Chapter 10

Energy

KENNEBUNKPORT COMPREHENSIVE PLAN 2030
Volume 2

May 2022

Rendering of New England Aqua Ventus, a 12 MW pilot project 3 miles off of Monhegan Island. Courtesy of the University of Maine's Advanced Structures Composites Center.

Introduction

The Energy Chapter is a new addition to Kennebunkport's Comprehensive Plan. In an era of unprecedented climate change, the Town recognized that a changing climate requires an examination of the conventional means of sourcing and utilizing energy to remain consistent with the community's broader goals.

It also bears noting that the State of Maine recently adopted several bold policy initiatives in an effort to reduce greenhouse gas emissions. It is in Kennebunkport's best interests to be cognizant of those initiatives, and where deemed appropriate by local residents, to align the town's Comprehensive Plan with the state's new policies.

Maine in a Regional & National Context

The Energy Information Administration (EIA) provides summaries of energy production and consumption for all fifty states. The EIA's latest summary for Maine includes the highlights that follow. See page 2_ for sources.

Energy Production

Although the state's forests, rivers, and winds provide Maine with substantial renewable energy resources, the state has no fossil energy reserves or production.

Energy Consumption

More than one in 10 Maine households heat with wood.

Maine has New England's most energy-intensive economy. Heating needs during the winters, along with the energy consumption in the state's transportation and industrial sectors, give Maine the highest per capita energy use in New England.

Home heating and transportation fuel consumption make Maine one of the most petroleum-dependent states in the nation. Maine has the highest per capita petroleum consumption in New England.

In addition to the wide use of petroleum in the state's transportation sector, nearly two-thirds of Maine households use fuel oil as the primary energy source for home heating, a larger share than in any other state.

Half of the energy used in Maine is consumed as petroleum, the largest source of energy for the state.

Energy Consumption

Maine's heavy use of fuel oil for home heating makes the state particularly vulnerable to supply disruptions and price spikes during the winter months.

The industrial sector's share of Maine's energy consumption is greater than in each of the other New England states.

ISO New England

Most of Maine is a member of the Independent System Operator New England (ISO-NE). The northern part of the state is not part of ISO New England, rather the region draws much of its electricity from transmission lines that run through Canada.

Electrical Generation

In 2018, about three-fourths of Maine's electricity net generation came from renewable sources (see Figure 10-7). Almost one-third of the state's total net generation came from hydroelectric dams, and slightly more than one-fifth each from wind turbines and biomass generators that primarily use wood and wood waste. Nearly one-fifth of net generation came from natural gas, and a small amount of Maine's net generation, less than 5%, came from petroleum, coal, and solar power combined.

Maine is one of a half dozen states that produce more electricity from petroleum than from coal.

Although Maine sends a small amount of its electricity to the New England grid, the state's generation does not meet in-state demand. Maine imports more than one-fourth of its electricity supply from Canada.

Natural Gas

Because of its small population and lack of distribution infrastructure, Maine's natural gas consumption is among the lowest in the nation, and in 2017 it was the fourth lowest among the states on a per capita basis.

Almost all of the natural gas consumed in Maine is used in electricity generation and in industry.

About 1 in 13 Maine households use natural gas as the primary home heating fuel.

Biomass

Biomass typically supplies between one-fifth and one-fourth of the Maine's net generation, the largest share of any state, placing Maine among the top U.S. producers of electricity from wood and wood waste-derived fuels, such as wood pellets.

Hydroelectric Generation

More than half of Maine's electricity net generation comes from hydroelectric dams and wood-based biomass. Hydroelectric turbines produce almost one-third of Maine's net generation, the second-largest share, after Vermont, of any state east of the Mississippi River.

By the mid-1980s, Maine was home to nearly 800 dams, many of which were capable of generating electricity.

Tidal Power

A facility in Cobscook Bay was the first U.S. tidal power generating facility to produce electricity.

Wind Power

Maine leads New England in wind-powered generation and ranks sixth in the nation in the share of its electricity generated from wind.

In 2018, Maine's wind turbines produced more than one-fifth of the state's total net generation and accounted for two-thirds of all wind-powered generation in New England.

Maine had more than 900 megawatts of installed generating capacity from nearly 400 wind turbines at the beginning of 2019.

Most new generating capacity planned in New England is wind-powered, and most of the onshore wind facilities will be located in Maine.

Solar

Maine's first utility-scale (1-MW or greater) solar photovoltaic (PV) generation facilities went online in 2017:

A 5-megawatt, 16,000-panel solar array in Madison and

A 1.5-megawatt, 5,300-panel solar array at Colby College in Waterville.

Greenhouse Gas Emissions

Maine is a member of the northeastern Regional Greenhouse Gas Initiative, a group of nine states committed to the reduction of carbon emissions from power generation.[1]

With its limited use of both coal and petroleum for electricity generation, Maine is among the states with the lowest carbon emissions.

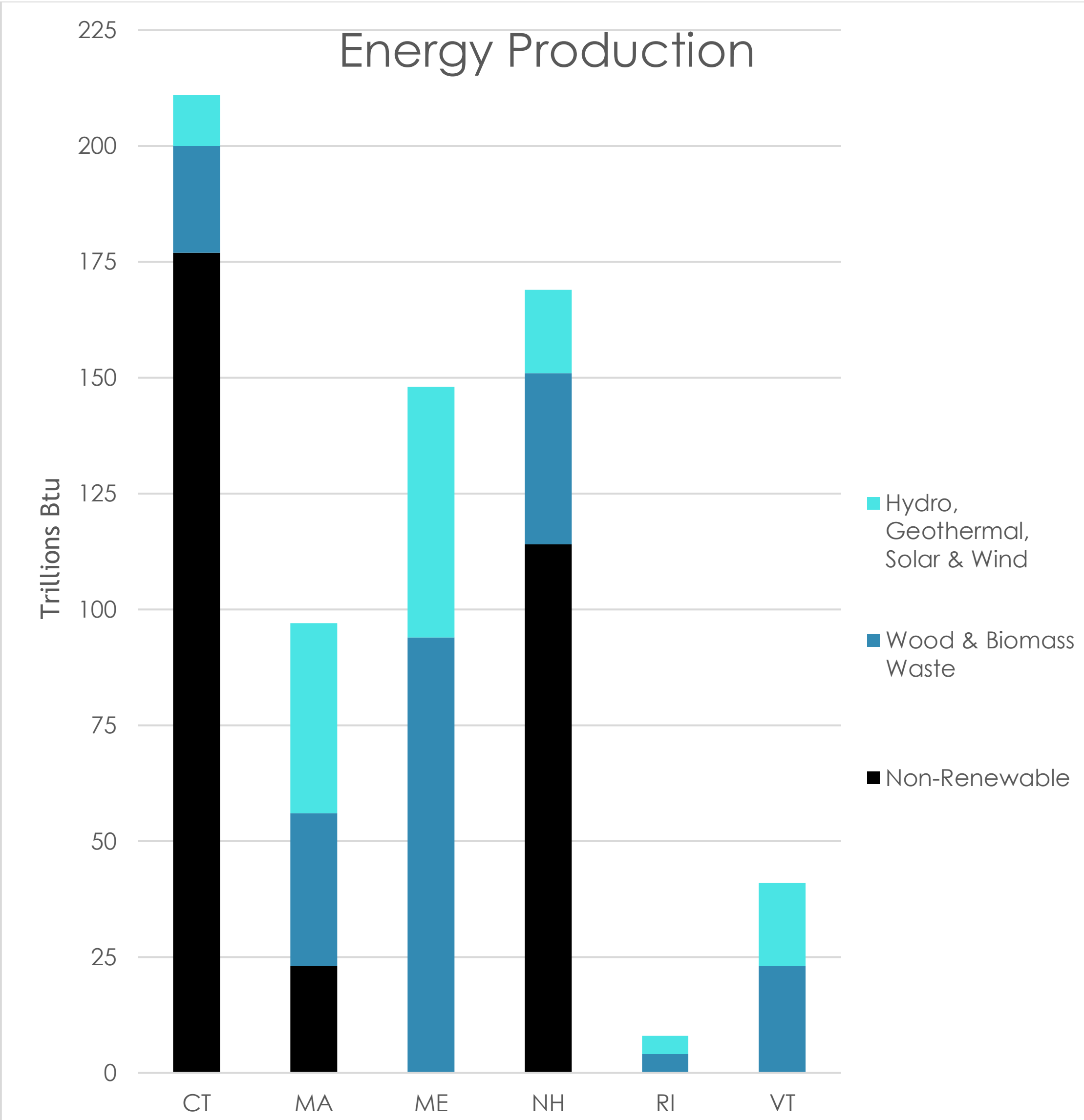

Figure 10-1 New England Primary Energy Production 2019. Source EIA Table P5B, Primary Energy Production Estimates, Renewable and Total Energy, in Trillion Btu, Ranked by State

Energy Sources

Maine's indigenous sources of energy include biomass, wind, solar, and geothermal, all of which are renewable.[1] Figure 10-1 displays a comparison with other New England States.[2] Maine extracts no fossil fuels from its territory, so all such fuels consumed in Maine are imported.

British Thermal Unit (BTU)

The amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit.

In 2019, Maine produced 148 trillion BTU's (44th in the US), and consumed 384 trillion BTUs, for a net import of 246 trillion BTUs.[3]

In 2019, Mainers' consumption per capita was 285 million BTU (30th in the US), which amounted to $4,359 per person (13th highest in the US).[4]

Energy Consumption

Maine's energy consumption is displayed below.

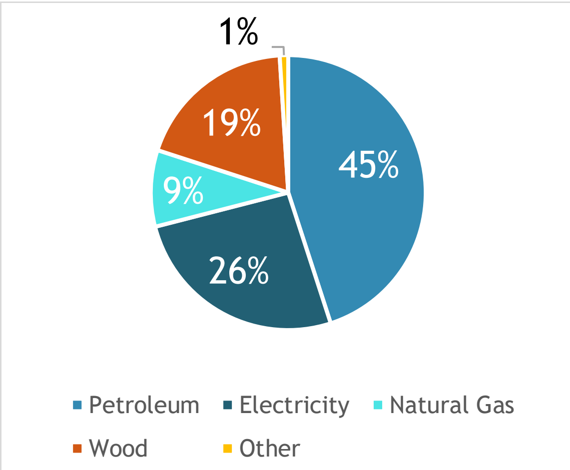

Figure 10-2 Maine Energy Consumption by Fuel Type 2019. Source: EIA Table C4. Total End-Use Energy Consumption Estimates.

Table 10-1 Maine Energy Consumption by Fuel Type 2019. Source: EIA Table C4. Total End-Use Energy Consumption Estimates.

Fuel	Billion Btu
Petroleum	172,300
Electricity	98,900
Natural Gas	36,500
Wood	73,700
Other	2,300

For comparative purposes, the EIA classifies energy consumption into four sectors, as seen in Figure 10-4 below. This chart highlights Maine's reliance on petroleum products, particularly in the residential and transportation sectors.

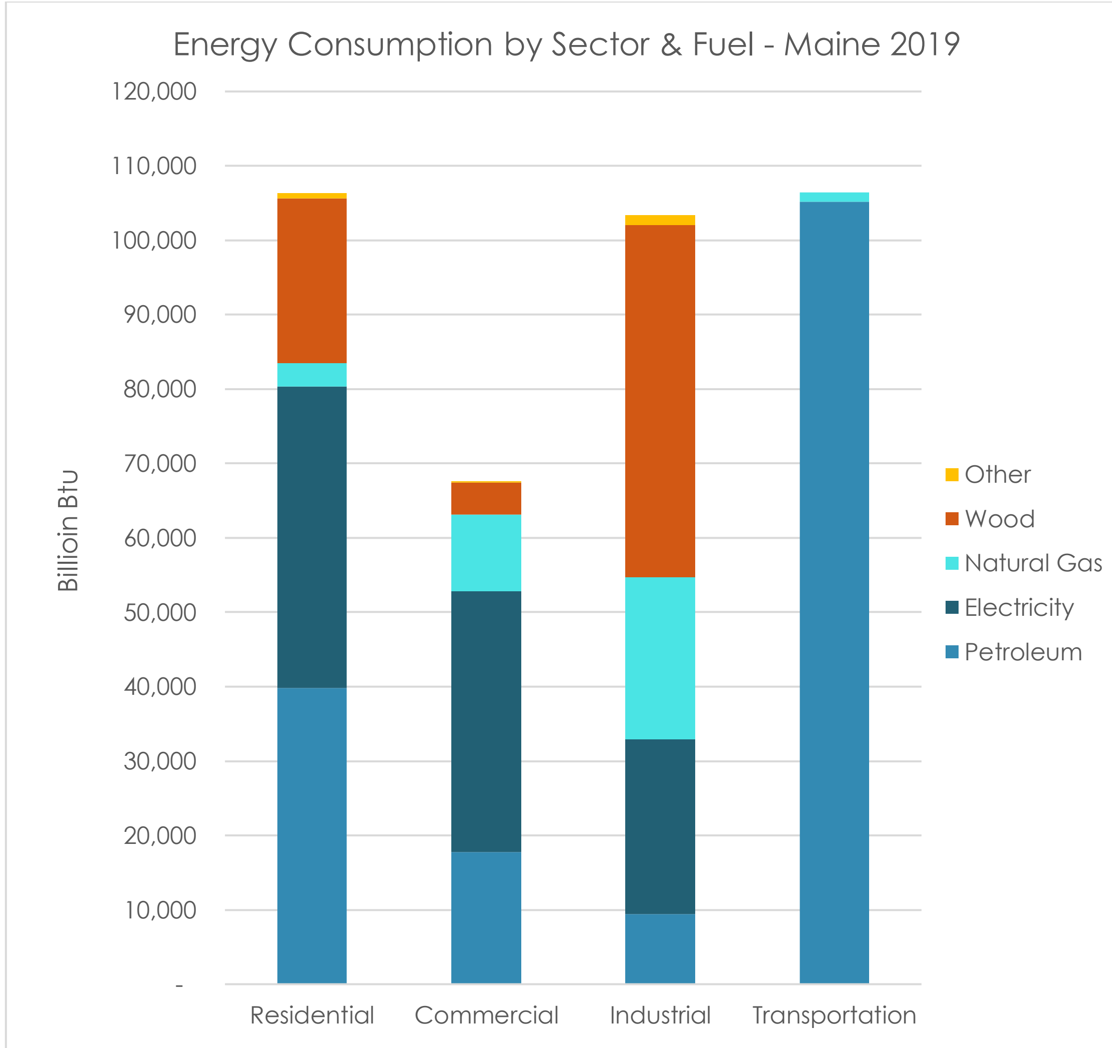

Figure 10-3 Maine Energy Consumption by Sector & Fuel 2019. Source: EIA, Tables CT4, CT5, CT6 & CT7

Figure 10-4 reveals the extent to which the New England states, and particularly Maine, are reliant on petroleum. Maine leads the nation in the percentage of homes that utilize oil for heating.

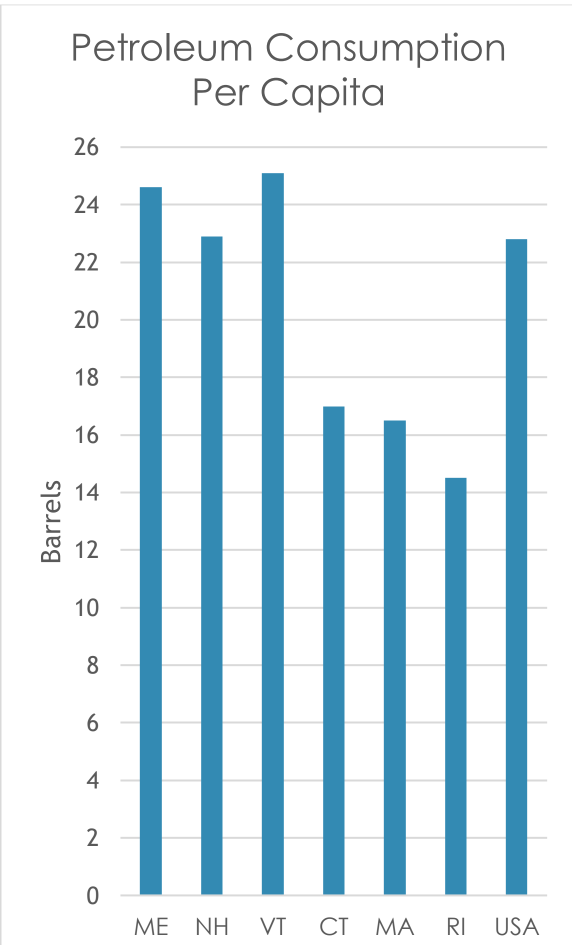

Figure 10-4 Residential Distillate Fuel Oil Use Per Capita 2019. Source: EIA, Table C15.

Figure 10-5 shows the types of fuel utilized to heat Kennebunkport homes in comparison to those in York County and in other New England states.

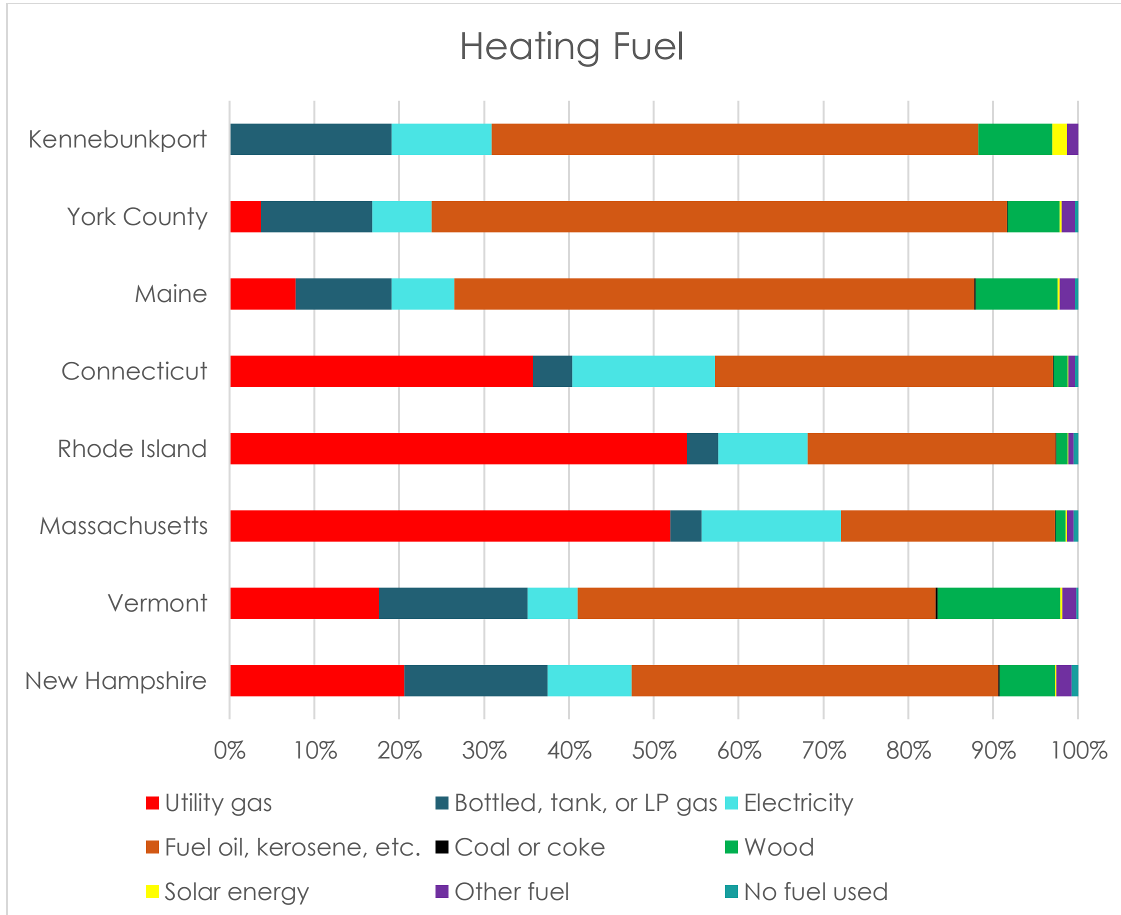

Figure 10-5 House heating fuel. Source: 2020 ACS 5-Year Estimates, Table DP04.

As seen above, the prevalence of liquified petroleum (LP) gas is greater in Kennebunkport than in the county and state.

MMBTU = 1 million BTUs

Fuel Utilized to Generate Electricity

The types of fuels that New Englanders utilize to generate electricity have evolved over the past twenty years, as seen in Figure 10-7 below.[5]

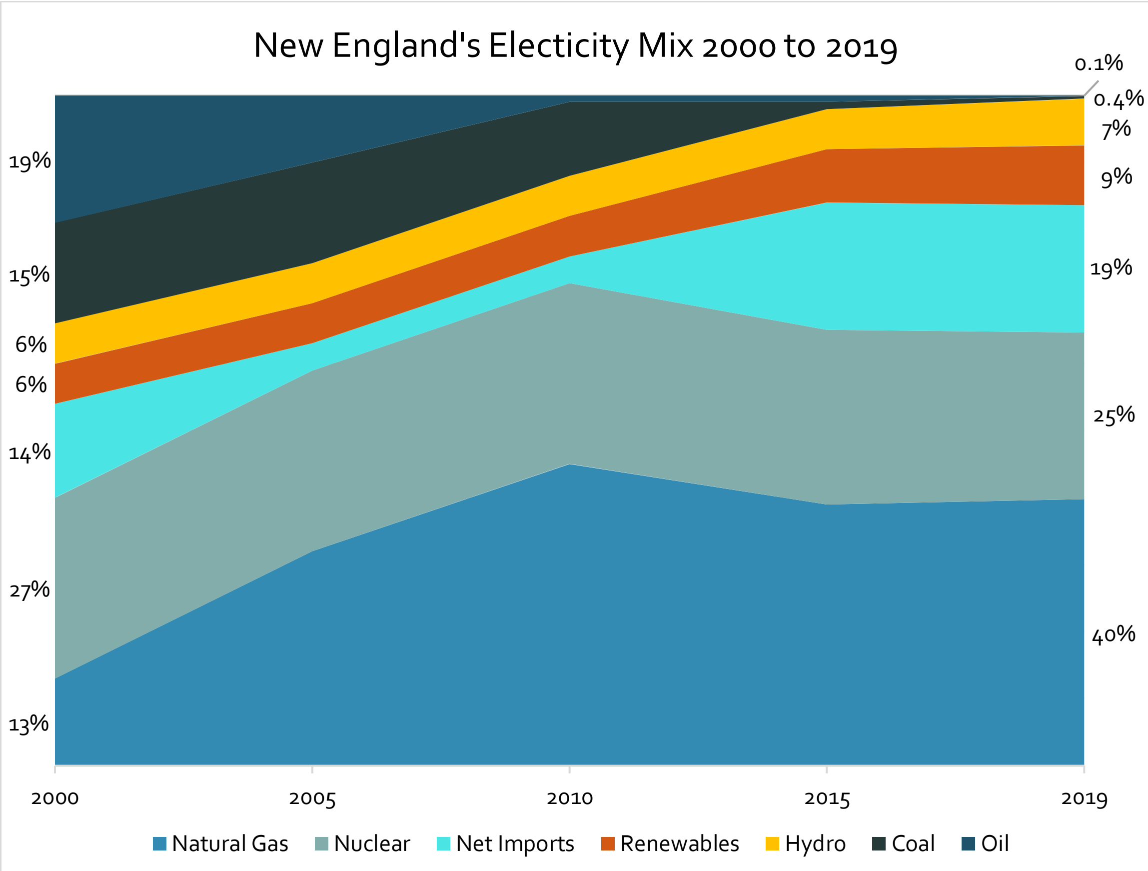

Figure 10-6 Percent of Total Electric Energy by Resource Type. Source: ISO New England.

The use of natural gas to generate electricity has grown threefold, while reliance on coal and oil dropped from 34% to 0.5%. Hydropower and renewables are up slightly.

Figure 10-7 below displays Maine's electricity mix in 2019.

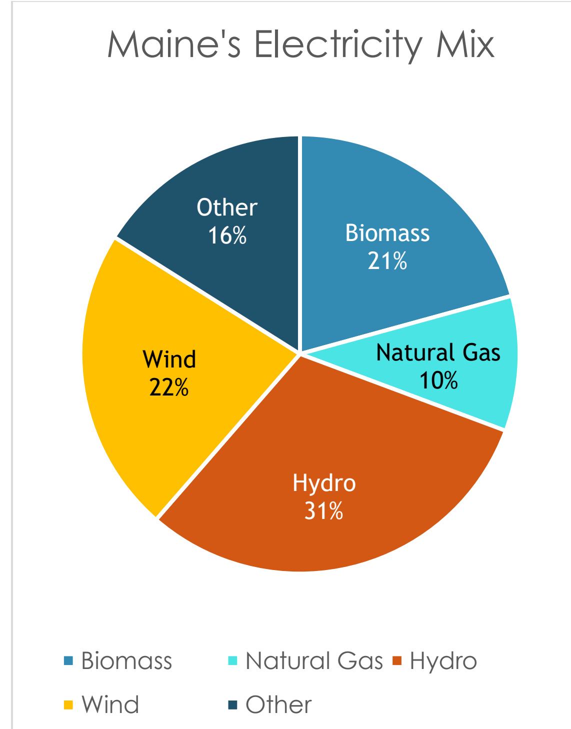

Figure 10-7 Maine's Electricity Mix in 2019. Source: EIA, Table CT8.

Natural gas is brought via pipeline from Sable Island in Nova Scotia and also via an LNG terminal in New Brunswick. The pipeline's primary purpose is to serve the Massachusetts market, but as Maine is situated along this route, the state is able to tap into this source (within a relatively narrow corridor).

Greenhouse Gases

Scientists advise that it is essential to make substantial reductions in the emission of CO_2 and other greenhouse gases in order to slow the rate of global warming.

As seen to the right, Maine's transportation sector discharges substantially more emissions than the national average (50% vs. 37%), likely due to the rural character of the state. Rural drivers make 45% more trips and drive twice as far as urban drivers. In 2019, Maine drivers averaged 13,500 miles, for a total of 14 million miles driven.[6]

Other factors that may well contribute significantly to transportation emissions are motor vehicle trips associated with logging and tourism, and Maine's lack of public transportation.

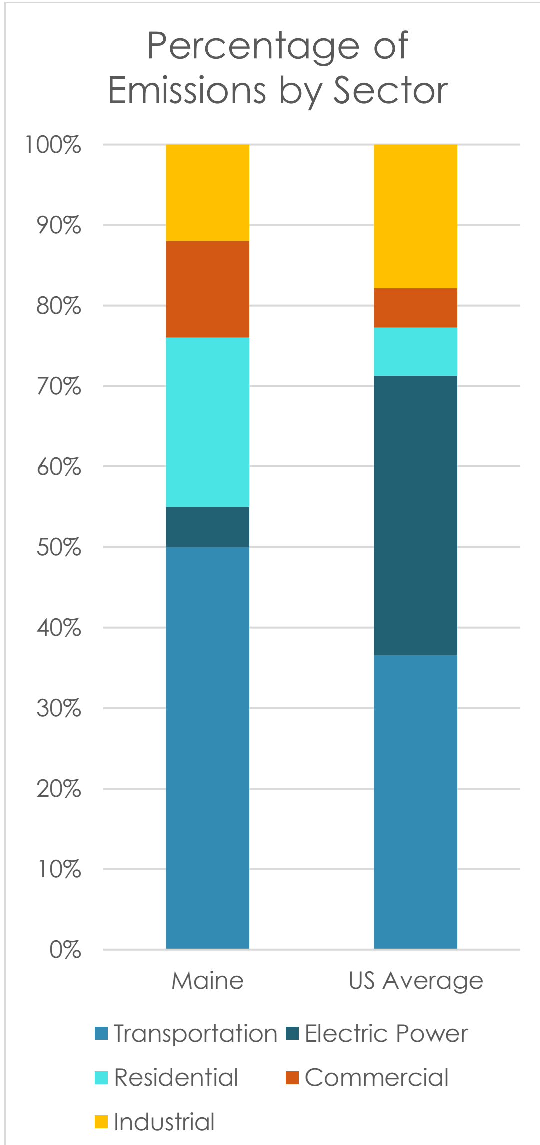

Figure 10-8 Percentage of Emissions by Sector, 2019. Source: EIA, CO² Emissions from Fossil Fuel Consumption (1970-2019)

Maine's residential sector emits greenhouse gas emissions at 3.5 times the national average (21% vs. 6%) due to the use of carbon-based heating fuels during the state's lengthy winters. As for the generation of electricity, Maine does quite well (5% vs. 35%) due to its ample supply of hydropower, and its very low use of high carbon emitting fuels such as oil and coal.

Figure 10-9 displays emissions via sector over time. The transportation sector emits the greatest volume of GHGs and has consistently done so since 1990. Emissions from the residential sector since 1990 have been variable.

$MMTCO_2e$

Carbon dioxide equivalents are commonly expressed as **Million Metric Tons of Carbon Dioxide Equivalents**. The carbon dioxide equivalent of a gas is derived by multiplying the metric tons of the gas by the associated Global Warming Potential (GWP). GWP of CO_2 = 1.

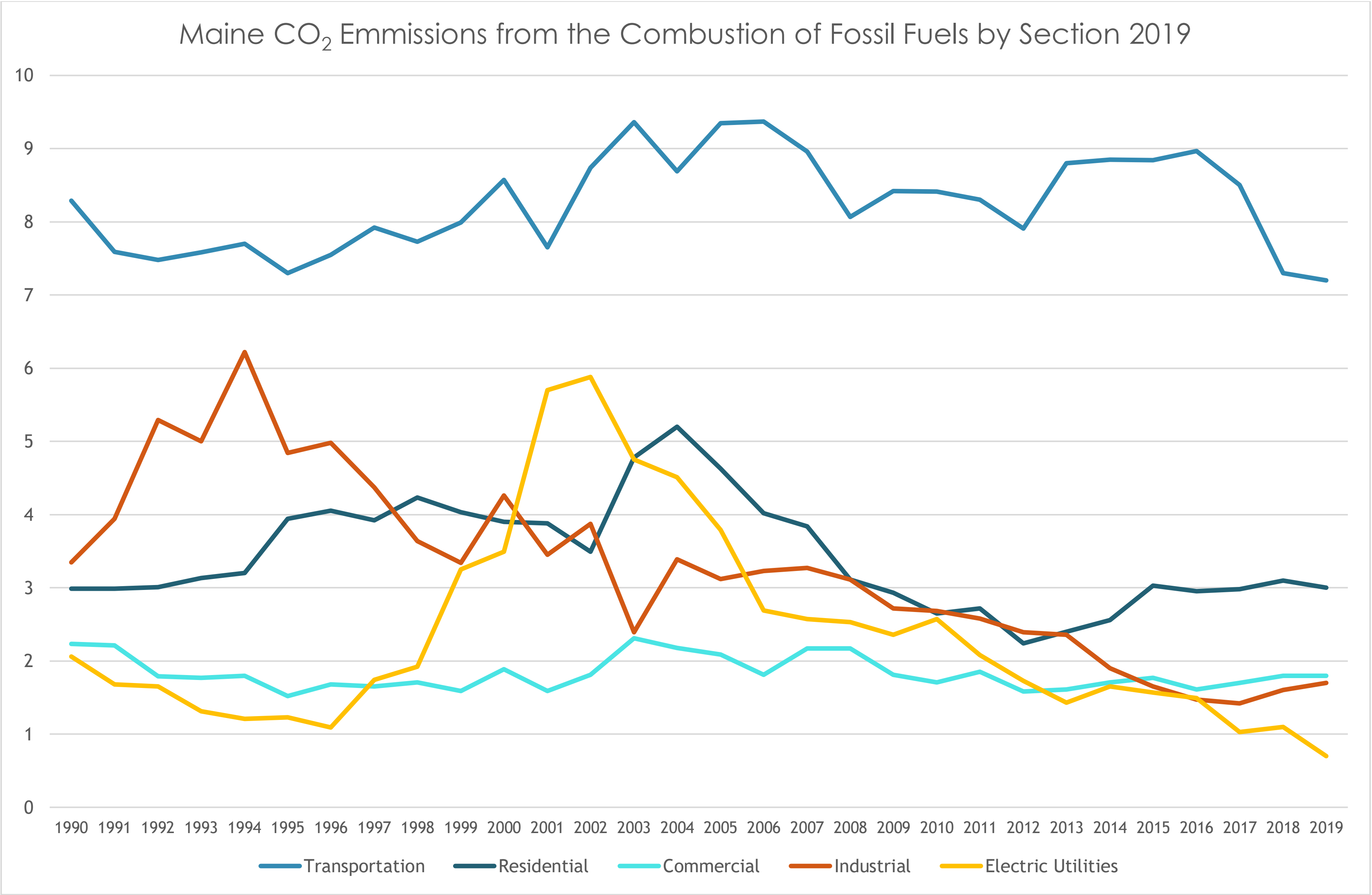

Figure 10-9 CO2 Emissions from the Combustion of Fossil Fuels by Sector 2017. Source: EIA, CO2 Emissions from Fossil Fuel Consumption (1970-2019).

Policy Initiatives

In 2019, Maine launched a number of ambitious initiatives designed to reduce greenhouse gas (GHG) emissions, as follows:

- Ended the ban on new wind power development.
- Established the Maine Climate Council. The council published a Climate Action Plan in December 2020.
- Set a goal of reducing GHG emissions 45% by 2030, and 80% by 2050 (LD 1679).
- Directed the Climate Council to issue recommendations to achieve a carbon neutral economy by 2045.
- Directed state agencies to equal or exceed Maine's energy and emissions targets, and to seek cost efficiencies in doing so.
- Set a goal of 100,000 new residential heat pump installations by 2025 (LD 1766).
- Increased Maine's renewable portfolio standard (RPS) from 40% to 80% by 2030, to 100% by 2050, allows utility scale solar arrays up to 100 MW in size, and established a thermal RPS of 4% no later than 2030 (LD 1494).
- Increased the net metering project cap from 660 kW to 5 MW, and incentivized distribution generation up to 5 MW (LD 1711).
- Ordered the Public Utilities Commission (PUC) to approve the Aqua Ventus contract, a pilot project featuring floating offshore wind turbine (LD 994).
- Joined MA and NH on Gulf of Maine Intergovernmental Renewable Energy Task Force to plan for wind energy development in the gulf.

Maine Climate Council in session on January 27, 2020. Photo: Tom Morgan.

Emissions Goals

In 2003, Maine established GHG reduction goals for 2010, 2020, and beyond. The state set a goal for reduction of GHG emissions (in the short term) to 1990 levels by 2010; to 10% less than 1990 levels by 2020; and for reductions sufficient to eliminate any dangerous threat to climate in the long-term.[7]

In 2019, the Legislature expanded the emissions goals to reduce gross emissions to no more than 45% of 1990 levels by 2030 and to no more than 80% of 1990 levels by 2050.[8]

Figure 10-10 illustrates Maine's emissions since 1990, alongside the state's emissions goals.

In its 8th biennial (progress) report to the Legislature, Maine's Department of Environmental Protection (DEP) summarized its findings as follows:

"Maine is on track to meet the medium-term goal of reducing greenhouse gas (GHG) emissions to 10% less than 1990 levels by 2020. Gross statewide GHG emissions increased from the initially measured levels in 1990, reaching a peak in 2002. By 2008, emissions were below 1990 levels, reaching a low in 2012, rebounding

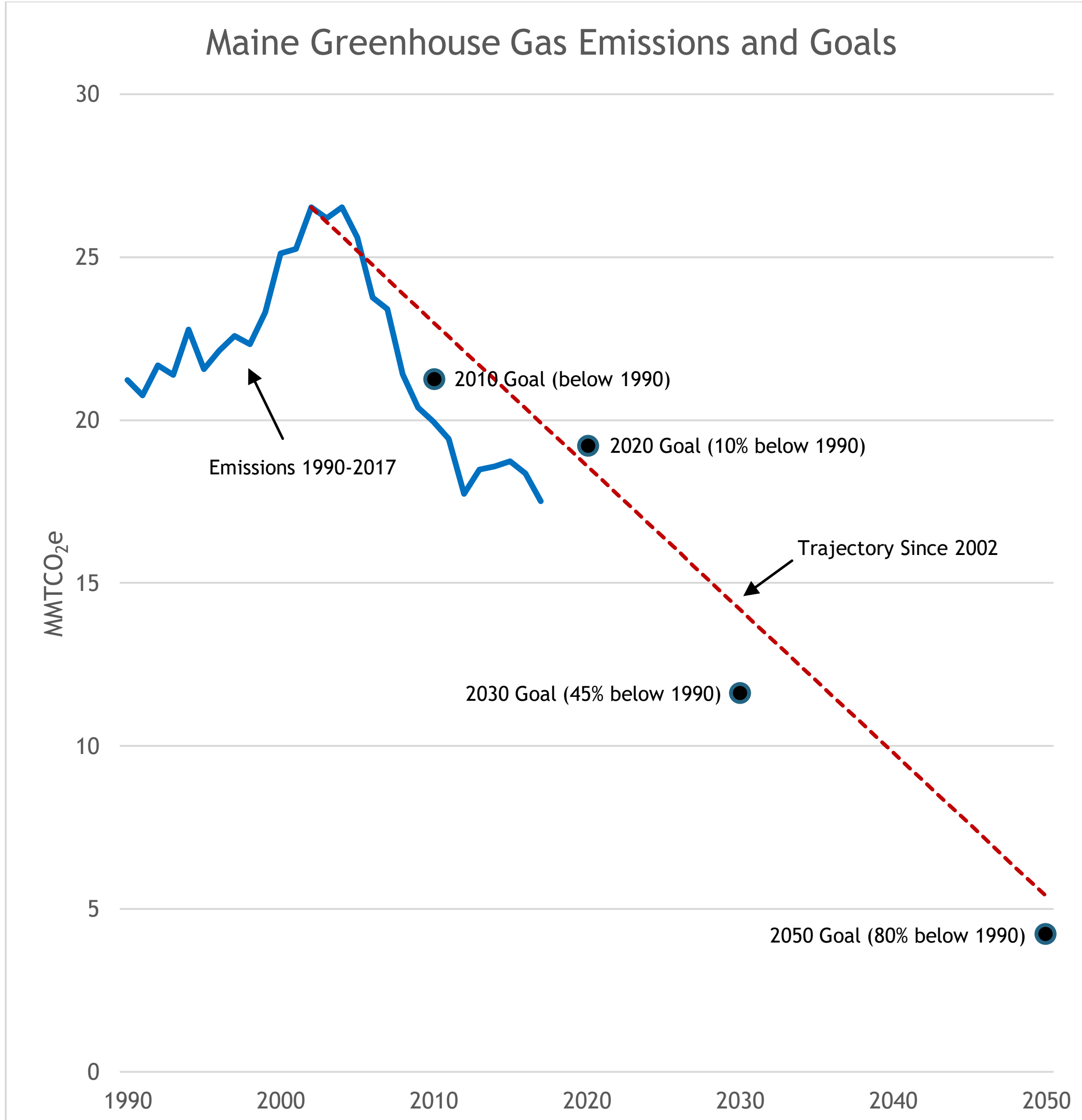

Figure 10-10 Maine Greenhouse Gas Emissions and Goals. Source: Maine DEP, Eighth Biennial Report on Progress toward Greenhouse Gas Reduction Goals, January 13, 2020.

slightly 2013-2015, and trending downward again in 2016 and 2017. Emissions have remained at least 10% lower than 1990 levels since 2012, and as of 2017 were 17.5% lower than 1990 levels."

The Department's analysis of the most current GHG data available indicates:

- 0% of GHG emissions in Maine are the result of energy consumption, mostly produced by combustion of petroleum products. Annual emissions in this source category have been reduced by 35% since the high in 2002 and 14% since 2010.
- Statewide carbon dioxide (CO_2) emissions remain at least 10% lower than 1990 levels in large part because of the use of lower carbon fuels such as natural gas and increased efficiencies.
- Annual CO2 emissions from fossil fuel combustion in the electric power sector have decreased by 83% since they peaked in 2002 largely by replacing high carbon fuels with natural gas and renewable sources.
- The transportation sector was responsible for 54% of Maine's CO_2 emissions in 2017, an increase from the 1990 contribution, 44%.
- Maine is creating 25% less GHG emissions per billion Btu (BBtu) of energy in 2017 than the peak discharge in 2002.
- In 2017, Maine's annual GHG emissions per million dollars of state gross domestic product (GDP) were 45% less than in 1990.
- Concern has been expressed that such reductions might come at considerable cost to the economy. However, as seen in Figure 10-11 below, since 2004 emissions have declined, while gross domestic product (GDP) has not declined, notwithstanding the trauma of the 2007 recession.

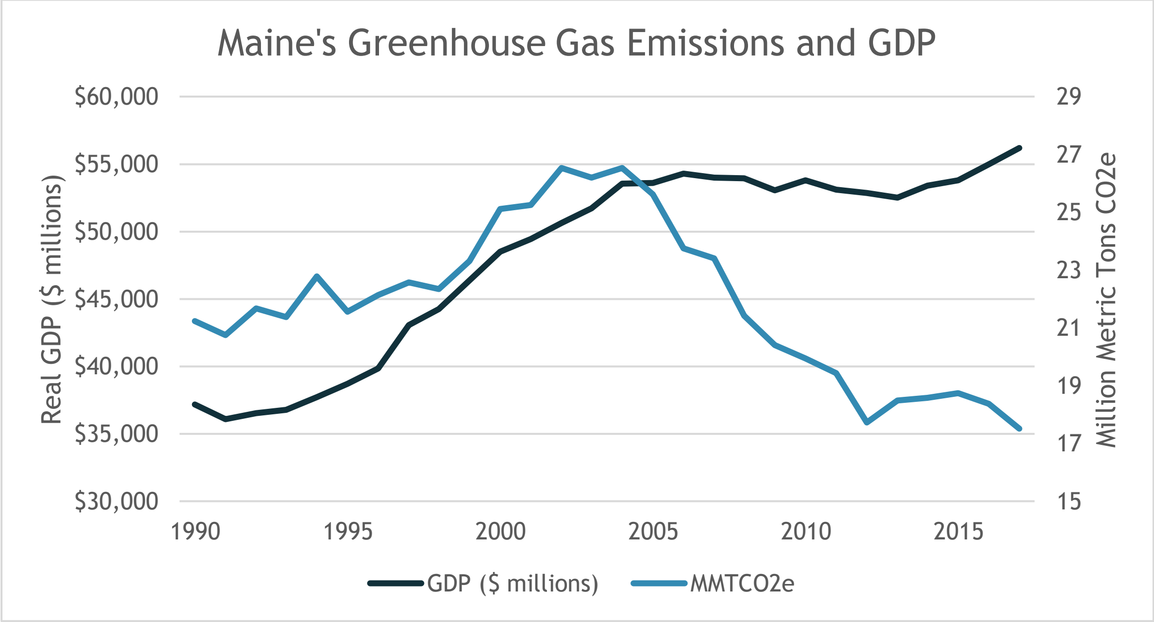

Figure 10-11 Total Greenhouse Gas Emissions and Real Gross Domestic Product. Source: Maine DEP, Eighth Biennial Report on Progress toward Greenhouse Gas Reduction Goals, January 13, 2020.

DEP's 2020 report concludes that Maine has met the first statutory reduction target of reducing GHG emissions to 1990 levels by 2010. Maine's GHG emissions were 17.5% below 1990 levels, and thus Maine is on track to meet the second statutory reduction target of 10% below 1990 levels by 2020.

Renewable Portfolio Standards

Renewable Portfolio Standards (RPS) require that a certain percentage of the electricity procured by utilities comes from renewable resources.

Energy generated via renewable means is assigned a Renewable Energy Certificate (REC) for every megawatt-hour of electricity produced. RECs can then be sold by a Maine generator to an entity in Maine or in another state to meet RPS. Utilities generally purchase RECs to meet their statutory RPS requirements.

Figure 10-12 below depicts the RPS requirements to which each of New England's six states committed in recent years. Note that Maine is the second most ambitious of the states, having ramped up its commitment substantially in 2019.

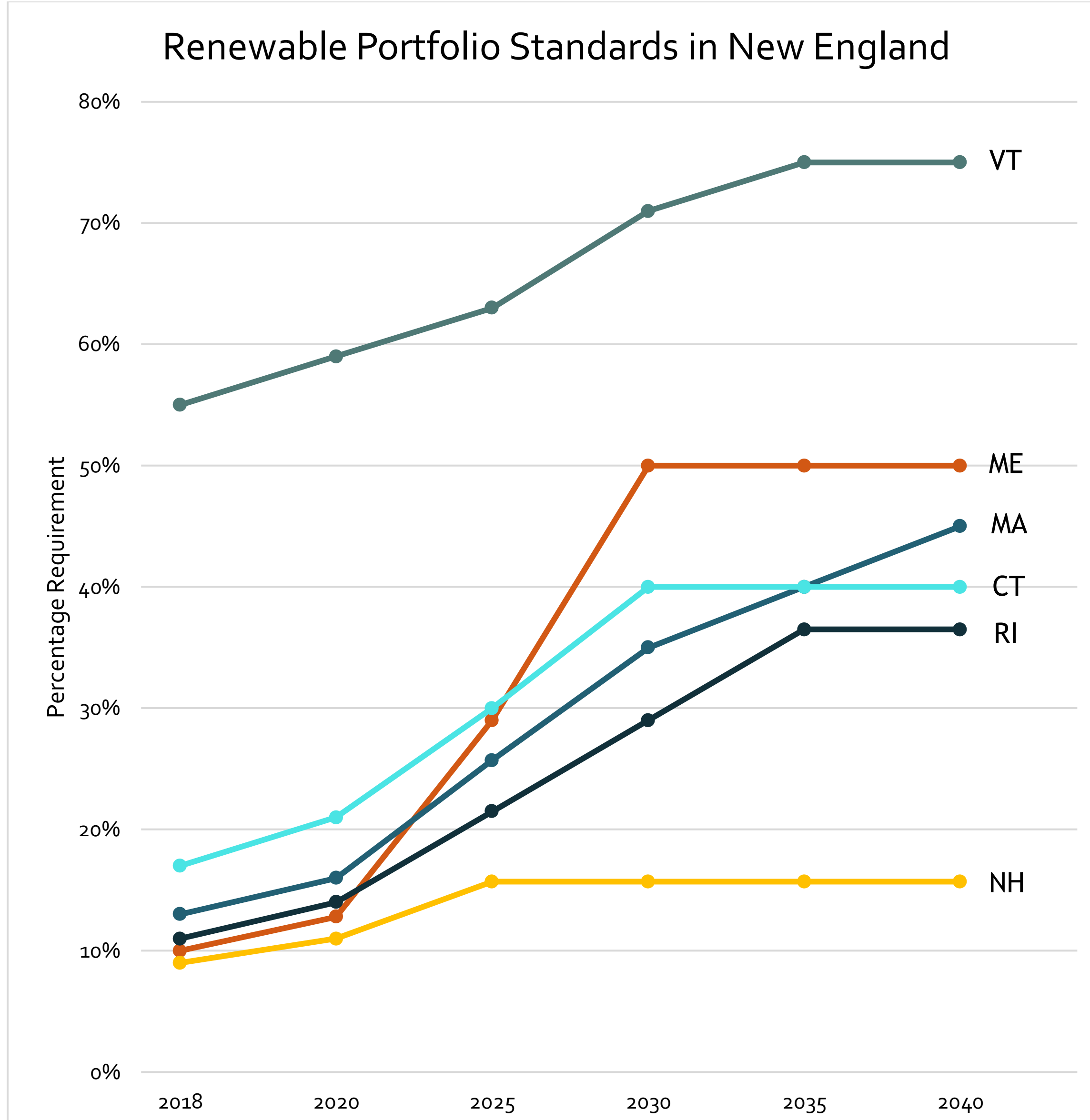

Figure 10-12 Renewable Portfolio Standards. Source: ISO New England.

Solar

Figure 10-13 depicts global horizontal solar irradiance, or more simply put, the strength and duration of the sun's rays at various locations in the US. Maine is suitable for solar farms but is not a strong as some other regions.

Kennebunkport's terrain is fairly level, hence solar irradiance varies little throughout town. At the property level, factors including the aspect of a roof and shading from other buildings or trees impact solar potential.

Horizontal Solar Irradiance

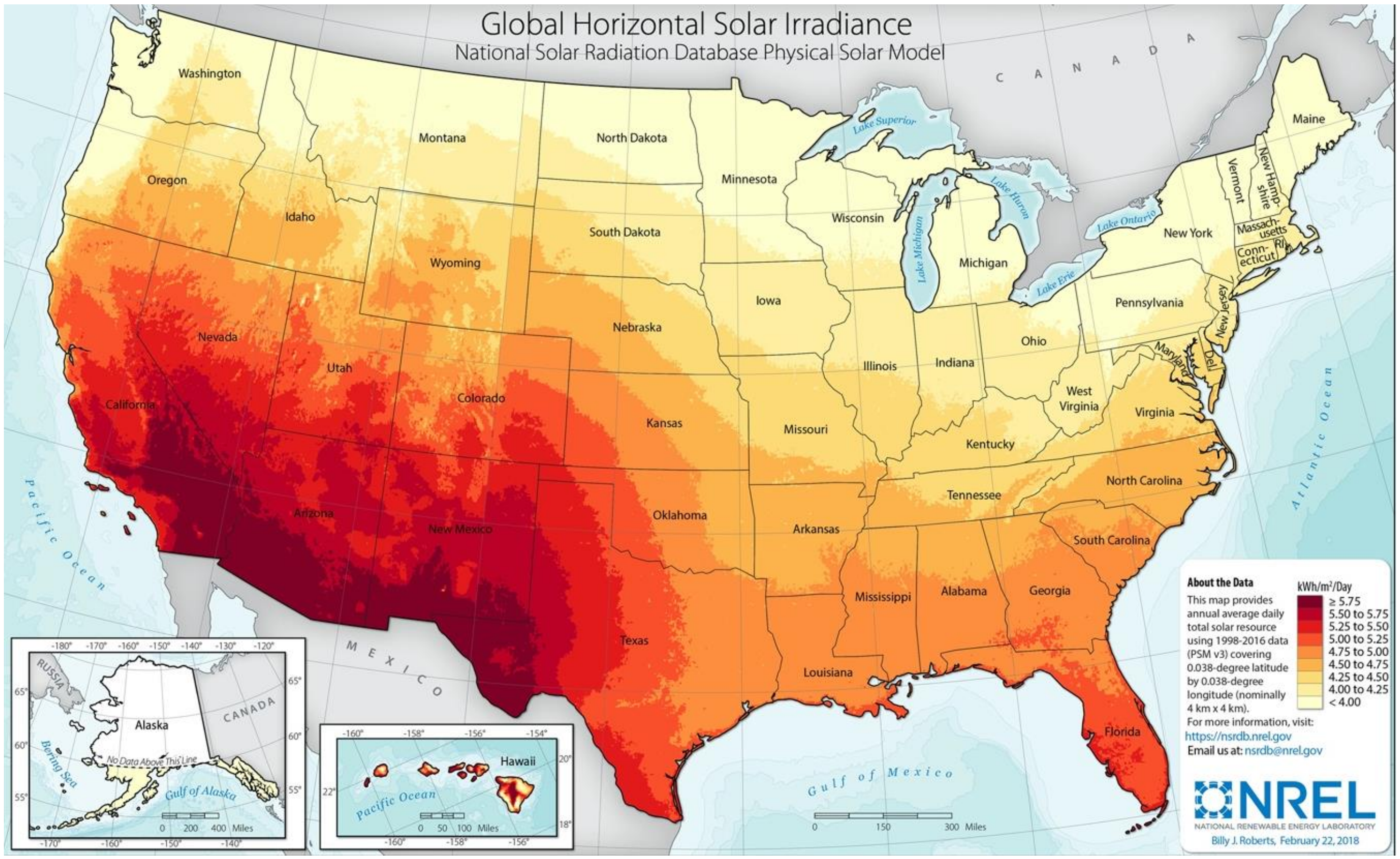

Figure 10-13 Horizontal Solar Irradiance. Source: National Renewable Energy Laboratory.

As seen below, the Natural Resources Council of Maine illustrates that the practical difference in annual kilowatt hours between solar generation in Maine and the southern US is not substantial.

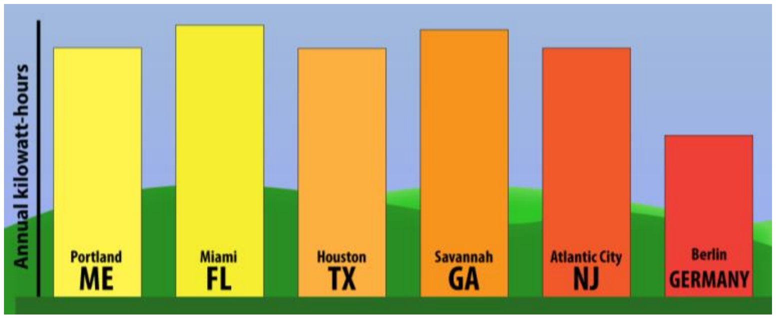

Figure 10-14 Maine Can't Afford to Stay in the Dark (Source: Natural Resources Council of Maine)

Maine and New Hampshire lagged behind the rest of New England in installation of behind-the-meter solar arrays since 2010.

Behind-the-Meter (BTM)

A BTM system is a renewable energy generating facility (in this case, a solar photovoltaic or PV system) that produces power intended for on-site use in a home, office building, or other commercial facility. The location of the solar PV system is literally "behind the meter," on the owner's property, not on the side of the electric grid/utility.

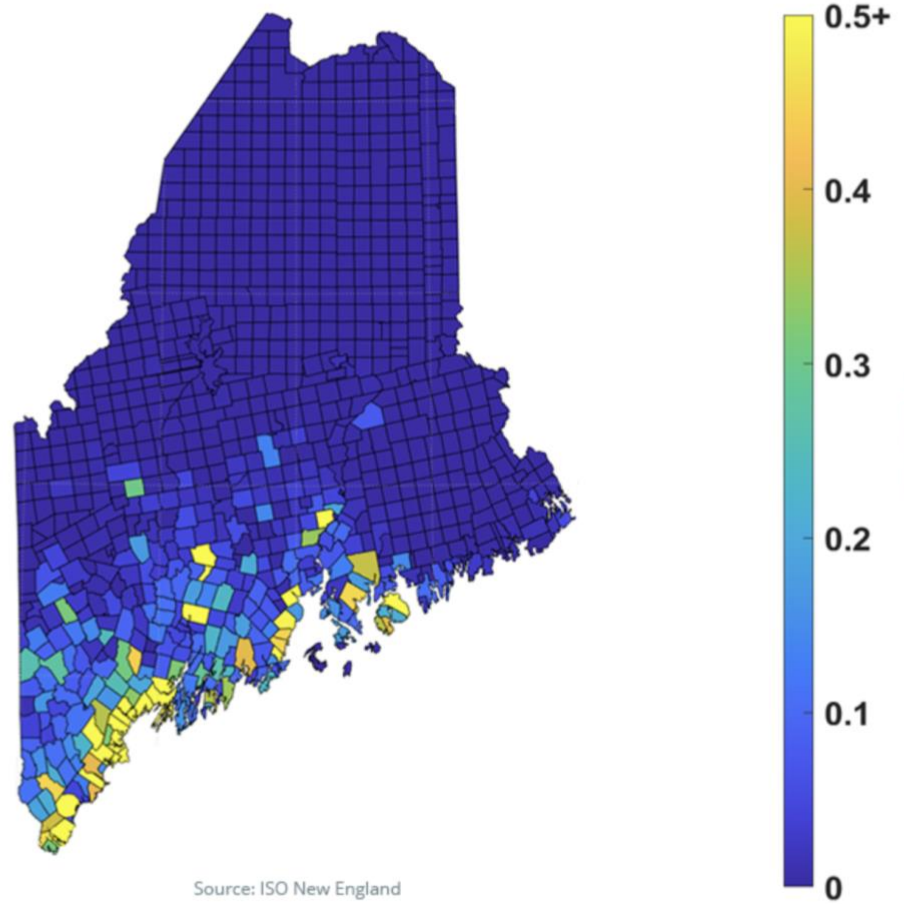

Figure 10-15 Installed Behind-the-Meter Solar Power by Town, as of December 31, 2019. Source: ISO New England.

In 2019, Maine increased the cap on solar facilities eligible for net metering from 660 kW to 5 MW.[9] This change permits neighborhood-scale solar arrays capable of powering multiple homes.

A 5 MW Solar Farm

Question: How much land is required to build a 5 MW solar farm?

Answer: Approximately 25 acres.

Figure 10-16 depicts the growth in New England solar installations since 2010 as well as the projected growth through 2030.

As of the third quarter of 2019, Maine's share of installed solar was 60 MW, which accounts for 0.17% of the electricity generated in state and is sufficient to power 4,400 homes. In this regard, Maine ranks 41st in the US. By 2025, 849 MW of solar installations are proposed, due in large measure to the state government's recent enthusiasm for solar energy.[10]

Local Regulations

Kennebunkport does not currently regulate large solar arrays in its zoning ordinance. To accommodate large ground mounted solar arrays in the town, the zoning ordinance would need to be amended to specify where this land use is permitted, to determine whether it is permitted by right, conditionally, or prohibited, and to establish performance standards for this use.

The destruction of forest land in order to construct a solar array would offer little net benefit in terms of reducing the town's carbon footprint due to the forests' role in sequestering carbon. For that reason, the zoning overlay should be designed to protect forested land, as well as rare natural communities.

A decommissioning mechanism that provides assurance that a solar developer will remove panels upon termination of energy production is typical in solar ordinances, as an abandoned facility would be viewed by many as an eyesore. Revisions to zoning Article 10, Site Plan Review, could address decommissioning as well as other issues raised by the installation of large-scale arrays.

There are several advantages of solar farms over fossil fuel generators. First is the financial cost of manufacturing the panels continues to decline during the past two decades.

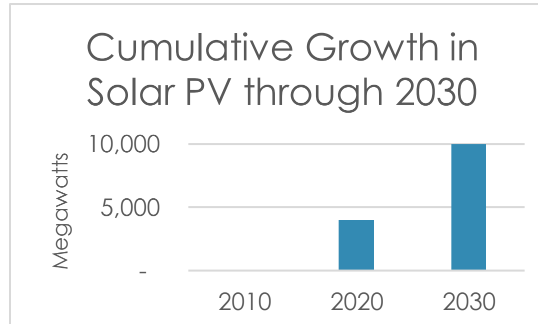

Figure 10-16 Projected Cumulative Growth in Solar PV through 2030 in New England. Source: Final 2021 PV Forecast, ISO New England.

Another advantage is an expanded tax base for the community, particularly at locations that are otherwise unsuitable for development.

A third advantage is that the arrays enhance aquifer recharge as there is typically very little impervious surface at ground level.

Solar arrays may also serve as a physical impediment to development in parts of town where development is perceived as premature or undesirable.

A common error by municipalities is their treatment of the panels' surface area as equivalent to impervious surfaces such as parking lots. The former enhances aquifer recharge, while the latter generates stormwater discharge, along with its attendant management challenges. The zoning ordinance should distinguish between the two, particularly when providing for the calculation of open space requirements.

Wind Power

Several of the twenty-eight 1.5 MW wind turbines at the Mars Hill Wind Farm in the Saint John valley. Photo: Michael Surran.

Eighteen land-based wind farms in Maine are responsible for 13.85% of in-state electricity production, generating 900 MW. Nearly all of these facilities are situated in remote areas of the state.

The Gulf of Maine holds some of the greatest potential for offshore wind-generated electrical power in the US, and indeed, in the world.

The figure below depicts the potential for offshore wind in the lower 48 states.

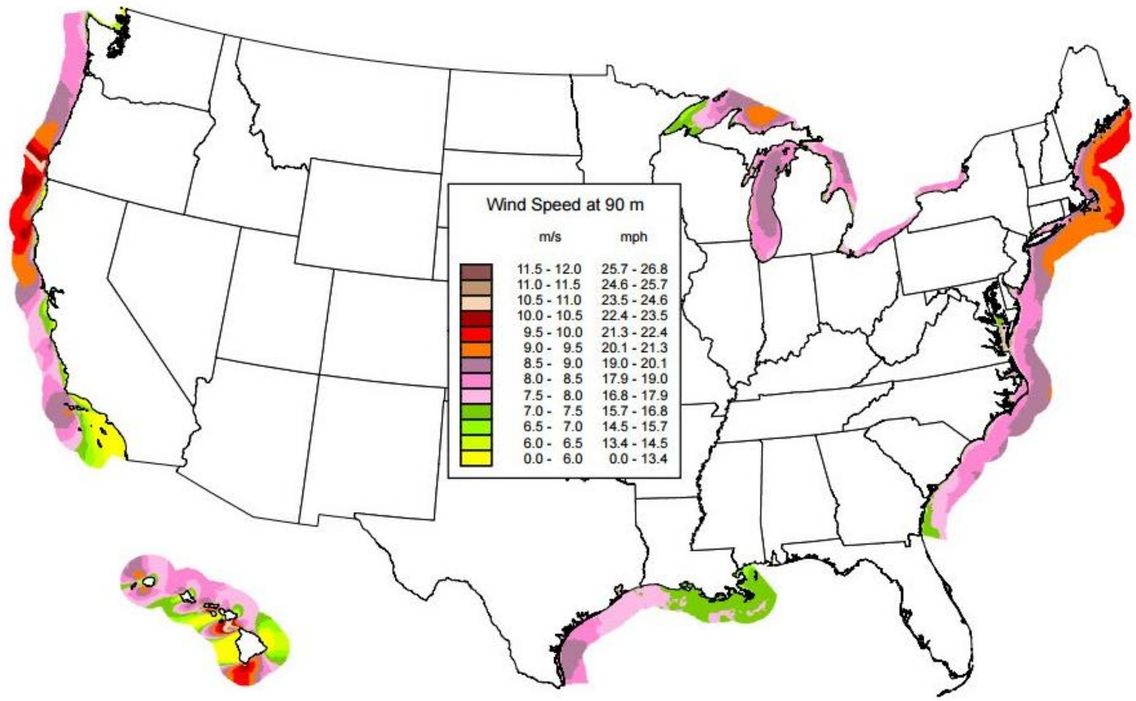

Figure 10-17 Annual Average Offshore Wind Speed at 90 Meters. Source: National Renewable Energy Laboratory, 2015.

A larger scale depiction of wind velocity is shown in Figure 10-18.

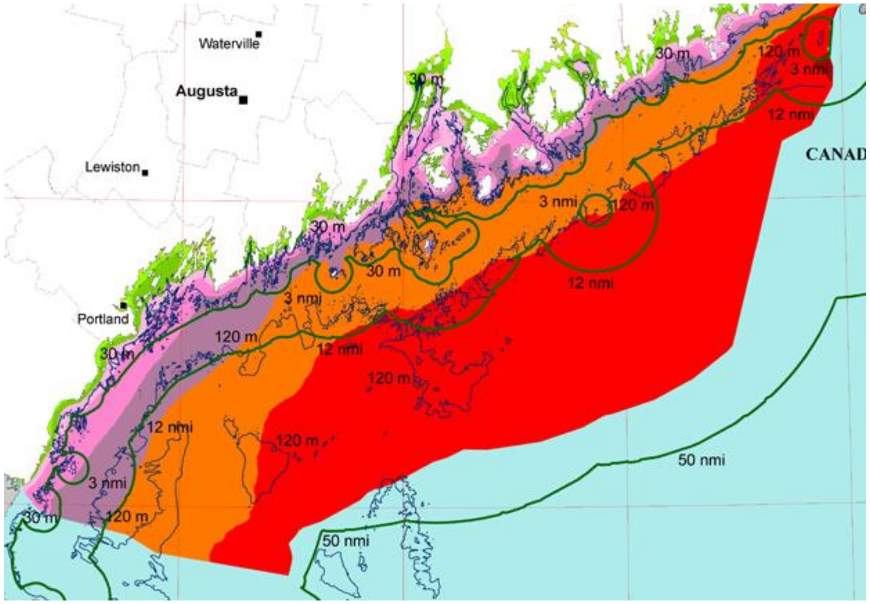

Figure 10-18 Wind velocity at 90 meters in the area depicted in red average 22 mph annually. Source: National Renewable Energy Laboratory.

Offshore wind is far and away Maine's largest untapped energy source. The potential yield off Maine's coast is 156 GW.

As Mainers typically consume but a small fraction of the Gulf's electrical potential each year, wind harvested in the Gulf of Maine could power much of the northeastern US.[11]

Watts & Watt-hours

A watt (W) = 1 joule per second and is used to quantify the rate of energy transfer. A joule is the energy dissipated as heat when an electric current of one ampere passes through a resistance of one ohm for one second.

A kilowatt (kW) = 1,000 watts
A megawatt (MW) = 1,000 kilowatts
A gigawatt (GW) = 1,000 megawatts, or one billion watts

By way of example, New England's largest nuclear reactor is rated for 1.2 GW, enough to power 1.2 million homes. The Maine's offshore wind potential of 156 GW is enormous.

Watt-hours (Wh) measure the electricity used over time. The typical electric bill reflects kWh consumed monthly.

While Maine's electricity costs are among the highest in the nation, the average Maine home uses just 551 kWh per month, 49th in the US. The national monthly average is 909 kWh.

The University of Maine's Advanced Structures & Composites Center is a leader in offshore wind development. Aqua Ventus is the name of the center's premier pilot project, intended to demonstrate the feasibility of a floating wind turbine off New England's coast. It is the first such floating facility in the US and is currently anchored three miles south of Monhegan Island.

In 2019, the Legislature directed Maine's PUC to approve a 20-year contract for Aqua Ventus power.[12] Maine Central Power signed the contract in December 2019.

Photo: University of Maine's Advanced Structures & Composites Center

Project managers have committed to site such facilities no closer than ten miles from inhabited islands and Maine's coastline to protect coastal views

Energy Efficiency

The American Council for an Energy-Efficient Economy (ACEEE) ranks US states in terms of each state's policies promoting energy efficiency. In determining a state's rank, ACEEE utilizes 33 metrics that measure the performance of home appliances, building energy codes, and vehicle efficiency. As seen in Figure 10-19, Maine ranked 16 in the US in 2020.

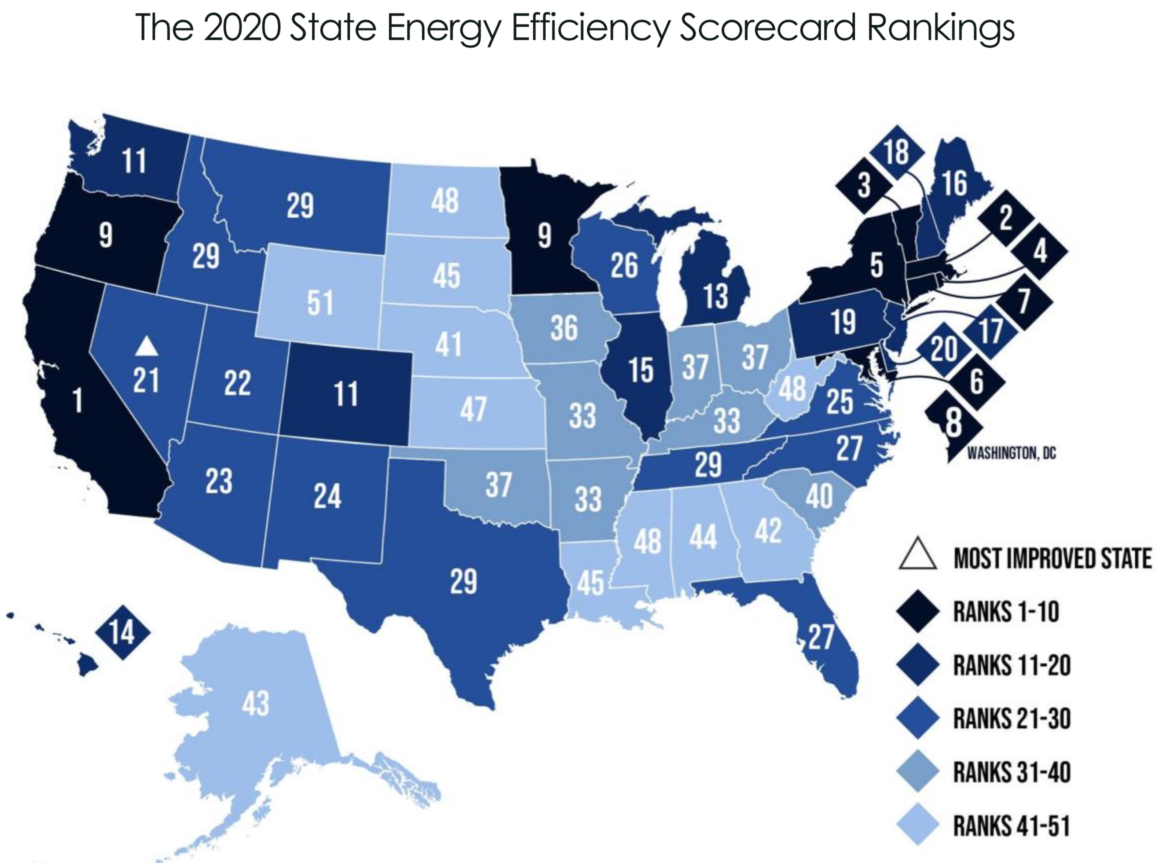

Figure 10-19 State Energy Efficiency Scorecard Rankings. Source: American Council for an Energy-Efficient Economy.

Local Opportunities

There are a number of measures the municipality could adopt in order to reduce greenhouse gas emissions.

Land Use Regulations

In order to reduce the number of vehicle miles traveled, and hence emissions, the town should consider re-zoning selected areas of town so as to permit greater residential density and mixed uses. Mixed uses tend to relieve nearby residents from traveling far for certain goods and services.

A variation of this approach is known at Traditional Neighborhood Development (TND) a strategy that is intended to allow the type of early 20th century neighborhoods that characterized Kennebunkport Village during the 19th century, and that was the norm in much of the US prior to the adoption of Euclidean zoning. These neighborhoods are typically characterized by one- and two-family homes on small lots, with front porches and shallow front yards. Garages were typically relegated to the rear of the property.

The zoning ordinance could be amended to provide a density bonus for new development that is built in targeted growth areas, away from areas designated Rural.

The site plan review provisions could be amended to require that proposed commercial development of a certain scale be required to include EV charging stations.

As noted above, the zoning ordinance should distinguish between solar panels and impervious surfaces such as parking lots, so as to not inadvertently preclude solar development.[13]

Municipal Facilities

Were the town to install LED fixtures in streetlights throughout town, the new fixtures would soon pay for themselves via a lower demand for electricity.[14]

Financial Incentives

The town could incentivize the installation of solar arrays on individual residents' properties by exempting such installations from property taxes.

Transportation Network

In order to provide residents with options other than an automobile for local errands, the town could undertake an ambitious expansion of multi-use trails. A design that prioritizes safety will attract more folks on bicycles (conventional and electric), and pedestrians of all ages. Similarly, installation of more bicycle racks around town would encourage non-motorized transportation.

Kennebunkport could convert the Town's transportation fleet to vehicles that generate fewer (or no) emissions.

EV Charging Stations

An important strategy for reducing greenhouse gas emissions is the facilitation of a transition from fossil fuels in the transportation sector. To the extent that electric vehicle (EV) charging stations are convenient and numerous, local resident as well as tourists will be more likely to utilize electric powered vehicles.

The technology behind EV charging stations continues to evolve, as seen in the summary below:[15]

What are the different electric vehicle chargers?

Level 1 charging is done via any standard 120-volt wall plug. It's the slowest way to charge your car, but in a pinch, it will do the trick and works well for charging plug-in hybrids overnight at home.

Level 2 - chargers, sold separately from an electric car, hook up to the kind of plug you might use for an electric stove or a clothes dryer (220 volts). They charge five to seven times faster than Level 1 chargers and get about 20-25 miles per hour of charging. These are practical at homes, businesses, and many other locations.

Level 3 chargers, also known as Direct Current Fast Chargers (DCFCs), are the fastest way to charge your car. They provide up to 40 miles of charge for every 10 minutes off charging, so you can charge your car while you eat lunch! These more expensive chargers are for highways and higher-use destinations. (Source: Natural Resources Council of Maine)

The map below depicts the eight EV charging stations located in Kennebunkport. All are Level 1 or 2. The nearest Level 3 chargers are located at the turnpike's Kennebunk service plaza.

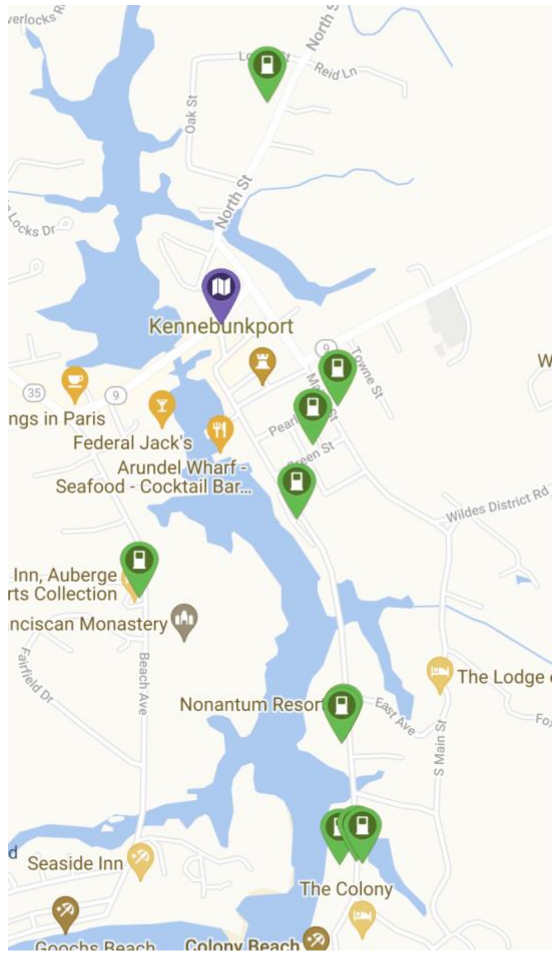

Figure 10-20 Location of EV chargers in Kennebunkport. Source: PlugShare.com.

Table 10-1 provides more detail on Kennebunkport EV charging stations.[16]

Location	Connector	kW
Fire Station	J-1772	
Maine Stay Inn	Tesla	16
Captain Lord	Tesla	16
Yachtsman Lodge	Tesla	8
Nonantum Resort	J-1772 & Tesla	13
Breakwater Inn	J-1772 & Tesla	8
Edgewater Inn	Tesla	8
Mabel's Lobster	Tesla	11

Table 10-1 EV charging stations in Kennebunkport. Source: PlugShare.com.

As is evident from the EV installations detailed in Table 10-1, Kennebunkport's hospitality industry recognizes the economic importance of providing EV services. Level 1 & 2 chargers are a practical choice for overnight guests. What is missing in Kennebunkport is a practical option for day-trippers. A popular tourist destination such as Kennebunkport is an obvious choice for Level 3 chargers.

Level 3 technology provides a full charge in the time it takes to dine at a local restaurant or patronize Dock Square shops. Dock Square's municipal parking lot is an ideal choice to locate banks of EV chargers. New Level 3 installations at several other locations in town could well serve both residents and visitors.

Kennebunkport Fire Station. Photo: Liz Durfee.

EV installations on Town property could be structured as a private enterprise so as to insulate local taxpayers from the initial investment. Alternately, the Town could seek funding for the infrastructure via grants and retain control.


A bank of EV Superchargers in Seabrook, NH. Photo: Tom Morgan.

Electrify America has been very active across the US in building Level 2 & 3 EV charging stations. This nonprofit was established as part of the Volkswagen settlement and has committed $2 billion to the installation of EV stations through 2026. To date, Electrify America has installed over 400 charging stations. Efficiency Maine Trust, a quasi-state agency, has utilized funds from Electrify America to develop EV charging stations in Maine.

The Town should audit its regulations to identify unintended obstacles to EV charging stations. Some municipal regulations, such as off-street parking regulations, unwittingly hinder installation of EV charging stations.

Electrification

As seen in Figure 10-8 above, 18% of Maine's greenhouse gas emissions are generated in the residential sector. In 2019, the Legislature enacted legislation that utilizes financial incentives to encourage Mainers to replace fossil fuel burning heating systems with electrically powered ductless heat pumps (LD 1766). This relatively new technology is estimated by Efficiency Maine to enjoy comparatively low operational costs, as seen in Table 10-2 to the right.[17]

In comparison to fossil fuels, long term savings from heat pumps will likely be greater due to the volatility of the fossil fuel market and the cost of investments in oil and gas infrastructure that utilities oftentimes pass on to consumers.

Other advantages of heat pump technology include the following:

- Heat pumps maintain constant temperatures, and permit room by room temperature control.
- There is no risk of combustion gas leaks.

Table 10-2 Home Heating Cost Comparison. Source: Efficiency Maine, prices as of 2/6/20.

Fuel Type	Units	Cost per Unit Delivered	Heating System	Annual Cost
Firewood	cord	$250	Wood Stove	$1,039
Electric	kWh	$.17	Geothermal Heat Pump	$1,213
Electric	kWh	$.17	Ductless Heat Pump	$1,325
Wood Pellets	ton	$258	Pellet Stove	$1,610
Wood Pellets	ton	$258	Pellet Stove	$1,847
Natural Gas	ccf	$2.14	Parlor Stove	$1,969
Oil	gallon	$2.67	ENERGY STAR Boiler	$2,150
Kerosene	gallon	$3.31	Space Heater	$2,195
Oil	gallon	$2.67	ENERGY STAR Furnace	$2,250
Natural Gas	ccf	$2.14	ENERGY STAR Boiler	$2,270
Natural Gas	ccf	$2.14	ENERGY STAR Furnace	$2,458
Propane (LP)	gallon	$2.55	Parlor Stove	$2,616
Propane (LP)	gallon	$2.55	ENERGY STAR Boiler	$3,015
Propane (LP)	gallon	$2.55	ENERGY STAR Furnace	$3,265
Electric	kWh	$.17	Baseboard	$3,881

- A California study demonstrated that the cost of building a single-family home with electrically powered ductless heat pumps is approximately $6,000 less than one heated by fossil fuels.[18]
- The heat pump initiative will generate new high-wage jobs in installation, thereby putting more money into the local economy.
- Heat pumps filter air year-round and may be utilized to dehumidify and cool the home during summer months.
- Switching from household appliances fueled by propane to those powered by electricity has been shown to improve indoor air quality.[19]

- As Maine's electrical grid evolves to a more decentralized configuration, the source of the electricity that powers local homes will likely be in closer proximity to town, and thus more reliable

Heat pump water heaters offer several advantages, particularly in comparison to propane systems. Likewise, another new technology, electrically powered induction ranges and cooktops (not to be mistaken for the older coiled electric burners) offer several advantages over traditional gas fired appliances.

Opportunities

What can the town do to facilitate a transition from fossil fuels to electrification? The town is well positioned to educate residents, via the Town's website. Educational materials could also be integrated into the building permit process.

Some US cities have amended their building codes to require that new dwellings are all-electric, while others require that houses placed on the market for sale be fitted up for conversion to 100% electric. The Maine Climate Concil endorses measures such as these.

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