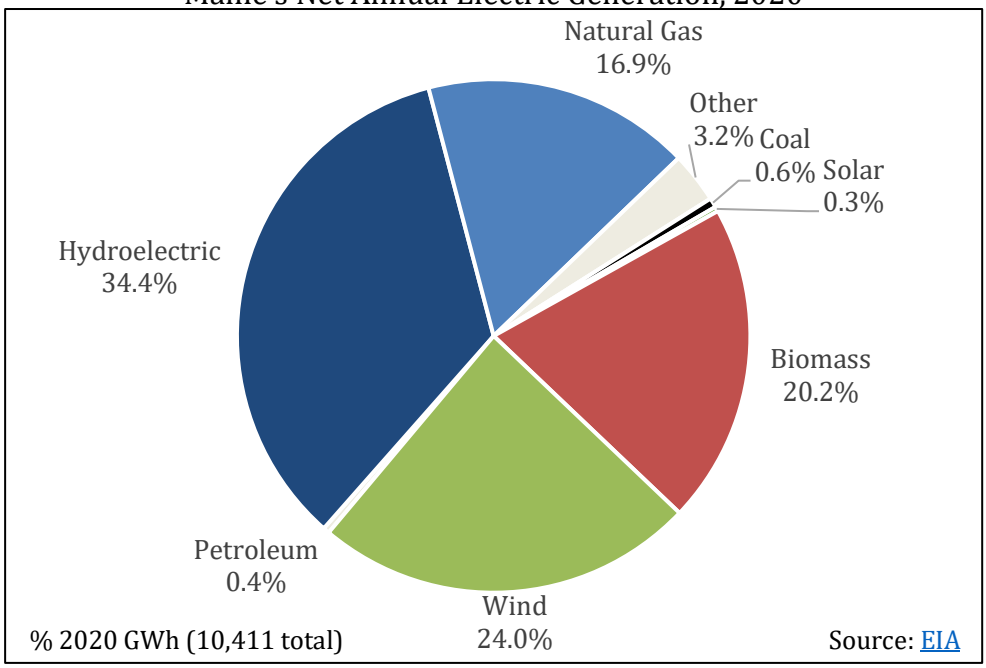
State Brief: Maine

BACKGROUND

Maine's Net Annual Electric Generation, 2020



Hydroelectricity supplies the majority of Maine's net electricity generation. Renewable resources, including hydropower, account for 4/5 of the Pine Tree State's net annual electricity generation. Maine is first in the nation in terms of electric generation from biomass sources.

The state is somewhat reliant upon natural gas, which is imported via pipeline from Canada. However, gas-fired generation capacity decreased significantly from 2016 to 2020, providing 30.3% of electricity in 2016 and dropping to approximately 17% in 2020. The generation gap was partially filled with new generation from wind, which jumped from 14.5% to 24% over the same period. Maine does not have widespread natural gas distribution infrastructure for residential heating, making the state one of the largest consumers of petroleum as fuel oil for home heating during the winter. Natural gas and electricity prices tend to peak during the state's winters. Due to mild summers, Maine's electricity consumption per capita is lower than the national average.

Maine has increased its wind generating capacity in recent years, and leads New England in installed wind capacity. The Maine Wind Energy Act of 2003 encourages development of wind energy in the state, and the legislature established goals of 2,000 megawatts (MW) of installed wind capacity by 2015 and 3,000 MW by 2030. In 2019, Governor Mills launched the Maine Offshore Wind Initiative to explore offshore wind development in the Gulf of Maine.

As of mid-2021, Maine had nearly 246 megawatts (MW) of installed solar capacity, ranking 29th overall in 2020. In 2020, the Solar Energy Industries Association (SEIA) ranked Maine 21st in the nation for projected solar energy capacity growth over five years at 1,597 MW. The 2020 U.S. Energy and Employment Report found that Maine has 8,946 traditional energy workers (1.4% of total state employment). In 2020, Maine ranked 44th nationwide for clean energy jobs (including jobs in energy efficiency and solar) and the industry employed 11,922 Mainers.[1]

The state's electric utilities are regulated by the three-member Maine Public Utilities Commission (MPUC). Commissioners are appointed by the Governor, who also selects the chair. Two current members were appointed by previous Governor LePage (R), the third commissioner was appointed in 2019 by the current governor. Governor Mills is a Democrat, and the state legislature features a Democratically controlled House and Senate.

[1] This is in addition to the number of traditional energy jobs in the state.

POLICY STRENGTHS AND OPPORTUNITIES

The National Renewable Energy Laboratory (NREL) developed the notion of "policy stacking,"[2] an important framework for policymakers to consider. The basic idea behind policy stacking is that there is an interdependency and sequencing of state policy that, when done effectively, can yield greater market certainty, private sector investment, and likelihood of achieving stated public policy objectives.

In theory, but not always in practice, clean energy policies can be categorized into one of three tiers of the policy stack. Tier 1, market preparation policies, remove technical, legal, regulatory, and infrastructure-related barriers to clean energy technology adoption. Tier 2, market creation policies, create a market and/or signal state support for clean energy technologies. Tier 3, market expansion policies, create incentives and other programs to expand an existing clean energy market by encouraging or facilitating technology uptake by additional market participants.

For example, before financial incentives for combined heat and power (CHP) will be successful, two key considerations for deployment are having clear interconnection standards and favorable stand-by rates for customers who opt to add CHP. In this example, states should adopt policies to address interconnection and stand-by rates before adopting financial incentive programs.

GRID MODERNIZATION

Digital technologies have enabled utilities to better manage the grid and provide opportunities for consumers to customize their services to fit their priorities. These technologies allow a two-way flow of information between the electric grid and grid operators and between utilities and their customers.

Emerging technologies improve system reliability and resiliency by enabling better tracking and management of resources. These technologies allow grid operators to incorporate central and distributed energy resources, energy storage technologies, electric vehicles, and assist in addressing the challenges associated with planning, congestion, asset utilization, and energy and system efficiency.

On the customer's side of the meter, dynamic pricing, advanced metering infrastructure, and other technologies allow an exchange of information and electricity between a consumer and their electric provider. Grid modernization is associated with greater consumer choice by allowing customers to meet their energy priorities by producing their own energy or through contracting innovative clean energy services from different providers.

Grid modernization will require a suite of state and federal policy changes to support advancements in grid technologies, grid management, and utility regulation.

Maine's state legislature passed the Smart Grid Policy Act in 2010, which established a framework for developing a comprehensive grid modernization policy and articulated a suite of policy goals, including improved reliability, security, and efficiency of the power system, integration of renewable generation and energy storage, and availability of energy usage data. In 2017, the MPUC made amendments to interconnection procedures for small generators and reviewed applications for non-transmission alternatives pilot projects. The MPUC also initiated a proceeding to consider whether IOUs can own microgrid assets. No decision has been made on that issue to date. While there is no dedicated grid modernization plan in place, the State Energy Plan recommended taking actions to reduce residential heating bills/electricity prices, limit greenhouse gas (GHG) emissions, and streamline renewable energy policies. Many of these recommendations were addressed in the 2019 legislative session, which focused heavily on climate and clean energy policies.

There are policies that Maine's policymakers could adopt to support in-state modernization efforts.

1. Require that utilities develop plans to enhance cybersecurity, integrate distributed energy resources (including electric vehicles and energy storage), and measure and report on the results of grid modernization efforts. States may also decide to require that utilities propose a ten-year grid modernization plan within a specified timeframe. Utilities would then be required to implement that plan within another specified timeframe. Strategies and/or

[2] V.A. Krasko and E. Doris, *National Renewable Energy Laboratory*, 2012. Strategic Sequencing for State Distributed PV Policies: A Quantitative Analysis of Policy Impacts and Interactions. http://www.nrel.gov/docs/fy13osti/56428.pdf.

plans should outline a clear set of grid modernization goals and describe methods to measure, report, verify, and enforce progress towards those goals.

2. Maine, a state with extensive deployment of smart meters, has established policy regarding customer data access and privacy protections. The state requires that utilities make customer usage data available to individual customers, and the independent organization Efficiency Maine has statutory authority to request energy use data for the implementation of energy efficiency programs. Third party organizations have limited ability to use customer data, but the state's largest IOU, Central Maine Power, has implemented the Green Button Connect program, a platform for downloading and sharing energy use data to approved third parties. The state could extend customer data access requirements to include all utilities and ensure that the statute or code clarifies who owns the energy data associated with customer energy usage, protects customer privacy, outlines the process for allowing direct access to data by third parties, and promotes access to the highest resolution of data possible. Enacted in 2019, LD 581 directs utilities to provide customer usage data on billing statements.

3. State departments of workforce services or their equivalent can be directed to work with utilities and other stakeholders to develop training programs for grid technicians and engineers. With new grid technology and distributed energy systems coming online, a new generation of workers can be trained to meet evolving needs, which will keep jobs local, and contribute to economic development.[3]

The adoption of incentives for or a requirement to integrate a certain amount of energy storage on the grid alongside enhancing renewable energy and electric vehicle policies can support modernization efforts and improve the chances of successful grid modernization.

ENERGY STORAGE

Energy storage offers a unique opportunity to manage supply and demand dynamically while also maximizing the value of grid resources. By deploying storage to strategic locations, utilities can more effectively manage their energy portfolios. First, storage allows utilities to manage intermittent demand – helping reduce peak demand requirements. Because the generation resources that provide peak power are the system's most expensive, reducing peak demand can save consumers money. Second, the responsiveness of energy storage can allow utilities to implement voltage regulation and other ancillary services, which are useful for improving system efficiency. Third, because storage technologies can both store and dispatch power, storage enables better integration of intermittent power generation resources like renewable energy to the grid. Finally, energy storage can help the commercial sector avoid costly demand charges. As utilities around the country consider implementing or extending demand charges to other sectors, energy storage will become more relevant as a customer cost-saving investment.

The flexibility of battery storage, combined with advanced metering infrastructure, allows customers to control, for instance, how and when they use energy from the grid or from solar panels installed on their home or business. In most cases, this can provide greater cost savings than standalone solar systems. Combined with time-varying rates or real-time pricing programs, state policy can further support customer choice and open a new market for energy services. Prices that better reflect the time-varying and location-dependent costs of producing and delivering electricity can lead to several economic and environmental gains.

Two major trends have enabled increased deployment of energy storage: declining costs and technological advances. State policies can help maximize these benefits by establishing both a framework for easy integration of energy storage resources onto the grid and a marketplace that monetizes the benefits of energy storage for cost-effective investment.

Maine is exploring methods to expand the deployment of energy storage. Enacted in the 2019 regular session, LD 1614 created a legislative commission to study the economic, environmental, and energy benefits of energy storage to the electric power industry. Furthermore, pursuant to the Smart Grid Policy Act, the MPUC opened a docket in 2016 on the development of a non-transmission alternative corridor, which would incorporate the "deployment and

[3] For a discussion of specific workforce needs that states might explore see: GridWise Alliance and U.S. Department of Energy. 2020. "Grid Modernization Index Insights into a Transformation: Principles for the Next Decade of Progress."

development of advanced electricity storage and peak shaving technologies." The docket was closed in 2018, and the MPUC ordered Central Maine Power and Emera Maine to file rate proposals that would provide incentives for non-wires alternatives (NWAs). In 2021, the state passed LD 528, "An Act to Advance Energy Storage in Maine." The bill sets an energy storage target of 300 MW of installed capacity by 2025 and 400 MW by 2030. The bill also instructs the Efficiency Maine Trust to conduct an energy storage pilot program to begin in 2022. The pilot program will provide energy storage systems to critical care facilities to support operations during outages and emergencies.

There are several policy opportunities to take advantage of the growing technological advances in and declining costs of energy storage. The recommendations here draw heavily from the Interstate Renewable Energy Council's (IREC) 2017 report, "Charging Ahead – An Energy Storage Guide for Policymakers." Policymakers in Maine could consider the following:

1. Amend existing interconnection and net metering policies to ensure that storage can connect to the grid through a transparent and simple process. IREC has produced a series of protocols that states can adopt. States can establish best practices for interconnection and net metering in statute, or legislation can provide an instruction to the utilities commission to implement these best practices.

2. Require the inclusion of energy storage as a critical piece of the energy system as both a demand and supply management resource. Some states have required that utilities evaluate the cost effectiveness of NWAs to large transmission and generation investments. Alternatively, the state might want to require that utilities develop a distribution investment plan that identifies the locations on the distribution system where energy storage or other distributed resources would offer the greatest value. Maine made major advances to support NWAs with the enactment of LD 1181 in 2019, which requires utilities and the MPUC to consider non-transmission alternatives prior to the approval transmission or distribution projects.

3. Finance and incentivize energy storage for customers and utilities. Incentives could enable customers to use storage to manage their electric load and store locally produced renewable energy. Incentives in the form of rebates, grants, and tax credits can provide a bridge to scalable deployment for storage. Incentives can be designed to decline as storage values become more readily monetized and/or as the cost of storage decreases. Policymakers could allow utilities that provide incentives to customers to recover the costs of installing smart meters. This would enable dynamic and time-varying energy management from multiple distributed battery systems. This should signal to customers the value of leveraging storage while better aligning customer costs with system costs. Financing energy storage installations for commercial customers could help reduce their demand charges. Policymakers might want to start first with a policy that provides grants to pilot projects. Policy might also target solar system owners. Financial incentives should be designed to ensure that the state will meet other goals including emissions and peak demand reductions, and equitable access to clean energy.

MAINSTREAMING RENEWABLES

As the renewable energy industry matured, technology improved, and global production of generating equipment increased. Renewable energy is increasingly seen as the least cost and lowest risk form of energy (excluding energy efficiency). A 2021 Energy Information Administration report predicts that the share of the United States' electricity generation mix supplied by renewable energy resources will increase from 21% in 2020 to 42% by 2050. With increased deployment, utilities are learning more about how to integrate renewables effectively, investors are becoming more comfortable with the technologies, and building code officials are recognizing common standards and best practices. For these reasons, it is in the interest of policymakers to ensure that their states are well positioned to benefit from the transition to clean and sustainable energy resources.

To reduce barriers to customer and utility participation in the renewable energy market, policymakers in Maine might consider several policy options.

Customer-Oriented Policies

1. **Interconnection, Net Metering, and Streamlined Permitting** – In general, customers want a clear, streamlined, affordable, and predictable system for connecting renewable energy systems to the grid. In 2017, the MPUC replaced the state's net metering program with a "buy-all sell-all" policy, which removed retail rate compensation. Maine restored the state's net metering policy with the passage of LD 91 in 2019, guaranteeing

that net metering customers will be credited at the full retail rate for excess electricity sent back to the grid. The state might also consider establishing either statewide standards for streamlined permitting processes, or resources to support local governments that voluntarily implement a streamlined program. State incentives, such as tax credits, financial incentives, or loans can be tied to systems that are established within a designated streamlined permitting jurisdiction.

2. **Shared Renewables** – Due to building and property attributes and ownership issues, many customers are unable to install renewable energy technologies where they live or work. Allowing shared, or community, renewable energy projects addresses these barriers. These projects have multiple owners or subscribers who pay for a portion of the project or the generation provided by the system. Maine's legislature directed the MPUC to create a Community-Based Renewable Energy Production Incentive pilot program 2009, which expired at the end of 2018. Under the program, the development of community solar gardens was encouraged by incorporating a 1.5 compliance multiplier for solar generation under the state's RPS. The state also adopted virtual net metering in 2012 under their net energy billing policy to enable shared ownership of renewable facilities. Virtual net metering allows a customer to receive credits from a shared system as if the generation were on site. Virtual net metering is different from a power purchase agreement (PPA), which pays the customer for the proportion of power they produce. Because it is treated as a credit on the customer's bill, the customer can avoid the tax implications of a PPA payment - which can adversely affect the economics of the system (and may come as a surprise to the participant). Maine improved upon its shared renewables policy in the 2019 legislative session with the enactment of LD 1711, which increased the system size limit to five MW from the previous maximum capacity of 660 kilowatts (kW). The bill also calls for the development of 400 MW of distributed solar, 150 MW of which will be supplied by "large-scale shared distribution resources."

   Low credit ratings often deter participation in renewable energy markets; this can affect low- and moderate-income (LMI) households' adoption of renewable energy solutions. Supportive policies for shared renewables can be designed to encourage participation by LMI households; this can increase adoption of renewable technologies and reduce energy costs. Low-income participation can be encouraged either through a percentage mandate for the overall annual contracted capacity, or by offering a higher rate of payment for the portion of shared solar capacity attributed to low-income customers. States that have a shared renewable program may want to coordinate this program with implementation of the federal Weatherization Assistance Program to provide recipients of assistance with participation in a shared renewable system.

   There are several additional policy options that Maine might consider to promote renewable energy uptake by low- and moderate-income consumers. Generally, successful state policies should be tailored to these customers, be cost-effective and financially sustainable, have measurable performance indicators, and be flexible enough to allow later changes in design.

3. **Corporate Procurement** – Many Fortune 100 and 500 companies have established either climate goals or commitments to purchase renewable energy. Since 2016, nearly 31 gigawatts (GW) of renewable contracts have been announced by corporate entities. In 2020 alone, corporations signed 100 agreements for over 10 GW of renewable energy. Maine was ranked 18th overall in the Retail Industry Leaders Association's 2020 rankings of state corporate procurement policies. Maine's policy allows companies to own shares in shared renewable projects, develop or lease onsite renewable energy projects, access competitive wholesale markets, and allows for retail choice in selecting electricity provider. Maine was ranked 18th overall in the Retail Industry Leaders Association's 2020 rankings of state corporate procurement policies. Maine might consider allowing companies to purchase renewable energy credits (RECs) or renewable energy through a green tariff to expand its renewable energy market, using the Corporate Renewable Energy Buyers' Principles as guidelines for designing a renewable energy standard offer. It is prudent to incorporate corporate renewable procurement commitments into long-term planning. By accounting for renewable purchase commitments prior to issuing a request for long-term contract proposals, utilities can avoid over-building resources and stranding generation assets.

Utility-Oriented Policies

Some states have created programs that aim to reduce greenhouse gas (GHG) emissions and increase investments in clean energy resources. Maine's original RPS was adopted in 1997 as a part of the state's electricity restructuring law and has been amended over time to account for different classes of renewable resource types. While the most

recent MPUC report found that utilities were on track to meet RPS goals, the state adopted new portfolio standards in 2019 as part of Governor Mill's rigorous clean energy agenda. LD 1494 requires 100% of retail electricity sales to be from renewable sources by 2050 and establishes an interim target of 80% renewables by 2030.

In 2019, policymakers in Maine adopted GHG emissions reductions targets of 45% below 1990 levels by 2030 and 80% below 1990 levels by 2050 (LD 1679). Maine is a member of the Regional Greenhouse Gas Initiative (RGGI), an emissions trading scheme that reduces the region's carbon emissions and incentivizes the development of energy efficiency measures and renewable energy projects. Efficiency Maine Trust directs revenue from carbon credit auctions toward energy efficiency investments and carbon reduction programs. LD 1657, passed in the 2018 session, updated the state's carbon allowance budget by requiring 2.5% reductions annually starting at 2022 compared with the 2014 base year budget. AVANGRID has set a goal to reach carbon neutrality by 2035.

To increase utility adoption of clean energy technologies, Maine's policymakers might consider adopting a clean peak standard**.** Clean Peak Standards aim to increase the share of clean energy resources used to meet peak demand and decrease energy bills over the long-term by reducing peak demand in the hours when energy costs are highest. These objectives can be met through different policy options, including planning and procurement that focuses on peak demand; a moratorium on the construction of new peaking units or a phase out of existing units; incentives – including carve-outs in states with RPSs – for clean energy resources delivered during peak times; and/or adopting a new clean peak standard that sets a target for clean energy deliveries during peak times.

ELECTRIFICATION OF THE TRANSPORTATION SECTOR

An estimated 58% of new car sales will be electric by 2040. Therefore, a key part of building a modernized grid involves designing infrastructure that will facilitate easy connection of electric vehicles (EVs) to the grid. One of the most important barriers to increased adoption of EVs is the consumer's awareness of the availability of EV charging stations. Ultimately, drivers want to be sure that their car will get them where they need to go. The good news is that both supportive policies for developing charging infrastructure and technological advancements have eased "range anxiety."

Maine has a number of programs to incentivize the purchase of EVs and the installation of EV charging equipment. Efficiency Maine Trust offers rebates for the purchase or lease of a qualified EV (set to expire December 2021). The Trust also offers rebates to government and non-profit entities for the purchase of EV charging equipment. Both programs are supported by funding from the Volkswagen settlement. The Maine Climate Council has set a state goal for 41,000 light-duty EVs on the road in Maine by 2025 and 219,000 by 2030. The state has also adopted California's zero emissions vehicle (ZEV) and low emission vehicle (LEV) requirements and standards. The American Council for an Energy-Efficient Economy (ACEEE) published a State Transportation Electrification Scorecard evaluating 29 states' progress in electrifying transportation in six key policy areas. Maine ranked 17th in the 2021 report.

There are policy opportunities to further encourage and prepare for increased market penetration of EVs in the state, including:

1. **EV and EV Charging Equipment Financing and Financial Incentives –** Providing additional financial incentives and innovative financing options can help spur greater market penetration of EVs. Sales, property, and income tax credits are some of the simplest methods for addressing high up-front costs of EVs and EV charging equipment. While sales tax credits are typically applied at the time of purchase, property and income tax credits may do less to address upfront cost barriers as the credit is not applied at the time of purchase.[4] States have adopted other financial incentives including low-interest loans and grants. A handful of states qualify EV charging equipment under their property assessed clean energy (PACE) programs. A simple solution is to increase and expand existing tax credits to incentivize commercial, publicly available charging stations.

2. **Charging Infrastructure Plan –** Locating charging infrastructure is different from locating conventional fueling stations. While some drivers will need to charge more quickly, others will refuel when they are parked for longer periods of time, for example when shopping at the mall or going to work. Charging infrastructure plans should attempt to pair the appropriate level of charging (level 2 or direct current fast charging) with a reasonable amount of time a person will be at that location. Legislation could direct a state agency to develop an

[4] A study by the Congressional Research Service suggests that tax credits are important tools for ensuring increased adoption of alternative-fueled vehicles.

infrastructure plan through a stakeholder process. Executive Order 36 (2021) directed state agencies to develop a Clean Transportation Roadmap to 2030. The Roadmap, expected December 2021, will outline policy changes necessary to meet Maine's transportation emissions and EV deployment goals.

Regional collaborations are emerging around the U.S. to promote EVs and coordinate the development of charging infrastructure. In May 2018, Maine joined 11 other states and the District of Columbia to release the Northeast Corridor Regional Strategy for Electric Vehicle Charging Infrastructure. The states in this region, from D.C. to Maine, will collaborate to invest in public EV charging infrastructure, promote EV sales across the region, and develop complementary policies and programs. Maine is also a member of the Transportation and Climate Initiative (TCI) of Northeast and Mid-Atlantic States, which is exploring regional policy options to reduce emissions from the transportation sector. The Mills administration is utilizing VW settlement funds to target emissions reductions from the transportation sector by installing charging networks across major transportation corridors. In 2020, Maine joined 14 other states and the District of Columbia in signing an MOU to support the deployment of medium- and heavy-duty ZEVs. Maine has also signed on to the Multi-State Zero Emission Vehicle (ZEV) Task Force, a collaboration of 10 states aimed at supporting the increased deployment of ZEVs.

3. **Parking Infrastructure Requirements** – In tandem with the development of a statewide plan, legislation could set requirements for EV parking infrastructure. Some states have adopted permitting standards for parking lots, requiring, for instance, that for every 100 parking spaces, there must be at least one EV charging space. Legislation could also incentivize utilities to develop make-ready locations. These locations supply power to the point where a utility or third-party developer might install an EV charging station. Maine's statewide building energy code could also be updated to include requirements for EV charging infrastructure.

NEWS

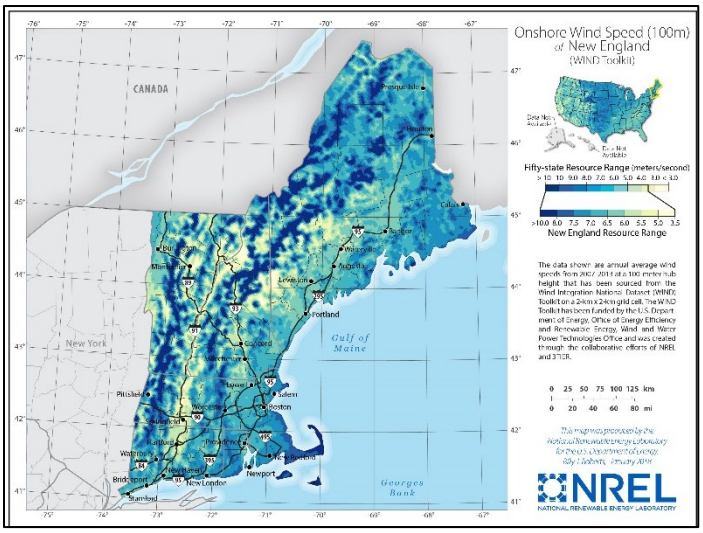
- July 2, 2021: Offshore Wind Compromise Lands on Governor Mills' Desk
- June 30, 2021: Bill to Jumpstart Northern Maine's Renewable Energy Industry Earns Janet Mills' Signature
- June 29, 2021: PUC Awards New Round of Maine Clean-Energy Projects
- June 24, 2021: Legislators Hope to Make Northern Maine a Hub of Renewable Power Exports
- June 24, 2021: Maine Becomes 9th US State to Adopt Energy Storage Deployment Target
- June 19, 2021: Maine Homebuilders are Preparing for New Energy-Efficient Building Codes
- June 16, 2021: House Advances Cuddy Bill to Build Strong, Diverse Clean Energy Workforce
- June 16, 2021: Maine Utility Regulators Can't Consider Climate in Their Decisions. A Bill Headed to The Governor Can Change That
- June 15, 2021: Energy-Efficient, Affordable Housing Could Be Coming to Maine
- May 27, 2021: Advocates Say Maine Needs to Expand Time-Of-Use Rates to Hit Climate Goals
- May 11, 2021: Maine Lawmakers Consider Charging Ratepayers for Some Offshore Wind Development
- May 4, 2021: Clean Energy Megaprojects, Including in Maine, Divide Environmentalists
- February 19, 2021: After Texas Blackouts, MPUC Will Look at Climate Demands for Maine's Electricity Grid

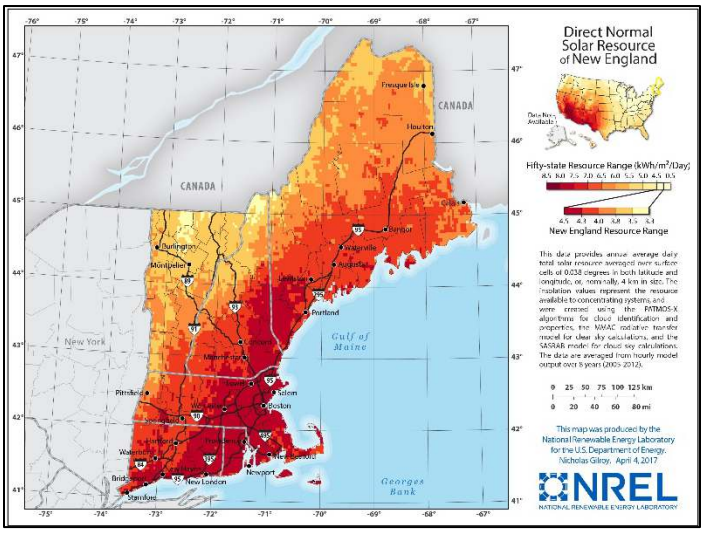
OTHER RESOURCES

- Maine Governor's Energy Office: http://www.maine.gov/energy/
- American Wind Energy Association (AWEA): https://www.awea.org/resources/fact-sheets/state-facts-sheets
- The American Council for an Energy-Efficient Economy State and Local Policy Database, Maine: https://database.aceee.org/state/maine
- The Database of State Incentives for Renewables and Efficiency, Maine: http://programs.dsireusa.org/system/program?state=ME
- U.S. Energy Information Administration, Maine: https://www.eia.gov/state/?sid=ME
- National Renewable Energy Laboratory Biomass Maps: https://www.nrel.gov/gis/biomass.html
- U.S. Department of Energy's Alternative Fuels Data Center, Maine: https://www.afdc.energy.gov/states/me
- SPOT for Clean Energy, Maine: https://spotforcleanenergy.org/state/maine/

NEW ENGLAND'S WIND AND SOLAR RESOURCES

WIND https://windexchange.energy.gov/states/ME





Our Resources

CNEE Homepage: http://cnee.colostate.edu/

The SPOT for Clean Energy: https://spotforcleanenergy.org/

The Advanced Energy Legislation (AEL) Tracker: https://www.aeltracker.org/

CNEE Contact Information

Tom Plant, Senior Policy Advisor
Tom.Plant@colostate.edu

Trina Hoffer, Research Manager
Katerine.Hoffer@colostate.edu