of future extreme weather, and to provide greater energy security for people and businesses, Maine must build a modern electrical grid that is reliable and resilient."[13] Grid reliability and resiliency are also foundational to the clean energy transition and beneficial electrification. As described below, however, the strategies and actions proposed to meet Objective B need to be revised to be more actionable.

Under Strategy A, the actions are sensible, but lack the ambition called for in the title of this strategy. The actions are important, but they should be revised to recommend additional actions beyond collecting data on electricity outages and grid vulnerabilities, and to specify how delivered fuel resilience risks will be addressed. Likewise, the actions proposed under Strategy B are reasonable, but they lack sufficient detail and specificity for implementation and lack metrics by which their achievement can be measured. The actions identified under Strategy C and D lack information or recommendations on who will implement the actions and how they will be implemented. Further, Strategy C references "bio-based fuels" but does not define that term. The plan should be revised to provide clarity on that term, including how it will be defined, which should be directly informed by the statutory requirements concerning emissions reductions. The strategies and actions should be revised to include coordination with other states on grid reliability, and to include quantitative targets and metrics.

C. <u>Objective C: Responsibly advance clean energy</u>.

The draft energy plan indicates that "clean fuels will be needed for use on an intermitted basis," and that "the state does not have significant control over the development of clean fuels."[14] The plan also states that Maine can take steps to ensure fuels in the state become cleaner over time, but does not define "clean fuels" or "low carbon clean fuels," or provide any

[13] *Id.* at 2.
[14] *Id.* at 33.

recommendations on any such definitions. Given the central role these fuels play in the draft plan, the plan should be modified to better define the terms and to more comprehensively assess and account for the cost and environmental implications, including emissions profiles, of these fuels. This plan will shape energy law and policy in Maine for years to come, and it is essential that the full implications of these fuels are assessed and reported.

The actions under Strategy A call for the design and establishment of a Clean Energy Standard (CES) but do not provide any details relating to "clean fuels." As discussed above, it is critical that the state be thoughtful and transparent about the terminology from the earliest stages and, in doing so, bear in mind existing statutory requirements concerning clean energy and climate change. The plan should be revised to be more specific about what is meant by the phrase "Maine's approach to clean fuels," which could mean many things, and to include additional discussion and guidance on the options for, and implications of various terminology.

The plan should also be revised to include more specific assessment of, and recommendations on, long-duration energy storage (LDES) and the likely value of the technology in contributing significantly to Maine's ability to cost-effectively achieve its climate and clean energy requirements. As the "Maine Pathways to 2040" report recognized, the technology for 100-hour, multiday LDES currently exists.[15] An example of that technology is currently being developed for implementation in Lincoln, Maine.[16] The draft plan should be revised to more fully evaluate the role that LDES can and will play, including but not limited to in energy shortfall scenarios, and to make assessments and recommendations on its actual value and how to maximize that value.

The actions concerning offshore wind energy under Strategy C should be revised to be include targets and metrics by which progress can be measured, beyond the action of procuring 3,000 megawatts of offshore wind energy by 2040. Without specific, actionable and quantitative measures of how and when to "advance Maine-based offshore wind port infrastructure," "advance the objectives of the Maine Offshore Wind Research Array" and "continue regional coordination and other partnership activities," the offshore wind energy industry in Maine will likely be delayed further and add to delays being experienced elsewhere in the industry, including at the federal level.

Under Strategy D, the draft plans call for reducing barriers associated with both large-scale renewable energy and supporting infrastructure. The plan should be revised to describe what those barriers are and make specific, actionable recommendations on how the state can go

[15] Wilson, R., Raman, K., and Burger, S., "Clean, Reliable, Affordable: The Value of Multi-Day Storage in New England," September 27, 2023, https://formenergy.com/wp-content/uploads/2023/09/Form-ISO-New-England-whitepaper-09.27.23.pdf.
[16] Office of Governor Mills, "Governor Mills, Senators Collins & King, and Congresswoman Pingree Announce Nearly $150 Million Federal Grant to Develop World's Largest Multi-Day Energy Storage Facility in Lincoln, Maine" August 6, 2024, https://www.maine.gov/governor/mills/news/governor-mills-senators-collins-king-and-congresswoman-pingree-announce-nearly-150-million.

about reducing those barriers. Similarly, the plan should be revised to include additional details and recommendations on how to go about maximizing existing transmission infrastructure. The plan mentions "appropriate utilization of advanced transmission technologies, grid-enhancing technologies, and non-wires alternatives to increase reliability and resiliency while reducing costs,"[17] but provides no further detail on what is appropriate or how they can be utilized.

It is critical that Maine continue to collaborate with other New England states on shared goals, including those expressed in the Energy Vision Statement, as Strategy E suggests. The actions listed in the plan are reasonable, but they should be revised to include actions related to identifying and maximizing funding sources in addition to federal funding in the near term.

The draft plan indicates that it is underpinned in part by the draft "Maine Pathways to 2040" report, which the plan characterizes as a "technical analysis outlining achievable pathways to reaching 100 percent clean energy by 2040."[18] Aside from two brief mentions of these pathways under Objective C, the draft plan is silent on these pathways. The plan should be revised to include additional discussion analysis of the pathways, both to provide context for the recommendations in the plan, and to account for the economic and environmental uncertainties associated with climate and energy planning and policy development.

D. <u>Objective D: Deploy efficient technologies to reduce energy costs</u>.

The draft plan appropriately highlights the important work of Efficiency Maine Trust in developing and managing energy efficiency and alternative energy programs statewide.[19] The plan also correctly indicates that expanding electrification with modern technologies increases the availability of an important resource—load flexibility.

Under Strategy A, actions include leveraging of federal funds and advancing the implementation and adoption of building energy codes and standards. These and other actions under this strategy should be revised to include additional actions and recommendations on funding sources other than federal funding, and to include specific ways to implement the actions, as well as quantitative targets and metrics that can be used to measure progress.

E. <u>Objective E: Expand clean energy career opportunities for Maine people and advance innovation</u>.

The draft plan properly highlights the importance of advancing clean energy careers.

Respectfully,

Phelps Turner

[17] GEO, Draft Maine Energy Plan, December 2024, at 38.
[18] *Id.* at 5.
[19] *Id.* at 40.

Comments submitted by Richard de Grasse

Good Afternoon All:

Thank you for giving me the opportunity to present my load management ideas on Maine's Energy Future during the December 16, 2024.conference..Your slides helped me expand on my "Maine Electrical Utility Load Management" Brattle Report response piece I sent you a few weeks ago. Other electric utilities have discovered that it is significantly less expensive and environmentally better to manage their loads then to build and operate fossil fueled fired peaking generation. Nova Scotia Power and Green Mountain Power are 2 nearby electric utilities I'm familiar with that have practiced load management for decades.

Time-of-Use Electricity Supply: I have contacted the several electric utilities currently supplying Maine electric power about offering time-of-use (TOU) supply rates aligned with current CMP TOU rates for residential and commercial customers.. All have declined for 2 reasons: First, they are unregulated and can make more money more easily offering a retail non time differentiated Standard Offer supply and second there is no existing off-peak load market in Maine. They understand, however, the need for a TOU off peak rate to be available in order to create the economic incentive for customers to invest in load management renewable equipment such as solar, storage, control and electric thermal storage heating as do.Nova Scotia Power and Green Mountain Power. It takes years to grow an off-peak load in lieu of peak generation.

Solar and Storage: All future solar systems in Maine must be accompanied by properly sized on site battery storage or increased off site storage to make solar energy available during electrical supply utility peak load hours. Today under net metering, excess solar energy unused by the solar array customer is paid by the utility back to the customer at retail prices and may or may not result in reducing the need for utility peak load generation. A number of utilities offer an economic incentive for customers to allow the utility to remotely control customer owned solar array battery banks so as to reduce the need for peak generation capacity. Again it takes years to build an off-peak/controllable customer load but an economic incentive comes first. An incentive could be added to a solar customer grant to encourage storage and control to the solar installation.

Electric Heat Pumps: A similar storage and control logic can be applied to electric heat pumps which typically peak the utility on late afternoon hours on cold winter days.

Marketing TOU Supply and Load Management: Off-peak rates should be reasonably competitive with the price of fossil fuels. I typically compare on a BTU basis the price of an off-peak kwh with the price of a gallon of fossil fuel oil..Load management equipment costs are typically competitive with oil heat systems, for example. When TOU supply rates become available in Maine, the State must aggressively market the concept of off-peak rates and customer owned load management equipment including electric thermal storage heating possibly with incentives much like solar arrays and heat pumps today.

I hope this helps!

Merry Christmas!

Richard (Dick) de Grasse,P.E.

Islesboro

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December 29, 2024

Dan Burgess, Director
Maine Governor's Energy Office
62 State House Station
Augusta, Maine 04333

Re: Maine Energy Plan

Director Burgess:

As a life-long Mainer, a 40-year Maine small business owner (now co-owner of a 40-employee employee-owned company), a board member of the Maine Pellet Fuels Association, and a landowner, I would like to make a few comments regarding Maine's energy future.

I believe we, in Maine, are missing a huge opportunity to cash in on the state-wide desire to wean off from fossil fuel heating. I believe that Maine could be the next Saudi Arabia of wood heat. Maine has an incredibly under-utilized forest resource that could benefit almost every aspect of our economy.

If we could just promote and incentivize clean green modern wood heating to the level we are currently promoting heat pumps, it would benefit landowners, loggers, truckers, boiler/furnace manufacturers and dealers, pellet mills, pellet/chip delivery companies, restaurants, gas stations, truck and equipment dealerships, mechanics, tire sales, construction companies, insurance agencies, banks, …the list goes on and on as funds trickle down to those dependent on these businesses, while at the same time filling a void in the market for low-grade biomass, which is essential to the manufacture of higher grade wood products. An added benefit, it will help to protect Maine woods from over-development and being paved over.

Again, I believe this is a huge opportunity for Maine, and currently, we are missing the boat.

Sincerely,

Robert Fogg

Q-Team, Inc.

Comments submitted by David Kunhardt

Thank you to the Governor's Energy Office for advancing this important work.

Please add to Objective A - "Deliver Affordable Energy" two suggestions:

1. Within "Strategy B: Reduce energy burden for low- and moderate-income households": Include: Request Maine's Congressional delegation to urge passage of Carbon Cash-Back legislation, which would tax all fossil fuel production, and return the revenue to every American. Between 2/3rds and 3/4ths of Mainers would come out economically ahead, on net, after all problematic fossil fuels are disadvantaged. This approach is supported by over 3,600 economists.

2. Within "Strategy C: Review existing approaches to identify additional electricity cost control opportunities."

Include the option to bring Community Community Choice Energy Aggregation of energy supply (also called Community Power) to life by modernizing the 1999 Maine authorizing legislation, to enable jurisdictions seeking Community Power to do so with an "opt-out" approach, after a public vote. This does not involve purchase of the existing energy infrastructure. See the work of the Maine Community Power Alliance.

Thank you for this opportunity to comment.

David W Kunhardt

SIERRA CLUB
MAINE CHAPTER

PO Box 3760
Portland, ME 04104
Phone: (207) 761-5616
www.sierraclub.org/maine

20 December 2024

Director Burgess
Governor's Energy Office
Via email: geo@maine.gov

Re: DRAFT Maine Energy Plan

Director Burgess and the Staff of Governor Mills' Energy Office:

The Maine Chapter of the Sierra Club is enthusiastic about your office's ongoing work to move our state away from harmful fossil fuels and take the wide range of steps needed to build us a sustainable renewable energy economy. The Draft Maine Energy Plan is a timely and comprehensive analysis of many of the necessary steps we must take to make progress in that regard, and our Chapter broadly celebrates the attention and time that staff have dedicated to this report. In particular, we are encouraged to see a clear focus on distributed generation, grid resiliency, and the need to save Mainers money during our energy transition.

However, there were also some points raised in this draft that need attention. Critically, we cannot plan our energy transition around any one panacea nor lose focus of a truly fossil-free energy future. Now is not the time to be discussing low-carbon fuels. We need to do everything that we can to fully unlock the potential growth of wind and solar in our energy mix. We need to build real renewable generation and energy storage, not lean on the promise of nuclear, large-scale hydro, nor "very-low-carbon" fuels.

We look forward to seeing much of this plan put into action during the upcoming 132nd Legislature through recommended legislation from your office. In that way, many of the report's objectives can be put into action in a timely fashion: urgency that this moment requires.

Thank you for your consideration of our comments and for your work on this draft. It is more important now than ever before.

Objective A - Deliver affordable energy for Maine people and businesses

- *Strategy A: "Consider updates to statutory oil dependence reduction goals, monitor oil dependence over time, and report annually on Maine's progress."* We recommend aggressively shifting oil dependence reduction goals based on historical trends. Based on the rate of reduction during the last-reported 2017-2022 5-year period, the existing 2050 goal of 50% reduction from 2007 levels should be moved up. We are on pace to surpass our current goals, so we recommend considering a 2027 goal of 50% reduction from 2007 levels, a 2037 goal of 60% reduction, and a 2047 goal of 80% reduction.

- *Strategy B: "Develop and support expanded financing options and ownership models to reduce barriers to clean energy and energy efficiency investments for low- and moderate-income households including renters, rural or underserved communities, and small businesses."* Current offerings for energy efficiency and clean energy technologies for renters, rural and underserved communities, and small businesses are chronically under-resourced. Particularly for renters and small businesses who lease their spaces, possible pathways for adoption of energy efficiency and clean energy solutions range from difficult to impossible, requiring negotiations with building owners that may jeopardize their tenancy. We recommend offering generous incentives for landlords to adopt clean energy technologies and energy efficiency measures to benefit Maine's tenants.
- *Strategy C: "Continue to work with the Maine PUC, OPA, and others to analyze and develop strategies to ensure customers benefit when utilizing Competitive Electricity Providers."* Given historical challenges with Maine's Competitive Electricity Provider program, we recommend that GEO consider supporting ongoing efforts to unlock the benefits of the community choice aggregation model in Maine. This model has proven successful in New Hampshire, Massachusetts, California, among other states, to offer ratepayers local control over their energy supply and significant savings.

Objective B - Ensure Maine's energy systems are reliable and resilient in the face of growing challenges

- *Strategy C and Strategy D offer support for "innovative and modern resilience solutions including microgrids" and "innovative technologies including energy storage" respectively.* We recommend that GEO clarify in these sections what reforms are necessary to unlock the latent benefits of these technologies, either at the Public Utilities Commission or in statute.
- *Strategy D offers support for decreasing "community dependency on centralized power sources."* We support this strategy as a means of moving to increasingly localized power systems, a more resilient way to build energy sovereignty. Distributed generation and energy storage are both crucial pieces of realizing that resiliency.
- *Strategy E supports the implementation of An Act Regarding Utility Accountability and Grid Planning for Maine's Clean Energy Future, Public Law 2021, ch. 702 (L.D. 1959)*. We value this strategy highly due to the long-term planning needed to build-out grid capacity and resiliency over time. Mid- and long-range planning by our state's electric utilities is necessary to ensure that we are prepared for increased load due to beneficial electrification and protected from the various threats posed by climate change. This process should proceed as rapidly as possible to start implementing resilience measures in short order.

Objective C - Responsibly Advance Clean Energy

- *Strategy A supports "a new complementary Clean Energy Standard (CES) to allow other zero- or very-low carbon energy resources, such as nuclear, large-scale hydro, or low carbon clean fuels for thermal electricity generation, to contribute to Maine's goal of reaching 100 percent clean energy by 2040."* **We strongly object to this strategy**. Though our existing Renewable Portfolio Standard has moved us closer to 100% renewable energy, even now it allows for low carbon, polluting fuels. We need to be generating more energy from existing clean, renewable sources, not reclassifying others to meet our goals. Large-scale hydro and nuclear both have serious,

unresolved environmental problems related to their operation, primarily impeding natural riparian ecosystems and waste-disposal, respectively. We need a truly fossil-free energy future; now is not the time to be discussing low-carbon fuels.

- *Strategy C. Advance responsible development of offshore wind energy.* We share GEO's vision of offshore wind energy playing an important role in our energy future and meeting our ambitious clean energy goals. However, it is absolutely necessary to engage in dialogue about what Maine is prepared to do to advance responsible development of offshore wind during times of national political uncertainty. We hope to see more from GEO in the coming final report discussing what Maine can do to advance offshore wind if potential roadblocks arise during the coming administration. Our energy transition cannot wait four years, and if offshore wind is going to play a significant role, as we believe that it should, Maine needs to be thinking creatively about how to deploy it in the intervening time.
- *Strategy D offers support for "Maximize existing transmission infrastructure by supporting studies and appropriate utilization of advanced transmission technologies, grid-enhancing technologies, and non-wires alternatives to increase reliability and resiliency while reducing costs.* We fully support this Strategy, and particularly any efforts to encourage reconductoring projects to increase capacity of existing infrastructure, as opposed to building new transmission corridors from scratch.

Objective D - Deploy efficient technologies to reduce energy costs

- Overall, Objective D does not fully discuss the impacts of deploying efficient technologies in the industrial sector. Given the emissions impact of industrial facilities, initiatives targeted at increasing electrification and efficiency adoption in the industrial sector would have a significant impact on our statewide emissions. We suggest further discussion by GEO of ongoing and future efforts at industrial decarbonization and efficiency.
- *Strategy A supports "Work with the Legislature, PUC and EMT to responsibly consider and adjust the 4% cap on procurement that could limit the ability of EMT to deploy beneficial electrification technologies that would reliably reduce rates over the life of those measures."* We support this strategy and any other efforts by this Administration to fully fund the work of Efficiency Maine Trust. While we understand that ratemaking is highly complex and consequential, moderate increases to this cap could bring significant cost savings to ratepayers over time and should be explored.
- *Strategy B supports identifying "policies that facilitate the integration of EV charging stations with Vehicle-to-Grid technology, preparing for its crucial role in balancing supply and demand."* We strongly support this effort, particularly in the wake of Efficiency Maine Trust's evaluation of the Wells-Ogunquit Community School's pilot vehicle-to-grid project for their electric school buses. Their report determined challenges with compensation for storage discharging, limitations to interconnection rules that impedes storage discharges, and significant project costs for bidirectional chargers. We encourage GEO to explore specific remedies that the legislature or PUC should consider to overcome these barriers in the final draft of this report.
- *Strategy C: Expand Maine's EV charging network.* Expanding Maine's EV charging network is crucial for encouraging adoption of EVs and electrifying our transportation sector. It is particularly critical to target network expansion to areas where EV adoption is lagging, since these regions are typically where gasoline usage is highest.

Objective E: Expand Clean Energy Opportunities for Maine People and Advance Innovation

- Generally, these strategies support a robust energy workforce, but we are concerned about a few pieces. In regard to Artificial Intelligence (AI), we hope the Governor's new task force will ensure that jobs are protected, and people's lives are improved through the use of AI, while we enrich Mainers lives and not only large, multinational corporations. Additionally, we need to focus more on high labor standards throughout these strategies; it is not mentioned. Lastly, heating fuel workers need to be specifically mentioned, as heating fuel is rapidly being replaced by heat pumps, and this sector is a critical part of Maine's economy.
- *Strategy A: Raise awareness of clean energy careers and connect employers to the local workforce through the Clean Energy Partnership.* The CEP is a critical strategy to advance workforce development.
- *Strategy B: Advance clean energy curricula development, technical training, and experiential learning.* We are glad to see GEO using federal dollars to advance more workforce development in this area, especially a qualified contractor workforce, as contractors/developers have consistently said that they need more skilled workers to meet demand.
- *Strategy C: Coordinate with educational institutions, technical and vocational training centers, labor unions, and employers to expand and promote clean energy career pathways.* We need much stronger language here and throughout this section to ensure high labor standards for this new workforce. With the transition to a clean energy economy, we have the opportunity to right the wrongs of the past and ensure the benefits of a market economy more equitably distribute to workers.
- *Strategy D: Expand pilot programs, technical assistance, and funding for clean energy innovation and foster partnerships with research, education, and innovation institutions and the private sector to advance clean energy innovation.* Exploring pilot programs, especially for fossil-fuel free technology could be a huge opportunity for Maine, including expanding thermal energy networks and nature-based greenhouse gas removal programs.

Maine Policy Institute's Comment on the Maine GEO's Draft Energy Plan

To the Maine Governor's Energy Office,

Thank you for the opportunity to comment on how Maine will pursue the goals set in the Maine Energy Plan. This is the Maine Policy Institute's response to your request for public review and comment on the draft plan, its objectives, and the strategies it considers to pursue those objectives. We have also included feedback to the "Maine Pathways to 2040: Analysis and Insights" report by the Brattle Group and Evolved Energy Research, cited multiple times in your draft plan as "the Technical Report." While the information provided below may not address all of the content of this plan, we hope it helps inform the final energy plan of the Governor's Energy Office.

Overview

As a preface, we are stating our strong objection to the projected policy goal of 100% clean energy by 2040. According to a report by Always On Energy Research, New England will suffer major increases in energy costs and reductions in energy reliability if we continue to pursue these renewable-focused policies.[1] To achieve this target, New England as a region will need to spend significant amounts of money overbuilding production and increasing supply to account for a transition to the majority of non-dispatchable energies, or we will suffer more frequent blackouts and unaffordable electricity by 2050.

According to the Maine GEO's webpage and introduction of the report, there are three alleged benefits of pursuing the 2040 plan, all of which are poorly justified.[2] There are several issues with the energy plan's alleged benefits, one reason being that the benefit of "diversifying Maine energy sources" while also "reducing reliance on [..] fossil fuels." is both false and contradictory.

The technical report claims that in 2023, about 65% of in-state generation came from renewables.[3] Logically, therefore, reducing fossil fuel usage would make Maine's energy sources *less* diverse. If by 2040, Maine relies entirely on a small group of clean energy sources, such as solar, wind, and hydro, with no fossil fuels involved, then it is, by definition, less "diverse" than a power grid that includes another 4 or 5 minority energy types from fossil fuel sources. Parsing out whether an energy grid is more "diverse" has questionable relevance, but that is another criticism of the draft report bringing up this subject in the first place.

The second alleged benefit is greater regional clean energy cooperation on clean energy investments and greater utilization of the Inflation Reduction Act's clean energy subsidies. The fact that a decidedly pro-fossil fuel presidential administration is incoming with a federal Republican trifecta means that many federal support structures for renewable energy have a shaky future. Additionally, such federal support

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[1] https://mainepolicy.org/research/the-staggering-costs-of-new-englands-green-energy-policies/
[2] https://www.maine.gov/energy/studies-reports-working-groups/current-studies-working-groups/energyplan2040
[3] https://www.maine.gov/energy/sites/maine.gov.energy/files/2024-10/Maine%20Pathways%20Report%20Draft%20for%20Comment.pdf

may soon target fossil fuels rather than ignore them, making this issue anti-renewable rather than pro-renewable.

Lastly, this policy would allegedly advance the governor's goal of increasing clean energy jobs in Maine. According to this same office's 2023 Clean Energy Industry Report, Maine's clean energy jobs only increased by 2,000 between 2016 and 2022, and the total as of 2022 is "over 15,000 workers."[4] Even if Maine increased its employment in the Clean Energy sector by five times the job growth over that period, we would still be almost 2,000 jobs short of the governor's energy growth goals. Furthermore, using one clean energy policy goal as the justification of another clean energy policy goal amounts to circular reasoning and is incredibly weak considering the numerous costs of continuing to pursue such policies.

Also, several troubling assumptions are made in the technical report, which are likely incorrect. On Page 33, the report assumes that Maine's three planned gigawatts of offshore wind will be built by 2040. However, Maine's Sears Island Windport has hit a practical standstill due to the fallthrough of an expected $450 million+ federal grant and an incoming renewable-skeptical presidential administration.[5] According to the National Renewable Energy Laboratory, it can take up to ten years to build a wind port.[6] Due to the need for federal funding, the importance of in-state launching, and the timeline effectively requiring a future presidential administration to rubber stamp hundreds of millions of dollars of financing by 2030, the likelihood of meeting the 2040 timeline seems relatively low.

The technical report also assumes a steady decline in baseline energy consumption prices when significant cost growth has occurred over the last few years. Explaining the justification for this prediction in more detail would help provide insight into the logic of the GEO and its contracted firms. Lastly, the technical report fails to consider with significant depth the option of advancing nuclear as a dispatchable clean energy option.

Analysis of Objectives in the Draft Energy Plan

The following section of this comment will consist of a response to the five objectives and accompanying strategies listed at the end of the draft Energy Plan. .

For "Objective A: Deliver affordable energy for Maine people and businesses," the listed strategies focus on efficiently using federal funding to support renewable energy projects. As previously noted, federal funding is shaky support for renewable energy projects, even under the Biden administration. Furthermore, the incoming Trump administration will make this strategy even more unreliable.

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[4] https://www.maine.gov/energy/sites/maine.gov.energy/files/2024-05/2023%20MECEIR%20Report%20Final.pdf
[5] https://mainepolicy.org/federal-government-denies-grant-for-sears-island-wind-port/
[6] https://www.nrel.gov/news/program/2023/what-will-it-take-to-unlock-us-floating-offshore-wind-energy.html#:~:text=%E2%80%9CBut%20the%20effort%20also%20represents,and%20take%20around%2010%20years

Additionally, the affordability of renewable energy in New England is questionable due to the $815 billion an expanded renewable energy resource mix would cost ratepayers through 2050.[7] Lastly, the diversity of such a system has already been addressed, and it should be emphasized that a more diverse energy system is not simply a system with more allegedly "good" energy, but a more extensive mix of energy from different or diverse sources. Since this plan would make Maine heavily dependent on wind and solar energy, the current energy plan would do the opposite of diversifying our grid.

Objective B emphasizes our energy grid's reliability, which is especially concerning to Maine Policy Institute. A non-dispatchable focused energy grid would require a massive investment in overbuilding energy production and storage. It would still be at risk of blackouts when an unexpected surge in demand occurs that exceeds energy storage capacity. A dispatchable energy system, clean or otherwise, is far superior in reliability and avoids much of the storage investment the draft plan requires.

Objective C is focused on responsibly advancing clean energy and discusses, in part, adding a clean energy standard on top of Maine's current renewable portfolio standard. The report claims that the RPS saves Mainers $21 million annually. However, this increase in affordability is somewhat underwhelming when compared to the $220 million renewable energy mandates such as net energy billing costs ratepayers annually.[8] Offshore wind will not increase this affordability either, as it has the highest all-in-system cost per megawatt-hour of all forms of renewable energy.[9] While transitioning Maine's RPS to include nuclear would be preferable to the status quo, the costs clearly outweigh the savings for renewable policies like this.

Objective D is to deploy efficient technologies to reduce energy costs, emphasizing electrification. Electric vehicle deployment is frequently a major target of projects like these. However, it should be noted that increased EV usage is unlikely to come to Maine soon. While increased public education and subsidies may look attractive on paper, the widespread public backlash to the Department of Environmental Protection's policy concerning statewide EV mandates illustrates the strong public opposition to EVs.[10]

Lastly, Objective E is to advance clean energy careers, and many of the strategies emphasize preexisting techniques such as expanding energy efficiency jobs and career pathway education. However, before advancing clean energy careers, we should both properly define what a clean energy career is and understand that not all clean energy careers are created equal.

More than half of the clean energy careers are labeled energy efficiency jobs, a questionable category to include in this metric. Many of these workers simply install products that reduce energy consumption,

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[7] https://mainepolicy.org/research/the-staggering-costs-of-new-englands-green-energy-policies/

[8] https://www.maine.gov/meopa/sites/maine.gov.meopa/files/inline-files/Actual%20Cost%20of%20NEB%20for%20Legislature%20-%20Final.pdf

[9] https://mainepolicy.org/research/the-staggering-costs-of-new-englands-green-energy-policies/

[10] https://www.instituteforenergyresearch.org/regulation/maine-rejects-californias-ev-mandate/#:~:text=The%20Maine%20Board%20of%20Environmental,favor%20of%20the%20EV%20mandate

rather than individuals working on clean energy production projects. Emissions reduction workers being included effectively doubles the total clean energy worker employment metric, and including this category in Maine's energy plans will reduce the accuracy of any findings related to employment.

Second, many of these jobs are part-time clean energy work. If someone spends a few hours a week installing solar panels, they are considered an additional energy worker. Not only does this mean that this metric indirectly encourages Maine to create lower-quality part-time jobs as opposed to high-quality full-time employment, but it also causes further distortion of the clean energy job market. The 2023 Clean Energy Industry Report adjusts for this by summing multiple part-time workers into single full-time employees, called "intensity-adjusted employment." Still, the draft energy report fails to include this lower figure. For context, the intensity-adjusted employment number is 11,063 workers, which is approximately 26% lower than the decontextualized number cited in the draft report.

For further context, nuclear energy pays far better. The average nuclear plant employs 500-800 workers and employs up to 9,000 workers during peak construction.[11] Additionally, these nuclear workers' salaries are 50% higher on average than other electricity generation employment. If Maine's goal is to create clean energy jobs, this would be the better policy avenue to pursue.

Recommendations

Maine Policy Institute thanks you again for the chance to comment on the draft energy plan. First, we recommend emphasizing the actual costs advancing renewable energy will have to Mainers' energy bills and energy reliability. Additionally, better-contextualizing employment data and nonrenewable alternative plans would better inform state policymakers as to the best policy strategies to pursue. Lastly, avoiding inaccurate descriptions of renewable energy policies as increasing affordability, reliability, or diversity of power sources would allow policymakers in Maine to more effectively consider the policy strategies and their drawbacks accurately.

[11] https://www.nei.org/advantages/jobs

January 3rd, 2025

TO: Governor's Energy Office

FR: Maine Labor Climate Council

RE: Maine Energy Plan

To whom it may concern,

Maine Labor Climate Council supports the State of Maine's pursuit of ambitious clean energy targets that are necessary for achieving rapid decarbonization statewide. The GEO's Maine Energy Plan charts a realistic and cost-effective course for achieving these goals, and we support the GEO's move towards a more capacious clean electricity standard that includes not only renewables but also other technologies that align with overall emissions-reduction goals.

Although we recognize and fully support the Maine Energy Plan's efforts to address the climate and energy crisis, it is essential that the State do so in a way that promotes job quality and equitable workforce development so that the work is completed in a safe and efficient manner — all while bringing underrepresented populations into our aging workforce. The industries and market viability of the technologies contemplated by the Maine Energy Plan simply would not exist at scale without significant state subsidies, procurement targets, and overall coordination. Given the scale of this market intervention — i.e., climate and energy policy is equal part economic policy — it is incumbent on the State to attach strong labor and equity standards to its energy policies. Specifically we recommend permanently building in labor agreements into the bid-evaluation framework for all future energy procurements — as was done with the recent example of the Northern Maine Renewable Energy Program — and integrating reasonable wage and apprenticeship utilization standards into Efficiency Maine Trusts's suite of incentive programs that play an increasingly significant role in the State's overall decarbonization plans.

These measures are vital to secure the State's interest in seeing work completed on time and on budget, while simultaneously growing the workforce commensurate with our decarbonization and clean energy job goals. They are also concrete ways to ensure a just transition for workers and families and communities most impacted by the shift to a low-carbon future.

We look forward to continued dialog with you as your application progresses, and stand ready to provide a letter of support and input on subsequent program design and implementation.

Francis Eanes, MLCC Executive Director

State of Maine
Governor's Energy Office

***Draft* Maine Energy Plan**

Comments of Peter Evans (New Power Technologies Inc.)

By email to geo@main.gov

December 30, 2024

I would like to thank the Governor's Energy Office (GEO) for the opportunity to offer the following comments on the Maine Energy Plan draft for public comment released December 16, 2024, referred to here as the Draft Energy Plan.[1] [2] [3] [4]

1. Affordable Energy for Maine People

We concur that affordable energy for Maine people should be the first objective of the Draft Energy Plan, which it is. We highlighted this point in our comments on the Pathways to 2040 Analysis.

The Draft Energy Plan includes this statement from the Pathways to 2040 Analysis:

"Overall energy supply costs are unlikely to increase significantly and may decrease somewhat over time. While overall expenditures on electric generation, transmission, and distribution will increase

[1] These comments are based on the "draft Maine Energy Plan" on the GEO website: https://www.maine.gov/energy/sites/maine.gov.energy/files/2024-12/Draft%20Maine%20Energy%20Plan%20for%20public%20comment%20Dec%202024.pdf.

[2] These comments are also based on the presentation by GEO and participant comments in the webinar dated December 16, 2024.

[3] These comments are also based in part on the technical analysis, "Maine Pathways to 2040" posted on the GEO website.

[4] We also refer to "Pathways to 2040 Analysis Comments of Peter Evans (New Power Technologies, Inc.).pdf" submitted to GEO on November 18, 2024.

to serve higher demand from electrified end uses, these higher electricity costs are largely offset by savings from decreased reliance on costly fossil fuels"

This prediction is very encouraging; moreover, it is supported by the very thorough Pathways to 2040 Analysis. This projection is of course a function of many underlying assumptions. We again ask that the final Energy Plan or the final version of the technical analysis include a detailed appendix identifying the actual assumptions used, their sources (with good links), how they have been incorporated into the study, and how they drive the conclusions.

In an ideal world, others could duplicate (and validate) this conclusion drawn from the underlying data. Also, as the Energy Plan is implemented over time, a clear understanding of actual circumstances relative to those assumed could support prudent mid-course corrections to support the Energy Plan's Objective A.

2. "Land" Impacts of Resources

Figure ES-2 of the Draft Energy Plan shows substantial growth in renewable resources sited in Maine, presumably offshore wind, northern Maine onshore wind, and solar, from 2023 to 2050. Objective C also discusses related needs for transmission and offshore wind port infrastructure.

Energy development always involves tradeoffs. Depending on how the resources described in the Draft Energy Plan are developed, they could have very significant impacts on Maine's land and waters. In the Draft Energy Plan, Objective C's Strategies and Key Actions speak of "reducing barriers associated with" this development to reduce costs, and "build support for" this development. Maine Won't Wait, for its part, has a specific strategy, "Strategy E: Protect the Environment and Natural and Working Lands and Waters in Maine."

We believe the Energy Plan should include specific, stated strategies and actions to assess, on an ongoing basis, the balance between renewable development and protecting the natural and working lands and waters Maine. There is no one "right" answer and choices in specific circumstances might be different than choices in the abstract, so this would be an ongoing priority more than a given goal. The Energy Plan could affirmatively prioritize renewable development that does not encroach on the natural and working lands and waters in Maine.

3. The Plan's Risks and Barriers

One of the commenters in the December 16 webinar introducing the Draft Energy Plan asked whether the plan included a contingency for the risks of offshore wind given the level of reliance on that resource. In our comments on the Pathways to 2040 Analysis we highlighted the core pathway's reliance on continued operation of legacy thermal generation in the region and its conversion to clean fuels.

It would be appropriate to include in the Final Energy Plan a specific discussion of the key risks and barriers to the plan's stated objectives and strategies. Identifying these risks and barriers would help to focus and prioritize resources and stakeholder mindshare in the implementation of the plan.

4. Electric Utility Adoption as a Lever in Energy Innovation

New Power Technologies Inc. has been a power grid innovator and solution provider with patented technologies for years, so we have some perspective on the Draft Energy Plan's objectives of embracing "modern grid" solutions in Objective B and advancing innovation in Objective E.

The Draft Energy Plan, in our view, correctly identifies multiple innovative solutions with the potential to yield electric service quality and policy benefits. It is also well and good to foster a clean energy innovation ecosystem. Pilots, incubators, accelerators, and funding grants all serve a purpose. However, in the end, business traction is required to sustain energy innovation solutions and jobs in clean energy. There is a term in the energy technology space: "death by pilot project."

In the sectors of clean energy generation, clean grid and storage, and energy efficiency, and also in resilience or modern grid solutions such as microgrids, success beyond the pilot phase *depends* on adoption or acceptance by the electric utilities. For the utilities' part, notwithstanding legislative or utility commission direction to do or plan to do specific things, adopting new practices involves risk, and adopting third party infrastructure-as-a-service solutions in lieu of grid expansion can reduce investment opportunities. In Maine we now have the potentially complicating factor that the nominally investor-owned utilities are non- public companies whose sole investor is a foreign entity.

The utilities must have an incentive to incorporate third-party sponsored and customer-side solutions such as demand response, flexible load, and grid services from customer-side generation and storage resources in their grid and resource planning. Also, the utilities must have an incentive to adopt new grid solutions (so-called Grid Enhancing Technologies and actions described under Objective B) in the expansion and operation of their power delivery networks.

We noted in our comments on the Pathways to 2040 analysis the extent to which the core pathway reveals peak demand challenges, and relies on load flexibility and potentially targeted power

generation within the distribution system to mitigate these challenges. We noted that these challenges provide an imperative and an opportunity.

In addition to the strategies listed in the Draft Energy Plan, achieving Objective E (and parts of Objective B) will require active engagement on the part of the electric utilities and quite likely significant changes to their incentive structure.

Loggers Standing Strong Since 1995
108 Sewall St., P.O. Box 1036
Augusta, ME 04332
Phone: 207.688.8195
Fax: 207.620.7517
plcloggers.org

December 28, 2024

Director Dan Burgess
Maine Governor's Energy Office
62 State House Station
Augusta, ME 04333

Re: Governor's Energy Office, Maine Energy Plan Draft

Dear Director Burgess,

On behalf of the Board of Directors of the Professional Logging Contractors of the Northeast (PLC), I am writing to provide comments on the Maine Energy Plan Draft, which was distributed to the public on Dec. 16, 2024.

The PLC was formed in 1995 to represent independent timber harvesting and hauling businesses in a rapidly changing forest industry. Today, the PLC remains the sole voice of independent logging and associated trucking contractors throughout the state of Maine. As of 2021, harvesting and hauling contractors in Maine employed over 3,000 people directly and were indirectly responsible for the creation of an additional 2,500 jobs. This employment and the investments that contractors make contribute $582 million annually to Maine's economy. Our membership, which includes 220 contractor members, is responsible for more than 80% of the wood harvested in the state annually.

The Maine Energy Plan Draft has many positive initiatives outlined to help lead Maine into the future and to attain its goal of producing 100% of its electricity from renewable sources by 2040. However, the PLC has some concerns with a few of the recommendations outlined in the draft plan that it would like to bring to your attention and request amendments before a final plan is drafted.

From our perspective, the draft plan falls short with respect to its recommendations for not fully utilizing one of Maine's greatest natural resources, its forest. The recommendations provided in the plan are centered around workforce development, beneficial electrification, and weatherization, but there are very few strategies mentioned that involve the expansion of heat or electricity production from wood. In fact, the only mention of a beneficial wood strategy is the Thermal Energy Investment Program (TEIP). While that's significant, there are no recommendations to move to move the program forward in tandem with other previously created programs such as the thermal renewable energy credit, the wood fired combined heat and power program or the highly efficient wood heat rebate program at Efficiency Maine Trust.

Wood energy should play a pivotal role in Maine's pathway to reduce its reliance upon fossil fuels and achieve carbon neutrality. The use of wood over heating oil provides a significant carbon offset as it is carbon neutral and does not introduce new GHG's in the atmosphere. According to the The Maine Department of Environmental Protection's (DEP) 9th Biennial Report on Progress toward Greenhouse Gas Reduction Goals, it recognizes that due to the cyclic nature of forest sequestration (page 21), wood products that are burned do not release any new GHG into the atmosphere vs. wood that decays naturally.

From our perspective, the state has fallen short with respect to implemention and marketing of programs that have been created to increase the utilization of wood for energy production. The draft plan's absence or even mention of these programs is a direct example of this neglect.

Marketing for TEIP, thermal renwable energy credits, highly efficient wood heat rebates and the wood fired combined heat and power program must be established and focused upon both residentaial and commercial stakeholders to fully realize their potential. These programs and a strategy to implement them must be included in this plan.

Additonally, as highlighted in the draft energy plan, there should be continued investments made to workforce development as well. However, this should not be limited to workforce development opportunities only for heat pumps and solar. In addition, Maine should increase investments in technicians to install, repair, and maintain modern wood heating systems. In order to grow the technology, the heating systems will need to be installed and serviced by licensed professionals and currently there is a significant shortage of these technicians in the state.

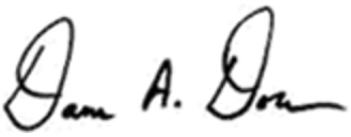
Landowners and logging contractors are struggling to find markets for their low-grade wood. This will have longterm impacts on landowners ability to own forestland and keep forest as forests, which could have long lasting impacts on carbon sequestration and achieving Maine's goals with respect to carbon neutrality.

By increasing marketing and workforce development for programs that will encourage the utilization of one of our greatest natural resources, the benefits would not only benefit the consumer, but the health of the forest and the entire supply chain. A revitalization of the low-grade markets would also do wonders for Maine's economy.

In closing, the Maine Energy Plan Draft is a good start, but it needs to do a better job of including ALL clean energy options. Wood has proven time and time again to be a reliable source for heat and electricity production. If wood is not part of this plan, it will be a disservice to the average Mainer, not to mention the wood products industry, which makes up a large portion of the economy in the state.

Thank you for your time and consideration of these comments and please do not hesitate to contact me with any questions or concerns.

Sincerely,



Dana A. Doran
Executive Director

REVISION ENERGY

December 30, 2024

Dan Burgess, Director
Governor's Energy Office
62 State House Station
Augusta, Maine 04333

VIA ELECTRONIC MAIL

RE: Maine Energy Plan – Draft for Public Comment

Director Burgess:

ReVision Energy Inc. (ReVision) offers these comments in response to the Governor's Energy Office's (GEO) invitation for public comment on the December 2024 "Draft Maine Energy Plan" (Draft Plan).

Founded in Maine twenty years ago, ReVision is an employee owned, certified B Corporation clean energy construction company. ReVision has grown to over 275 employees headquartered at its branches in South Portland and Montville. Guided by a mission to make life better by building our just and equitable electric future, ReVision has designed and constructed thousands of distributed energy resources (DERs) serving Maine households, municipalities, schools, and businesses. These installations span solar systems, battery energy storage, heat pumps, heat pump water heaters, and electric vehicle chargers. Together, these products enable our customers to take strides toward whole-home and whole-business electrification, supplied with renewable generation.

ReVision supports the objectives outlined in the Draft Plan as important steps to building Maine's electric future in a manner that benefits all energy consumers. The Draft Plan offers a useful summary of the harm that results from Maine's continued overreliance upon imported fossil fuels, including the exposure of Maine energy prices to volatile global markets. ReVision agrees wholeheartedly that a shift to local low-cost, renewable sources of electricity generation is essential to delivering the energy affordability and resilience needed to support continued economic growth and reduce household energy burden. The electrification of heating and transportation required to achieve Maine's emission reduction targets only adds to the urgency of investing in clean, affordable sources of generation to meet the projected load growth associated with this beneficial electrification. In finalizing the Maine Energy Plan, ReVision encourages the GEO to further clarify that DERs, including solar and energy storage, can be readily deployed to support the timely and cost-effective achievement of Maine's clean energy targets.

ReVision recommends that the GEO add a new "strategy" under "Objective C: Responsibly advance clean energy" that is specific to encouraging the cost-effective deployment of distributed solar and storage. This strategy is consistent with the findings of the draft Pathways to 2040 Technical Report (Technical Report) that higher adoption of DERs mitigates electricity system peak and lowers distribution costs (Technical Report at page 52). Key actions for the GEO could include coordination with stakeholders to develop improved mechanisms for incentivizing the time- and location-based targeting of DERs. Such actions could involve participation in efforts to advance rate design and distribution system planning that helps maximize the value of DERs to the grid, as well as efforts to leverage federal funding to enhance DER deployment. This strategy should also emphasize the important role that DERs can play in delivering renewable generation as a complement to the utility-scale facilities that are expected to comprise major portions of Maine's clean energy supply. Whereas larger projects, including planned offshore wind, still face major hurdles to development, the technology and workforce are already in place to accelerate the construction of distributed solar and storage across the state. Sustaining appropriate incentives for these DERs is critical to ensure that Maine adheres to its clean energy targets, including in the years preceding the completion of anticipated wind resources.

At minimum, ReVision would encourage the GEO to revise Strategy D under Objective C to better capture the value of DERs in delaying and avoiding the need for costly grid upgrades. For example, Strategy D could be updated to: "Advance efficient, necessary infrastructure to modernize Maine's energy systems and advance the deployment of DERs to reduce costs" (page 37). The actions noted above related to advancing incentives for targeted DER deployment could be added to the key actions already listed under this strategy.

ReVision also recommends that the GEO consider the following clarifications and additions to the Draft Plan:

- Objective B, Strategy D (page 30) describes steps to deploy energy storage and other DERs to advance community resilience and progress toward clean energy targets. The DERs described in this section are well-established and have been deployed to serve homes, businesses, municipalities, and nonprofit organizations across the state. The GEO could consider revising Strategy D to acknowledge the proven track record of the technologies and applications referenced in this section's key actions. For example, an updated heading could read: "Leverage established technologies including energy storage, DERs, and energy efficiency upgrades to increase resilience and reduce greenhouse gas emissions."

- Objective C, Strategy D (page 37) describes steps to modernize Maine's electric grid, including to enable the deployment of renewable generation. ReVision recommends expanding this draft strategy to address the critical obstacle that interconnection delays and costs poses to the achievement of Maine's clean energy targets. This addition is consistent with the Technical Report, which observes that improved interconnection processes can reduce project soft costs (Technical Report at page 68). The GEO could adapt the first bullet in this section to include key actions such as engagement with the utilities and other stakeholders to refine interconnection procedures, prioritize relevant distribution system investments, monitor trends in interconnection timelines, and advance innovative technologies to streamline the integration of new renewable capacity. At minimum, the final sentence in the first bullet could be revised to state: "This includes continued engagement with stakeholders and communities to evaluate and implement best practices with respect to clean energy siting, permitting, and interconnection" (page 37). Lastly, ReVision assumes that the first sentence of this key action is intended to state: "distributed energy resources."

ReVision appreciates the GEO's efforts to solicit feedback in the development of the Technical Report and the Maine Energy Plan. ReVision thanks the GEO for the opportunity to provide these comments.

Respectfully submitted,

/s/ Nat Haslett

Nat Haslett
Director of Utility & Regulatory Affairs
ReVision Energy Inc.
nhaslett@revisionenergy.com

Comments submitted by Linda Stathoplos

Thank you for assembling an updated draft energy plan for Maine with clear objectives.

Under "Objective C: Responsibly advance clean energy," page 34 references nuclear as a potential path for augmenting electricity generation, "to contribute to Maine's goal of reaching 100 percent clean energy by 2040." Nuclear is also first on p.35 in the list of ways to generate "zero- or low-emissions electricity resources."

New nuclear plants are very expensive, slow-to-complete ways to generate electricity. (See pages 13, 16, and 38 in https://gcc02.safelinks.protec□on.outlook.com/?url=https%3A%2F%2Fwww.lazard.com%2Fmedia%2Fxemfey0k%2Flazards-lcoeplus-june-2024_vf.pdf&data=05%7C02%7CSy.Coffey%40maine.gov%7C498ac38818bd4ec4f58408dd23688c87%7C413fa8ab207d4b629bcdea1a8f2f864e%7C0%7C0%7C638705654110009727%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMiIsIkFOIjoiTWFpbCIsIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=fxYm%2FosbWAtVGhzsvofviya7B4vYuCpim%2FiHqcejQws%3D&reserved=0, which provides levelized cost of energy estimates (LCOE) for different electricity generation options.) New nuclear plants do not provide a realistic, timely, affordable option for meeting Maine's Energy Plan objectives.

Suggesting new nuclear power plants can help Maine reach the goal of 100% clean energy by 2040 directly contradicts "Objective A: Deliver affordable energy for Maine people and businesses," and should not be included as a viable option for achieving Objective C. References to "nuclear" should be omitted on pages 34 and 35.

I appreciate the opportunity to comment.

Linda Stathoplos

Union of Concerned Scientists
ucsusa.org Two Brattle Square, Cambridge, MA 02138-3780 t 617.547.5552 f 617.864.9405
1825 K Street NW, Suite 800, Washington, DC 20006-1232 t 202.223.6133 f 202.223.6162
500 12th Street, Suite 340, Oakland, CA 94607-4087 t 510.843.1872 f 510.843.3785
One North LaSalle Street, Suite 1904, Chicago, IL 60602-4064 t 312.578.1750 f 312.578.1751

January 3, 2024

Dan Burgess, Director
Maine Governor's Energy Office
62 State House Station
Augusta, ME 04333

RE: Union of Concerned Scientists Comments on Draft Maine Energy Plan

Director Burgess,

Thanks for the opportunity to submit comments on the Draft Maine Energy Plan on behalf of the Union of Concerned Scientists (UCS). UCS is the nation's leading science based non-profit organization with more than a half a million supporters, including more than 2,500 in Maine.

Overall, the report provides a comprehensive picture of Maine's current energy landscape and a broad and compelling set of objectives, strategies, and actions to achieve Maine's climate and clean energy requirements. The objectives, strategies and actions are well-aligned with the updated climate action plan and other recent reports and analyses commissioned by the state.

I offer the following comments on how the report could be further improved in several areas:

Objective A: Deliver affordable energy for Maine people and businesses

- Under Strategy B, I would suggest adding an action from the climate action plan to set a target for reducing the energy burden for low-income residents by January 2026.

Objective B: Ensure Maine's energy systems are reliable and resilient in the face of growing challenges

- At the end of the introduction, I would suggest adding energy efficiency, distributed solar, storage, and microgrids to the list of priorities for improving the resilience and reliability of Maine's energy systems, as discussed in more detail under Strategies B, C, and D. I would also suggest prioritizing improved resilience and reliability for critical infrastructure (e.g. police, fire, hospitals, nursing homes, wastewater treatment plants, etc.) and vulnerable communities and populations.

- Under Strategy A, I would suggest quantifying the economic benefits to customers that improve resilience and reduce outages by adopting behind the meter storage. This could be done by using and regularly updating the analysis completed by E3 for the Maine Energy Storage Market Assessment.
- Under Strategy E, I would suggest mentioning CMP and Versant current efforts to conduct climate vulnerability assessments of their systems and identify key solutions and investments for improving resilience and reliability that will help inform future climate change protection plans and their broader grid plans.

Objective C: Responsibly advance clean energy

- I would suggest mentioning in the caption of Figure 26, a footnote, and/or the last paragraph on p. 32 that there is some uncertainty in the timing for the procurements for offshore wind, the Northern Maine REDP, and other new renewables. For example, it might be advantageous for Maine to start procuring offshore wind well before 2036 to take advantage of federal tax credits that are currently set to expire in the early 2030s and if offshore wind costs decline significantly as the supply chain and port infrastructure grows in New England and the rest of the U.S.
- In the discussion of the Pathways to 2040 Technical Report on page 33, I would also emphasize that the modeling showed that renewables (primarily wind and solar), storage, efficiency, electrification, and demand management are the key solutions for achieving the 100% clean energy by 2040 targets and reducing energy costs to consumers. For example, Figure III-6 on p. 30 of the draft Pathways to 2040 study shows renewables providing almost all of Maine's electricity generation in 2040 under the core pathway. The generation from "clean fuels" in thermal plants is barely visible on the graph after 2035. Wind, solar and other renewables also are projected to provide the vast majority of the region's generation, with existing nuclear generation and the use of clean fuels in thermal plants providing a slightly higher share than what is projected for Maine, as shown in Figure V-2 on p. 48 of the draft Technical Report. This context is important for informing the key actions and design of the 100% by 2040 CES under Strategy A.
- I would suggest clarifying that while the modeling assumed new nuclear was potentially eligible for the 100% CES, no new nuclear was built under any of the scenarios because it was more expensive than other alternatives (primarily wind, solar, and storage), as Dan Burgess highlighted during the December 16 webinar. The same is true for gas plants with carbon capture and storage (CCS). As stated on p. 32 of the draft Pathways to 2040 report:

    - *"The Core pathway selects wind and solar resources to meet load over alternative clean technologies available in the model (including new nuclear and gas plants with carbon capture and sequestration), as this approach results in the lowest energy supply costs subject to physical and policy constraints. This indicates that for Maine and greater New England, additional renewable generation—backed by storage and thermal generation for reliability—is the most economic option for satisfying growing electricity demand while achieving climate goals."* Footnote 78 goes on to say: *"There are some additional technological considerations that are not included explicitly in the modeling, but might make these alternative technologies less attractive, including immature technology with substantial uncertainty about availability, timing, and cost."* These important caveats and challenges should also be highlighted in the Maine Energy Plan.
    - The safety, security, technical, and economic challenges of deploying new nuclear plants are also discussed in this recent UCS blog about small modular reactors and this comprehensive UCS report from 2021, *Advanced Isn't Always Better: Assessing the Safety, Security, and Environmental Impacts of Non-Light-Water Nuclear Reactors*, by my colleague Edwin Lyman, Director of Nuclear Power Safety.
- I would also recommend clarifying that generation from existing nuclear plants in New England (Seabrook and Millstone) are currently under contract with utilities in other states, and they would not be eligible to contribute to a 100% CES in Maine unless the existing contracts were changed.
- The description of the potential role of using so-called clean fuels in thermal plants is unbalanced and does not acknowledge many of the important challenges and concerns of producing and using these fuels. For more details and examples of these challenges and concerns, see my November 18, 2024, comments on the draft Pathways to 2040 analysis.
- Under Strategy A key actions, the design of 100% by 2040 CES should also consider increasing Maine's class 1 RPS targets beyond 50% by 2030 (and the overall RPS targets of 80% by 2030), similar to what other New England states such as MA, RI and VT have done, as shown in Figure 27. This is also consistent with the results of the Maine Pathways to 2040 study, which showed wind and solar continuing to increase after 2030 and providing nearly all of Maine's generation by 2040.
- New renewables should also be allowed to compete in any new class created for other zero or low-emissions technologies (such as nuclear, clean fuels, and large-scale hydropower) to ensure that the CES targets are met at the lowest cost. These technologies should also be required to meet certain sustainability

criteria and include important safeguards to protect the environment and public health. A lifecycle analysis that accounts for emissions during production, transportation, and use should also be conducted for these technologies to ensure they are truly low or zero carbon.

Objective D: Deploy efficient technologies to reduce energy costs

- Under Strategy B actions, I would suggest adding the need to make load flexibility and demand-management programs more equitable by removing barriers and increasing participation from LMI households so they can realize the economic and reliability benefits from these programs.
- I would also suggest adding a new Strategy D that encourages greater EV adoption by Maine households and businesses by continuing or increasing state incentives/rebates for purchasing EVs and advancing other regulatory actions that could be pursued to increase EV adoption in Maine.

Thanks for the opportunity to submit comments on the Draft Maine Energy Plan.

Respectfully submitted,

Steve Clemmer
Director of Energy Research and Analysis
Climate and Energy Program
Union of Concerned Scientists
2 Brattle Square, 6th Floor
Cambridge, MA 02138
Tel: (978)-844-4531
Email: sclemmer@ucsusa.org

Comments submitted by David von Seggern

I attended the webinar today and had submitted comments on the draft of Pathways to 2040, but wish to make an additional comment here.

Figure III-1 of the draft report is very important in the context of the report, but the discussion around it fails to highlight perhaps the most important implication of the timeline of the figure. The figure predicts that overall demand for energy in the state decreases greatly toward 2040 largely due to phasing out fossil fuels. This is a clear reflection of the fact that burning fossil fuel to supply our energy needs is very inefficient compared to providing those supplies via electricity generated with renewable sources such as wind and solar. But equally important is that the elimination of fossil-fuels from our energy supply means that an enormous amount of money stays in Maine. Maine has no fossil-fuel sources, and a large part of every dollar spent on them is draining outof-state. These are dollars that can be spent to support Maine businesses, buy Maine products, and enable Maine farms. Although the report was not commissioned to deal with such an economic benefit, GEO should highlight it. This economic argument should sway those who are not so much convinced that global warming is human-caused largely through the burning of fossil fuels.

David von Seggern

Comments submitted by Bill Weber

The assumption that Maine will have 3 GW of offshore wind by 2040 is dubious as Europe seems to be scaling back their commitments to OSW. Yes, I understand that Maine is committed to Offshore wind development but at what price? One of the objectives of the Energy Plan was to keep costs down. The supply chain is not likely to recover as the Report states. This is wishful thinking. And with a diminished supply chain the cost will go up based on the law of supply and demand.

A contingency plan should be developed if the 3 GW assumption does not pan out. Was a "pathway" evaluated where OSW adoption is slowed or stalled? As a minimum a sensitivity analysis of the model should be performed if OSW adoption is stalled.

How often will the model be revisited as real world data becomes available?

I would appreciate a response to this comment. Thank you.

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Bill Weber