2015

Maine Comprehensive Energy Plan Update

Governor's Energy Office

State of Maine

February 2015

Table of Contents

February 5, 2015

The Honorable David Woodsome
The Honorable Mark Dion
Members of the Energy, Utilities and Technology Committee
Cross Building Room 211,
100 State House Station Augusta, ME 04333

Dear Chair Woodsome, Chair Dion, and Members of the Committee,

It is my pleasure to present to you the executive summary of Maine's energy plan.

I would like to thank Lisa Smith, Senior Planner in the Governor's Energy Office, Chris Shorey who was instrumental in the development of the energy profile, the Public Utilities Commission, the Office of the Public Advocate, Efficiency Maine, the Department of Environmental Protection, the Department of Transportation, and the stakeholders who provided comments to the Governor's Energy Office to improve this plan.

This is a time of significant volatility in energy markets that has had significant consequences on the Maine people and the Maine economy. From large employers shutting down because of the cost of natural gas and electricity, to an historic reduction in oil prices that has given some relief to Maine customers, there have been rapidly changing dynamics in energy commodity markets that humbles any effort to predict long-term energy price forecasting.

An energy plan must recognize the unpredictability of the market and position the state to adapt to these changing markets, remain competitive, and also continue to make progress in reducing air pollution. There are many assets that the State of Maine has to address our energy challenges, from our renewable hydropower in our state to regional resources, including hydropower to our north and natural gas in Pennsylvania.

To establish a plan there must be an objective. While the Legislature has established a myriad of goals and policies, there is not an overarching policy objective for the State of Maine. The Governor's Energy Office proposes that Maine's overall energy policy should be to lower costs for our businesses and residential customers and reduce pollution.

Some of our programs are achieving these goals, but are not integrated into one holistic policy and many could be more cost-effective. Simplifying our programs and subsidies to achieve clear objectives would provide better oversight and provide a mechanism for the Governor and Legislature to assess the returns of finite state resources, ultimately lower costs for our residents and businesses, and improve our environment.

The Governor's Energy Office has established eight sectors within the energy plan, and each has its own policy recommendations. These include residential thermal, commercial and industrial, renewables, electricity, transportation, wind, greenhouse gases, and state government.

1) Thermal

Profile. Maine has made significant progress in reducing the consumption of home heating oil, including a 26 percent reduction from 2007 to 2010. The State continues to have a building stock with inefficient building envelopes and inefficient heating systems. In addition, over the last three years new technologies, including heat pumps, have provided a cost-effective option to lower costs and reduce pollution. The Home Energy Savings Program at Efficiency Maine has been a catalyst for accelerating Mainers towards more affordable heat in the winter, with over 13,000 households participating in the programs over the last two years.

Policy Recommendations.

- Devote additional resources to accelerate progress in lowering heating costs and reducing pollution from this sector. Establish a goal of $10 million annually for these programs in FY16, FY17, and FY18, with the intention of improving the heating systems and building envelopes in 10,000 homes per year.
- Our low-income programs have not been successful in reaching this population. The state needs to develop a targeted program to assist low-income households to participate in programs that lower their heating costs.
- We need a better understanding of our progress towards weatherizing Maine's homes. Efficiency Maine should adopt interim goals and report on the progress with every triennial plan.

2) Renewables

Profile. Maine continues to be one of the leaders in the country with renewable energy production. In 2012, Maine generated 54 percent of its electricity from renewable resources and has had strong growth in the use of wood energy for thermal applications. Much of the recent growth in the electrical sector has been driven from New England's renewable portfolio standard, the federal production tax credit, and Maine's wind energy resource. Maine's renewable energy credit prices have fallen significantly, and, without policy changes, renewable energy credits will unlikely be a primary reason for pursuing renewable investment in Maine.

Policy Recommendations.

- The state should consolidate our state renewable energy policies to improve cost-effectiveness, and develop a long-term distributed generation program that reflects the value of these assets to ratepayers and the environment.
- The region should adopt consistent renewable energy definitions to bring business certainty.
- The region should explore opportunities for supporting innovative technologies throughout the region.

- The state should continue additional thermal renewable energy programs to reduce greenhouse gas emissions and lower the cost of heat.

3) Commercial/Industrial

Profile. Maine's commercial and industrial electricity and natural gas prices are not nationally competitive. While there has been expansion of the natural gas distribution service in Maine to provide a more diverse fuel mix, New England experiences volatility and sharp increases in electrical pricing.

Policy Recommendations.

- The State should continue to pursue a regional solution to natural gas capacity constraints. Based upon the Maine Public Utilities Commission's report, the New England States Committee on Electricity (NESCOE)'s work, the Massachusetts' report regarding gas demand in their state, and Connecticut's Integrated Resource Plan, there is consensus that significant capacity constraints exist. Upwards of 1 billion cubic feet per day additional capacity would likely be cost-effective for ratepayers.

4) Transportation

Profile. Maine is a rural state and as a result of our population distribution, Mainers travel more miles than the national average. This is a major expense for households and contributes to Maine's greenhouse gas emissions. Although Maine has developed train service from Boston to Freeport, and feasibility studies are underway for additional service, it is unlikely that passenger rail will significantly reduce energy consumption in Maine's transportation sector.

Policy Recommendations.

- The State should follow the Department of Transportation's plan to make targeted rail investments to increase access for shipping freight by rail, and to improve the Downeaster passenger rail service.
- The state should consider public-private partnerships to increase inter-city bus service, and intermodal transportation in targeted locations that would shift commuters into public transportation. Although alternative vehicles remain a relatively small percentage of Maine's vehicle fleet, the state should consider partnerships with large fleet owners to transition to alternative vehicles including natural gas, propane, and electricity.
- Finally, the state should consider moving the state's ferry system from diesel to alternative fuels, including LNG.

5) Wind Power.

Profile. Maine has had significant growth in wind installations in the state with 443.5 MW installed and significant additional projects proposed. The vast majority of the projects installed in Maine have contracted with utilities in Massachusetts and Connecticut. Although Maine construction companies have developed an expertise in the

installation of these projects, the state has not successfully developed a wind related manufacturing base in the state.

Policy Recommendations.

- The policy recommendations issued in the Wind Energy Development Assessment (Governor's Energy Office, March 2012) remain valid. These include modifying the wind energy goals, improving the wind siting policy for the unorganized territories, clarifying long-term contracting authority, and ensuring that these projects benefit the residents of Maine in addressing their energy challenges.

6) State Government.

Profile. State Government is a significant consumer of energy, and there exist significant opportunities to reduce costs to the taxpayer. Fuel expenditures from the State of Maine are approximately $500 million annually. The oversight of Maine's building energy management is within the Bureau of General Services.

Policy Recommendations.

- The state needs a comprehensive plan to pursue cost-effective energy efficiency, heating system, and HVAC system improvements. One challenge has been the upfront cost for the state and the budgetary cycle for long-term planning.
- The Governor's Energy Office, the Bureau of General Services, the Legislature, and Efficiency Maine should pursue a financing program that allows long-term planning for energy improvements to lower the cost of energy expenditures for taxpayers.

7) Greenhouse Gas Emissions.

Profile. Maine has a unique profile with respect to our greenhouse gas emissions. While our electric emissions are one of the lowest in the country, our transportation and thermal energy emissions are higher per capita than the national average. The State continues to pursue policies primarily in the electric sector to lower emissions by its participation in the Regional Greenhouse Gas Initiative, and state electric renewable energy programs.

Policy Recommendations.

- The state should focus efforts in the thermal and transportation sectors to lower greenhouse gas emissions. In addition, the state should consider adopting long-term goals for emissions targets based on economic growth and pursue regional efforts to comply with the Environmental Protection Agency's Clean Power Plan.

8) Electricity/Efficiency.

Profile. Maine, like the rest of New England, has experienced sharp increases in wholesale electrical prices over the last three years. While the state has significant renewable energy resources, the state remains susceptible to wholesale market pricing that is correlated to natural gas prices. Maine has a significantly higher percentage of its electrical load dedicated to industrial users than the rest of New England, and is therefore

highly susceptible to price volatility. Efficiency Maine is the manager of state's efficiency programs, and has allocated $21 million for electric efficiency programs in FY14. The Maine Legislature also devoted 55 percent of funds from the Maine Yankee Settlement to invest in energy efficiency programs.
Competitive Electricity Suppliers have grown in the state, increasing competition, but also raising issues regarding transparency in pricing. The Legislature has also required the state to consider non-transmission alternatives as a substitute for transmission projects.

Policy Recommendations.

- Pursue long-term contracts that provide ratepayer benefits, including lowering price volatility.
- The State should closely follow efforts in other states to modernize utility infrastructure to utilize all technologies available to ensure the reliable delivery of electricity.
- The state should position itself for transmission investments that improve diversity of resources and provide ratepayer benefits.
- Finally, the state should develop a program targeting low-income households for electric efficiency upgrades.

This energy plan is outlined by section, and includes a detailed assessment of Maine's hydropower potential that was conducted by Kleinschmidt Associates. We look forward to working the specific policy proposals in the months and years to come.

Sincerely,

Patrick Woodcock
Director
Governor's Energy Office

Residential Thermal (Heating) Sector

Key Conclusions from 2009 Plan

1) Oil, the primary heating fuel used by Maine households, had increased dramatically in price, and was also subject to significant price volatility due to changing world market and political conditions (price per gallon in 2008 fluctuated from $2.26 to $4.74 per gallon);
2) Imported oil was a drain to the Maine economy, as 85% of the money spent on oil left the state; and
3) Continuing to rely primarily on oil for home heating, with its high costs and price volatility, was not sustainable for most Maine citizens.

Primary Residential Sector Objectives of 2009 Plan

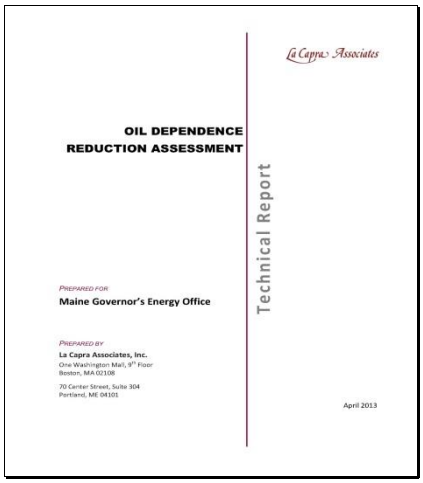
- Establish a goal for weatherizing 100 percent of residential homes by 2030;
- Aggressively provide opportunities for residents to invest in energy efficiency, including audits and financing mechanisms;
- Increase utilization of existing residential energy efficiency loan programs;
- Increase the number and availability of energy efficient heating systems and appliances in the state;
- Develop residential auditing workforce;
- Promote natural gas as a transitional fuel.

Maine Action Since Release of the 2009 Energy Plan

- ***Expand energy efficiency programs.*** Efficiency Maine Trust was reorganized as an independent, quasi-state agency; funding level increased significantly in the 2013 Omnibus Energy bill, LD 1559 (Sponsor- Reps. Hobbins & Fredette, Sen. Cleveland); new efficiency programs developed; and existing efforts retooled and reworked to better serve Maine residents.

efficiency MAINE

- ***Assess the state's oil consumption, and develop plan to reduce oil use statewide.*** In 2011, the Maine Legislature enacted LD 553 (Sponsor - Rep. Fitts), "An Act to Improve Maine's Energy Security" (PL 400), which established oil consumption reduction goals, and required the Energy Office to develop a plan to meet these goals. The assessment and plan, completed in 2013, revealed that Maine residents had decreased their oil consumption by 26% from 2007 to 2010, and, overall, the state would achieve the 30% oil reduction goal under current policies and market conditions.



- ***Explore new efficient heating technologies.*** In 2012, the Legislature also passed LD 1864 (Sponsor – Senator Thibodeau) "An Act to Improve Efficiency Maine Trust Programs to Reduce Heating Costs and Provide Energy Efficient Heating Options for Maine's Consumers"(PL 637). In this bill, the state's investor owned electric utilities (CMP, Bangor Hydro, and Maine Public Service) were authorized to conduct pilot programs for adoption of efficient electric heating technologies. This program, first proposed by Governor LePage, resulted in the installation of 1,000 energy efficient heat pumps by Bangor Hydro and Maine Public Service customers. *A description of the program, including heating savings, is available here.*

- ***Direct resources specifically to reduce residential heating costs.*** The 2013 *Omnibus Energy* bill LD 1559 (Sponsors – Reps. Hobbins & Fredette, Sen. Cleveland) for the first time allocated a portion of Regional Greenhouse Gas Initiative (RGGI) revenues to reduce home heating demand and costs. RGGI funds, combined with other eligible Efficiency Maine funds, brought the total reallocated to reduce residential heating demand to $10.25 million in FY14, and $10.29 million in FY15. This program, called the Home Energy Savings Program (HESP), assisted 6,440 Maine households in FY 14 (see chart below), and incentives leveraged an additional $21.3 million of energy efficiency and heating upgrades.

Home Energy Savings/Loan Program (MMBtu) Results, FY14 and FY 15*

	Total Participants	Total Installations	Annual MMBtu Savings	Lifetime MMBtu Savings	Efficiency Maine Costs	Participant Costs	Lifetime Energy Benefit	Benefit to Cost Ratio
FY14	6,440	6,440	61,698	1,298,009	$5,183,417	$21,363,650	$47,445,694	1.79
FY15	6,834	6,834	57,000	1,280,000	$4,483,000	$27,921,000	$46,787,000	1.96

**FY 15 through Dec. 15 (preliminary data)*

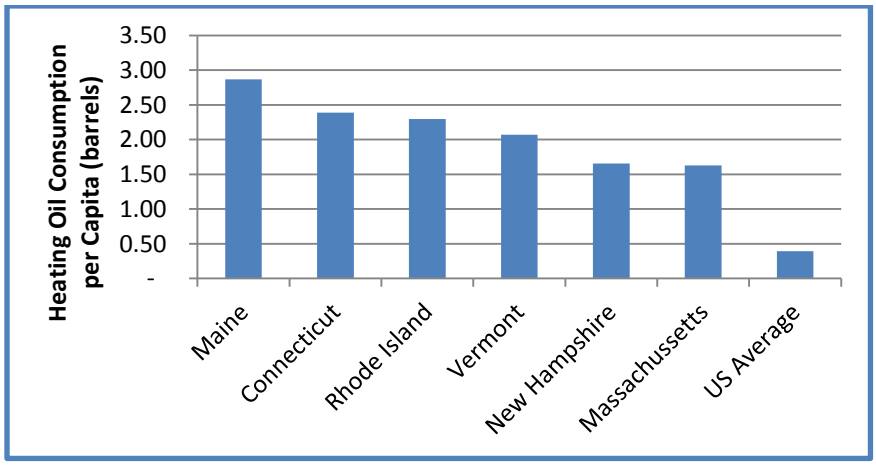
- ***Expand availability of natural gas to residential sector.*** Summit Utilities, certified as a Maine natural gas company in 2012, has invested approximately $300 million in a natural gas distribution system in the Kennebec Valley and in residential areas north of Portland. The Maine PUC approved a rate structure whereby Summit was permitted to offer rebates for conversion costs ($1,500 per household; $4,000 for LIHEAP eligible homeowners, in addition to several hundred dollars for air sealing services). In 2013 and 2014, an estimated 8,000 residential homes have converted to natural gas by the four natural gas local distribution companies, Bangor Natural Gas; Maine Natural Gas; Summit Natural Gas; and Unitil.

Continuing Challenges

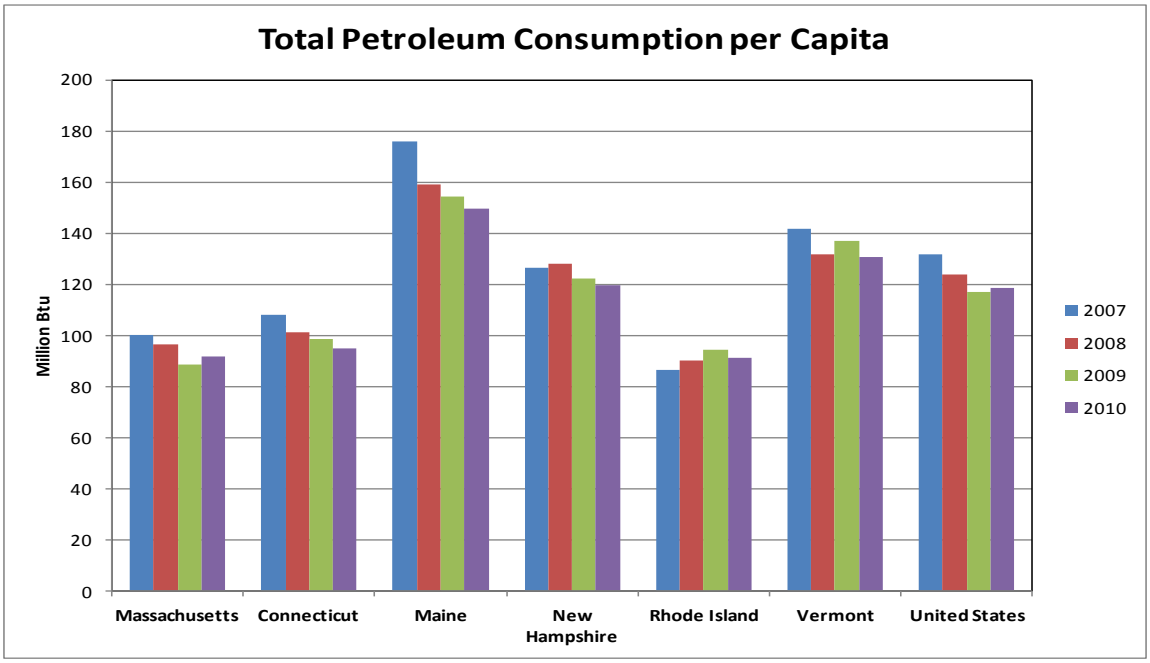
Residential Heating Costs remain unaffordable and there continue to be significant emissions from this sector. Heating costs and our reliance on inefficient petroleum heating systems continue to be one of the state's most significant energy challenges.

Petroleum usage by residents. Although heating oil use has declined since the 2009 energy plan (75% of Maine households in 2008 to an estimated 64.2% in 2013), Maine *remains the most petroleum dependent state* for home heating.

2012 Heating Oil Consumption, New England and US Average



Total Petroleum Consumption per Capita, New England States, 2007-2010*



*Data from EIA State Energy Data System (SEDS) http://www.eia.gov/beta/state/seds/

Maine households have been given a short term reprieve from escalating heating costs, due to the significant decline in oil prices over the last several months. Reduced global demand and increased U.S. oil production are behind the price declines, and these circumstances could change quite rapidly (see EIA short term energy outlook, below).

EIA Short Term Energy Outlook – January 13, 2015

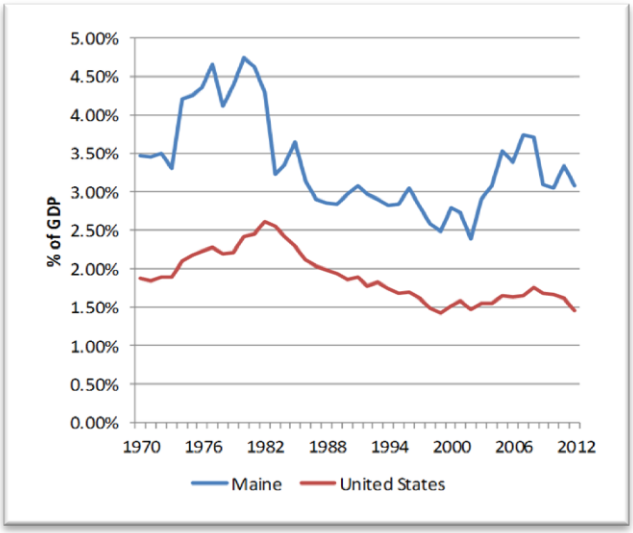
	2013	2014	2015 (projected)	2016 (projected)
WTI crude oil, $ per barrel*	$97.91	$93.26	$54.58	$71.00
Brent crude oil, $ per barrel	$108.64	$99.02	$57.58	$75.00
Gasoline, $ per gallon**	$3.51	$3.36	$2.33	$2.72
Diesel, $ per gallon***	$3.92	$3.83	$2.85	$3.25
Heating Oil, $ per gallon	$3.78	$3.71	$2.71	$3.03
Natural Gas, $ per thousand cubic feet	$10.30	$11.00	$10.63	$11.00
Electricity, cents per kwh****	$12.12	$12.50	$12.63	$12.86

*West Texas Intermediate.
**Average regular pump price.
***On-highway retail.
****U.S. residential average.

What is certain is that petroleum prices remain volatile, and there is a significant range in long-term oil forecasts.

Unsustainability of current heating costs. Most Maine homeowners pay more for heating oil than any other energy expense (from $2,460 annually in 2009 to almost $3,400 in 2012). Maine pays a higher percentage of its GDP on residential energy than any other state in the country, largely due to high heating costs.

Maine vs. United States Residential Energy Expenditures
As a Percent of Gross Domestic Product, 1970-2012



2012 National Comparison

State	Residential Energy Expenditures/ GDP (%)	National Rank
CA	0.90%	1
US Avg.	1.54%	-
NE Avg.	2.37%	-
ME	**3.09%**	**50**

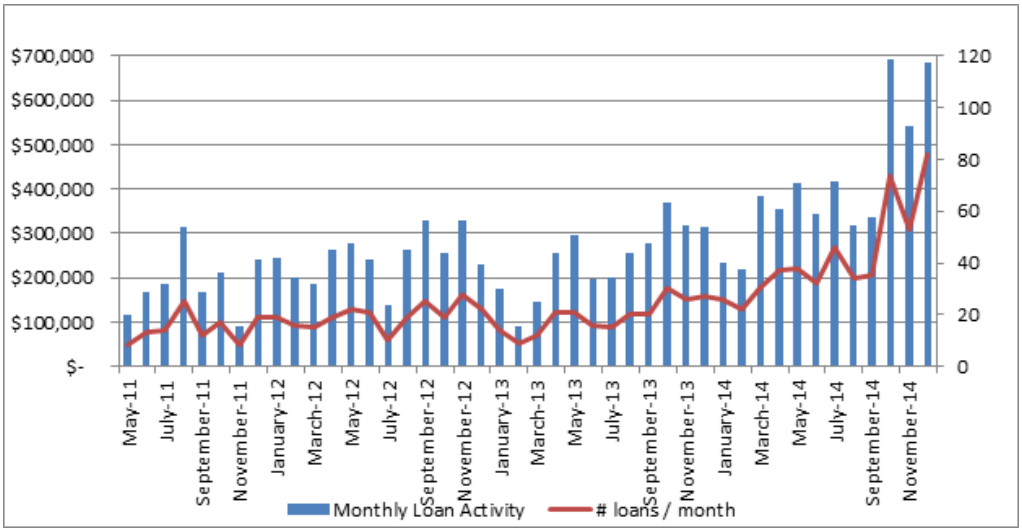
Most Maine residents reside in areas too rural to access lower priced natural gas. Most of the state's residents will never see pipeline gas, as it is not cost effective to build natural gas distribution systems in highly rural areas, where most Mainers live (Maine Energy Profile). Therefore, most will continue to rely on a combination of delivered fuels (heating oil, kerosene, and propane), wood, and electricity to stay warm.

Energy efficiency programs have been disproportionately focused on electricity use, not heating costs. Historically, most energy efficiency programs have been supported through a fee on electric bills, so their focus has been exclusively on electric efficiency. While increasing efficiency of residential electricity use is a laudable goal, heating costs remain the most significant household energy expense. In 2012, the average Maine household spent $900 on electricity, and $3,400 on heating oil. Funding for residential energy efficiency is not aligned with the most significant household energy expenditure, heating costs.

State resources devoted to heating costs. The state has made significant progress toward addressing this enormous challenge; however, current programs are capturing a

fraction of the opportunity. According to the U.S. Census, in 2013 there were approximately 547,686 occupied residential dwellings in the state, and of those, almost half were built before 1970. The current home energy savings program (HESP) at Efficiency Maine served 6,400 households in FY 2014, slightly more than half the goal set out in the 2009 plan. In addition to issuing rebates, EMT also received 1,452 applications[1] for energy loans, and successfully closed on 317 of those loans, totaling $3.6 million in residential energy upgrades. For the first 6 months of FY 2015, Efficiency Maine has received 1,017 loan applications[2], and successfully closed 282 loans totaling $2.6 million, with an average project cost of $9,400. Factors contributing to the increased uptake in loan activity include an improved economy, increased marketing of HESP rebate program, and the availability of additional loan products. Below is a chart illustrating how the rebate program has catalyzed activity in the home energy loan program.

Efficiency Maine Loan Program Monthly Closing Activity



Low-income households. Current programs are not reaching those disproportionately affected by increased heating costs, i.e., the low and very low-income households. The state administers a federally funded fuel assistance program, the Low Income Home Energy Assistance Program, which will deliver approximately $37.7 million in heating assistance for roughly 50,000 households this year. Most, if not all of these households do not have the upfront capital to invest in energy efficiency measures or more affordable heating systems, despite the availability of rebates and low interest loans. Efficiency Maine has a small program for low income households. For the past few years, Efficiency Maine has used these funds to install cold climate heat pumps in

[1] Loan application decline rate of 38% in FY 14
[2] Loan application decline rate of 24% in first 6 months of FY 15

multi-family units. In FY 2014, the program served 123 households; in FY 2015 (to date), the same program has helped 139 low income families, with more installations expected by year's end. As the chart at the end of this section indicates, there are significant opportunities for lower income households to save on their energy costs with the use of a heat pump. This year, only $1 of every $35 spent in the federal LIHEAP program is allocated toward weatherization measures. Maine State Housing administers the Weatherization (WAP) and Central Heating Improvement Programs (CHIP); Efficiency Maine provides some additional resources to this program to permit the installation of more efficient heating equipment, or an air source heat pump. However, funding is quite limited; this past heating season (2013-14), Efficiency Maine's resources enabled only 51 LIHEAP eligible households to receive efficient heating system upgrades, and there are lengthy wait lists for eligible households to receive federal weatherization grants. However, as the chart at the end of this section indicates, there are opportunities for low income households to reduce their costs.

2015 Maine Energy Goal for Residential Heating

Continue the progress the state has made toward reducing heating costs for Maine families, by significantly increasing opportunities for residents to install energy efficiency improvements and more affordable heating systems.

Policy Recommendations

- ***Target resources to lower heating costs.*** In just three short years, over 10,000 cold climate heat pumps have been installed in Maine homes through the Home Energy Savings Program. However, these households represent a fraction of the opportunity available to increase thermal efficiencies and reduce home heating costs. Additional resources should be allocated to the residential program, so that 10,000 households per year can participate, the goal stated in the 2009 energy plan. Possible funding options could include the following: continued use of Forward Capacity Market (FCM) funds; expanded use of Regional Greenhouse Gas Initiative (RGGI) revenues; revenue from increasing harvesting on state lands; and using potential lease payments from use of the interstate highway corridor for energy infrastructure. **The state should prioritize this energy challenge and work to provide $10 million annually (roughly $1,000 for 10,000 households) to accelerate the transition to cleaner and more affordable heat.**

- ***Expand financing methods.*** The state should work with utilities to develop on-bill financing programs or loan programs in order to allow Mainers to install energy efficiency measures and more efficient heating systems in their homes. On-bill financing would eliminate the major obstacle to energy savings that many Mainers face, which is the upfront capital cost of the improvements.

- ***Assist low income population with targeted program.*** Create a specific low-income heating program in collaboration with Maine Community Action Program, Efficiency Maine Trust, and Maine State Housing Authority. The program could include financing options for upgrades in heating systems and efficiency improvements, at level that would be accessible for our lowest income households. Summit Natural Gas has a low income program available now, where most of the cost of a new natural gas system would be paid for, with a combination of funding from Summit and Efficiency Maine. However, the relatively small contribution needed from the low-income applicant remains an obstacle. Efficiency Maine (or EMT and the state) should work with the state's philanthropic organizations to redirect heating assistance resources to better address old and inefficient heating systems for low income households.

- ***Define weatherization and determine progress.*** While the State continues to invest in weatherization with both federal and state resources, we do not have metrics established to determine the standard of efficiency that we are attempting to achieve, or the number of homes that have been "weatherized." Clearly define energy efficiency, so progress toward weatherizing homes and businesses can be measured, thereby improving accountability regarding the use of state resources. Goals should be based on measurable metrics.

- ***Target natural gas expansion.*** Work with the municipalities of Ellsworth, Belfast, Rockland, Farmington, and Presque Isle, to expand natural gas infrastructure that could ultimately serve residential customers.

Commercial and Industrial Sector

Key Conclusions from 2009 Plan

1) In 2007, 80% of Maine businesses (and residents) were dependent on petroleum products for heating and transportation;
2) Unprecedented increases in the price of heating oil, gasoline, and diesel fuel in 2008 were adversely affecting the viability of Maine business and industry;
3) Billions of dollars were exported out of the state to pay for foreign oil; this reduced the availability of capital for these businesses to improve and expand, as well as their ability to compete with businesses in areas not as dependent on oil.

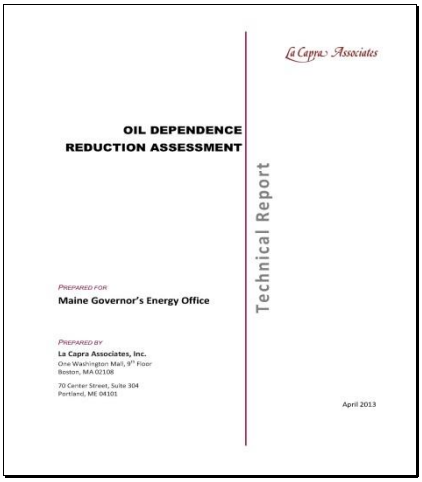
Primary Commercial and Industrial Sector Objectives of 2009 Plan

- Expand use of natural gas as a transitional fuel;
- Reduce peak load energy consumption;
- Aggressively provide opportunities for business and industry to invest in energy efficiency, including energy audits and financing mechanisms, including grants, loans, and private funding;
- Develop an interdisciplinary energy SWAT team to assist large industries and manufacturers in addressing their energy needs (more cost effectively);
- Establish a goal of weatherizing 50% of Maine businesses by 2030;
- Increase the development and use of cogeneration and tri-generation in the state; encourage the strategic location of district heating clusters;
- Encourage Maine's businesses to invest in distributed renewable energy.

Maine Action Since Release of the 2009 Energy Plan

- ***Expand availability of natural gas to large industrial users.*** Sappi Fine Paper's Somerset Mill in Skowhegan, Huhtamaki Packaging in Waterville, Lincoln Pulp and Paper, and UPM in Madison now all have access to lower cost natural gas to run their operations, thus making them more competitive in a global marketplace.

- ***Assess state's oil consumption, and develop plan to reduce oil use.*** In 2011, the Maine Legislature enacted LD 553 (Sponsor - Rep. Fitts), "An Act to Improve Maine's Energy Security" (PL 400), which established oil consumption reduction goals, and required the Energy Office to develop a plan to meet these goals. The assessment revealed Maine's commercial sector decreased oil consumption 20%, and the industrial sector by a significant 40% from 2007 to 2012. These reductions in oil consumption were largely all market driven, and were not the result of significant government intervention. Under current technologies, programs, and market conditions, the state will attain the 30% oil reduction goal by 2030.



- ***Develop and implement program to assist large industrial users to increase electric efficiency.*** Two of the 2009 plan's recommendations – develop a SWAT team to assist large industrial operations, and provide opportunities for these large energy users to become more energy efficient – have been embodied in Efficiency Maine's large customer program. Efficiency Maine reaches out to these large energy users (e.g., manufacturers, hospitals, food processors, office complexes), and assists them to develop an energy reduction plan. The companies then apply to a 50-50 cost share program for the upgrades. For example, Jasper Wyman and Sons, a large blueberry processor, worked with Efficiency Maine to upgrade their refrigeration and automate electric controls, so the company could save $90,000 per year in electricity costs. Cuddledown, a manufacturer of high-end bedding, partnered with Efficiency Maine to update the lighting in their warehouse. By changing out older fluorescent tubes to LED lamps with motion sensors, the company will save approximately $70,000 in annual electricity costs. Efficiency Maine's Large Customer Program participants from 2010 to 2013 are listed at the end of this section.

- ***Additional funding source developed to assist large, energy intensive industrial users install energy efficiency improvements and invest in distributed renewable energy.*** LD 1647 (Sponsor – Rep. Berry), "An Act to Enhance Maine's Clean Energy Opportunities" (PL 518), directed the Public Utilities Commission to authorize a long term contract between Maine's t&d utilities and Efficiency Maine (title 35-A M.R.S.A. § 3210-C(2) for energy efficiency capacity resources and related energy, or EECRs. Through a competitive bid process, Efficiency Maine is to 'procure' energy capacity through energy efficiency and distributed generation at large,

energy intensive facilities. Efficiency Maine provides the upfront capital, and is then reimbursed for the savings by t&d utilities. For FY 2015, Efficiency Maine is authorized by the Maine PUC to procure $7 million in energy efficiency/distributed generation. The costs of these efficiency efforts are ultimately borne by electric ratepayers.

- ***The Governor and state officials have pursued economic development opportunities with Canadian provinces.*** New England has worked with Quebec and the other provinces to improve the potential of acquiring low and no-carbon, renewable energy (electricity) from Canada.

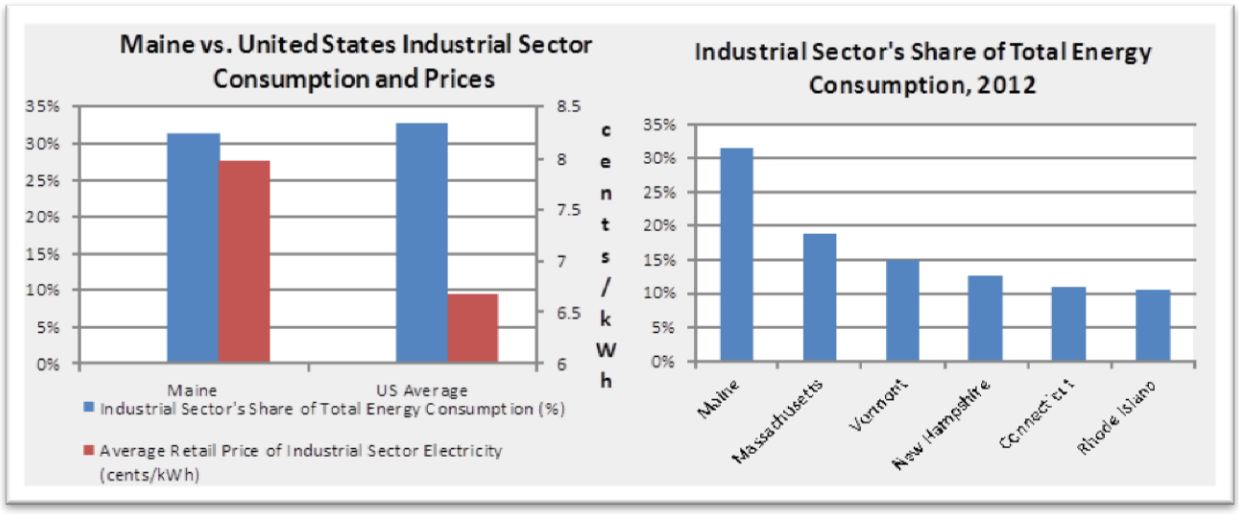
Continuing Challenges

Massive natural gas infrastructure constraints have resulted in skyrocketing electricity costs, particularly during the winter months, for many commercial and industrial users in the state that are subject to wholesale electric and natural gas prices.
These constraints have led ISO-New England to develop winter reliability programs to ensure reliability of the electric grid. While the oil and world LNG price reductions over the last six months have significantly relieved the wholesale market, Maine continues to severely susceptible to New England gas pipeline capacity constraints.

Last winter, constraints on existing natural gas pipelines caused the wholesale price of electricity to skyrocket, forcing some Maine manufacturers and other energy intensive businesses to cease operations and idle workers. These curtailments are occurring this winter as well, and will continue until additional pipeline capacity is constructed into the region. One recent example is Madison Paper, which has shuttered operations for several weeks due to high energy costs http://www.pressherald.com/2015/01/13/madison-paper-industries-to-shutter-for-weeks-lay-off-some-employees/ . This situation is anticipated to be exacerbated after 2017 as more of New England converts to natural gas for heating, and the region becomes even more dependent on natural gas for the generation of electricity. Even if additional pipeline capacity was approved today, it wouldn't be constructed and become available for Maine businesses for another three years.

Energy is so expensive in Maine that it curtails new business investment, and is one of the primary reasons energy intensive businesses close or relocate. According to the Energy Information Administration, Maine is one of only three states where the industrial sector consumes more than 30% of the state's electricity – yet our electric rates are significantly above the U.S. average. Our energy intensive businesses do not compete with others in New England; they instead compete with operations in other countries, and in lower priced areas in this country, namely the

South and Midwest. Below are some graphs that illustrate how Maine differs from the rest of New England, and the U.S. average.



For example, just this past year, three paper operations – Verso in Bucksport; Old Town Fuel and Fiber; and Great Northern in E. Millinocket closed their doors, and left approximately 1,000 Mainers out of work (Maine Fuel and Fibre has since reopened under new ownership). High energy costs were cited as one of the primary reasons for the closures; these facilities simply could not compete with operations in other states and other countries. The Governor has had personal calls with major manufacturers that are interested in Maine's geographic location, but the energy prices are not competitive.

The Bangor Daily News recently conducted a statewide poll on the 10 most pressing issues critical to growing the state's economy, and the results of the poll indicate the cost of energy was the #1 challenge facing the state.

Even successful manufacturing operations cannot operate during times of peak demand for their product, because the cost of electricity exceeds the value of the end product. For example, Maine Woods Pellet Company in Athens spent 63% more on electricity for the first ten months of 2014, than they spent in all of 2011. Due to prolonged colder temperatures in New England last winter, there was a shortage of wood pellets. But instead of making more pellets, the company had to shut down on occasion due to electricity costs that peaked at 80 cents/kwh. At that price, the electricity costs exceeded the value of the pellets. According to the company, if the company had shut during all the periods when it was uneconomic to operate because of electricity prices, many households in New England would have been without heat (pellets).

Maine's many small businesses, already burdened by high energy costs, do not possess the financial resources to absorb the dramatic price increases

experienced last winter, and continuing this winter. Johnson Outdoors, manufacturer of canoes and kayaks in Old Town, consolidated its Washington state operations in Maine because of low natural gas prices. Over the last couple of years, they began experiencing price increases for both electricity and natural gas. From 2014 to 2015, their electricity will increase 39%, and natural gas 21%. They face competition from companies not burdened with these costs, and struggle with pricing themselves out of the market. Another example is Integrity Composites, a manufacturer of composite decking in southern Maine employing 18 people. Despite only operating their machinery three days a week, their electricity bill is $180,000 per year, their largest variable operating expense. Continued price spikes will affect their ability to maintain employment and expand their business. And Jeff Ingalls, who operates a convenience store in Bangor employing 8 people, has seen the electric bill for his store double from October 2014 ($2,300) to January 2015 ($4,100). Mr. Ingalls does not have the ability to absorb these increases, and because of the price hikes, he does not have the capital to invest in efficiency to help lower his bills. This scenario is occurring across the state.

"The fact is, we have very competitively priced electricity and natural gas for nine months out of the year, but as every business knows, you can't shut down for three months," said Patrick Woodcock, Maine Energy Office Director. "We are very close to having the world's very best natural gas reserves. Unfortunately, the region [New England] has not followed Maine's leadership in building a natural gas infrastructure to supply our businesses and employers." *BDN 10/7/14*

"These natural gas price spikes are like signal flares, warning us that there could be an economic disaster ahead for New England consumers and businesses. We need to bolster our capacity to bring domestic natural gas into New England." *Senator Edward Markey, D-Massachusetts, to Boston Globe 1/10/14*

2015 Maine Energy Goal for Commercial and Industrial Sector

Continue to work regionally, and as an individual state, to successfully expand natural gas transportation infrastructure into New England and into Maine, to restore reliability to the regional grid, and with the longer term goal of reducing the state's electricity costs to the national average. Regional reports to NESCOE, the State of Massachusetts, and Maine Public Utilities Commission have all suggested that an additional billion cubic feet per day could be significantly cost-effective for regional ratepayers.

Policy Recommendations

- ***Continue the regional process (NESCOE) to achieve a unified regional agreement to expand natural gas pipeline capacity into the region.*** In 2014, The New England States Committee on Electricity (NESCOE) made significant progress toward reaching an agreement to bring additional natural gas pipeline capacity, as well as additional electric transmission from Canada and northern Maine, into the region. The six state coalition's work was suspended in late summer, when Massachusetts withdrew from the process. Newly elected state leaders bring an opportunity to restart this process, and Maine should take a leadership role toward finalizing an agreement for additional infrastructure.

- ***Continue evaluating cost-effective options for expanding the state's natural gas transportation infrastructure through the Maine PUC process (docket # 2014-00071).*** In 2013, LD 1559, also called the *Omnibus Energy* bill (PL 369; sponsors - Reps. Hobbins & Fredette, Sen. Cleveland), included a provision for addressing the natural gas capacity shortage into the region. The legislation authorized the Maine PUC to evaluate cost effective options for the state to increase natural gas infrastructure (independent of a regional solution), and to contract with pipeline companies for capacity that benefits Mainers. Phase I of the process has concluded, and Phase II, where pipeline companies submit their proposals for evaluation, is underway.

- ***Explore options for improving the credit-worthiness of key employers to reduce their energy costs.*** In Maine's de-regulated electricity market, large electricity users negotiate their own electricity supply from a competitive electricity supplier (CEP). These CEPs base their rates partly on the credit rating of the company for which they are providing electricity, i.e., companies with the best credit rating would receive a lower rate. The state could establish a mechanism to bolster the credit rating of selected energy intensive companies over the life of the electricity contract, e.g., letter of credit or a contract guarantee, so they might negotiate a lower rate with suppliers, or pursue authority for manufacturers to obtain credit enhancements for firm natural gas capacity.

- ***Provide more assistance to small businesses to reduce their energy costs.*** Small and medium sized businesses often lack knowledge, time and resources to address energy costs on their own. Efficiency Maine (EMT) has a business incentive program, but many small businesses do not have the up-front capital, staff resources, or technical knowledge necessary to participate in the EMT program; many are not even aware of the Efficiency Maine's technical assistance or financial incentive programs. Dedicated technical assistance services for small businesses may remove an initial obstacle to participation.

- ***Focus renewable energy subsidies on the most cost effective options.*** Energy costs are one of the most significant costs for commercial and industrial users, so above

market costs for renewable energy can impact commercial and industrial electric bills, and reduce their ability to compete with companies in other locations. Renewable energy policy, to the degree that it relies on ratepayer subsidies, should focus on the most cost efficient options (see renewable energy sector for more detail).

- ***Explore options to increase co-generation and district heating clusters for businesses.*** Increasing the development and use of cogeneration (combined heat and power, or CHP) as well as the strategic siting of district heating clusters, was recommended in the 2009 plan, but no significant progress has been made in this area. Aggregation of consumers is not occurring under current market conditions. The state should explore ways to promote and encourage development of CHP and district heating clusters.

Commercial and Industrial Sector Appendix
Efficiency Maine Trust's Large Customer Program Projects
2010-2013

Business	Town	Incentive	Private Match	Contractor/ Vendor	Lifetime Energy Savings kWh	Project Description
Bowdoin	Brunswick	$400,000	$3,400,000	Sullivan and Merritt Constructors, Scarborough, ME Paul Mercer, Penobscot ME Richard Renner Architects, Portland, ME Shelley Engineering, Westbrook, ME Verrill Dana LLP, Portland, ME HP Cummings, Winthrop, ME The Babcock and Wilcox Company, Yarmouth, ME Turbosteam, LLC, Turners Falls, MA Webb Pump, Cranston, RI RMF Engineering, Baltimore MD	16,341,000 kWh	Bowdoin College replaced a 46-year-old oil-fired steam boiler at the central utility plant with a new combined heat and power system. The plant provides heat to 75% of the campus and 400kW of electric power. The CHP project reduced campus energy consumption by 9% and the college's greenhouse gas emissions by 18%.
Cumberland County Jail	Portland	$165,000	$197,157	American DG, Waltham, MA	14,292,810 kWh	American DG Energy installed and operates two natural gas-fueled generators at the Cumberland County Jail that provide electricity, domestic hot water and space heat used on site. The company sells the energy produced from the units to the Cumberland County Jail at a discounted rate. These distributed generation units produce an average of 79,404 kWh a month. Over the life of the project, the Cumberland County Jail will save over $100,000.
Huhtamaki	Fairfield	$400,000	$850,000	Trask-Decrow Machinery, Portland, ME Horizon Solutions, Portland, ME	29,715,000 kWh	Huhtamaki installed variable speed drives and higher-efficiency vacuum pumps to target energy savings in two areas of the plant. Vacuum is required for smooth molding machines to manufacture paper products. Huhtamaki installed new vacuum pumps with variable frequency drives that control the vacuum level on each individual machine. The previous system supplied a constant vacuum level for a number of machines, regardless of the volume of operation. The upgrade has significantly reduced the energy intensity of the vacuum process as

Business	Town	Incentive	Private Match	Contractor/ Vendor	Lifetime Energy Savings kWh	Project Description
						well as guaranteeing more consistent production.
Huhtamaki	Fairfield	$155,000	$155,000	Trask-Decrow Machinery, Portland, ME Horizon Solutions, Portland, ME	12,228,765 kWh	Huhtamaki bundled three different kinds of energy saving measures for this project. Inefficient compressors in the plant's high pressure and instrument air systems were replaced with high-performance models. Huhtamaki also replaced a number of inefficient lighting fixtures and installed variable frequency drives on two river water pumps that feed process water to the plant.
Irving Forest Products	Dixfield	$706,543	$706,542	Thermal Systems, Inc., Scarborough, ME	84,466,100 kWh	Irving added a steam turbine and generator to an existing biomass boiler to simultaneously generate steam and electricity. While the boiler can maintain its primary function of heating the facility and drying wood, the turbine now generates enough electricity to displace 4.2 million kilowatt hours or 23% of what the plant purchased from the grid. The upgrade significantly reduced energy expenses for the facility as well as demand on the grid.
Irving Forest Products Inc	Dixfield	$471,000	$471,000	The Fitch Company, Mexico, ME Ryan Mechanical Services, Rumford, ME SCS Forest Products, Sheridan, CO	23,331,860 kWh	Irving Forest Products was using a static time-based drying schedule that did not account for variability in wood stock. The company was able to improve the wood product drying process, improve customer satisfaction, and significantly reduce energy costs with the installation of a kiln that will monitor the wood moisture content as it dries. The change reduced energy consumption by allowing the company's kilns, fans, and boilers to operate more efficiently saving nearly 13% of the mill's annual energy expense or 2.3 million kilowatt hours a year.
Jackson Lab	Bar Harbor	$369,011	$369,011	Kinney Electric Co., Brewer, ME ABM Mechanical, Inc., Bangor, ME Turbosteam, LLC, Turners Falls, MA	38,306,300 kWh	Jackson Lab installed a back pressure steam turbine to convert its wood pellet-fired boiler into a combined heat and power plant. Housed in a new 4,000-square-foot energy center, the steam turbine reduces demand to the grid by 574 kW a year and is projected to save the laboratory an estimated $2 million annually. Jackson Lab's switch to combined heat and power fueled by wood pellets is part of the organization's commitment to improve the local environment and stimulate the local economy.

Business	Town	Incentive	Private Match	Contractor/ Vendor	Lifetime Energy Savings kWh	Project Description
Lewiston - Auburn Water Pollution Control Authority	Auburn	$330,000	$487,000	TBD	28,925,180 kWh	The L-A Water Pollution Control Authority recently switched from composting and disposing of biosolids to an anaerobic digestion method. Methane produced from the digester will directed to a cogeneration system to create electricity and heat for use at the facility. The system will reduce LAWPCA's need to purchase power by approximately 66%; LAWPCA will be able to generate the electricity needed to meet the demands of the digestion process as well as other treatment plant equipment.
Madison Paper Industries	Madison	$725,000	$725,743	Metso Paper USA, Inc., Norcross, GA	92,734,660 kWh	Wood grinding to create pulp is one of the most energy intensive aspects of the paper-making process. Utilizing new pressurized stone grinder technology, Madison Paper has reduced the energy intensity of the wood grinding process by 20%. These new grinders are smoother and more even than conventional grinders, allowing more pulp to be ground with less energy.
Madison Paper Industries	Madison	$481,400	$481,587	Metso Paper USA, Inc., Norcross, GA	60,494,670 kWh	The productivity increase resulting from the switch from conventional to pressurized stone grinders was so dramatic that Madison replaced two additional stone grinders at their facility. The upgrade resulted in a 20% reduction in energy use and a 21% increase in production. This increase in productivity has allowed Madison to grind the same amount of pulp with fewer stones.
Mid Coast Hospital	Brunswick	$109,026	$262,417	Energy Management Consultants, Inc., South Portland, ME	6,695,780 kWh	Mid Coast Hospital partnered with Energy Management Consultants, Inc. to replace approximately 2,900 lighting fixtures. The new lamps, including T8 lamps with low power electronic ballasts and LEDs, are estimated to reduce the hospital's energy consumption by 515,060 kWh annually. These electric savings are estimated to reduce operating costs by $57,171 a year at current electric rates.

Business	Town	Incentive	Private Match	Contractor/ Vendor	Lifetime Energy Savings kWh	Project Description
Mid State Machine	Winslow	$146,757	$156,876	Energy Management Consultants, Inc., South Portland, ME	11,430,952 kWh	Mid State Machine undertook a large-scale lighting upgrade to reduce electric consumption in two buildings at its Winslow facility. The upgrade included switching from T12 to T8 lamps with low-power electronic ballasts, and replacing metal halide fixtures with high intensity fluorescent fixtures. LEDs were also installed in exit lights. The retrofit reduced the facility's energy consumption by 879,304kWh a year and is estimated to save Mid State Machine $80,016 a year in operating costs.
Moose River Lumber	Jackman	$450,000	$850,000	Thermal Systems, Inc., Scarborough, ME	56,334,500 kWh	A steam turbine and generator were added to Moose River Lumber's existing biomass boiler to simultaneously generate steam and electricity. The turbine now generates about 2.8 million kilowatt hours a year or 40% of the facility's electric load on site. The resulting reduction in Moose River's electric costs allowed the facility to add three jobs while retaining the 66 full-time and 5 part-time workers currently employed at the plant.
Portland Water District	Portland	$300,000	$1,607,670	CDM Smith, Cambridge, MA D & C Construction, Co., Rockland, MA	35,464,230 kWh	The Portland Water District broke ground this year on an energy-efficient UV water treatment plant. The UV system will provide new purifying capabilities while reducing overall energy costs. The two-treatment units will feature 84 UV lamps that will treat water molecules as they pass through pipes, up to 52 million gallons of water a day. The project will significantly reduce energy costs for PWD rate payers; the water treatment facility will use 2,364,282 fewer kWh, and save approximately $192,710 annually.

Business	Town	Incentive	Private Match	Contractor/ Vendor	Lifetime Energy Savings kWh	Project Description
Rumford Paper Company (New Page Corp.)	Rumford	$340,000	$458,165	AMEC, Portland, ME The Fitch Company, Bangor, ME Waugh's Mountain View Electric, Rumford, ME James O. Carter Company, Standish, ME Cianbro, Pittsfield, ME Kenway Corporation, Augusta, ME Sullivan and Merritt Constructors, Scarborough, ME Hahnel Bros. Co., Lewiston, ME Alfa Laval, Inc., Richmond, VA	29,486,796 kWh	This mill-wide lighting retrofit replaced 1,271 existing low-efficiency fixtures with high efficiency fixtures reduced Rumford Mill's electric consumption by 2,457,233 kWh a year. The project reduced demand on the grid and allowed Rumford Mill to enhance the economic viability of the Rumford facility.
SAPPI	Skowhegan	$300,888	$300,112	Horizon Solutions, Portland, ME Maine Industrial Repair Services, Inc., Augusta, ME Cianbro, Pittsfield, ME Gilman Electrical Supply, Newport, ME New England Controls, Inc., Bangor, ME URS Energy and Construction, Birmingham, AL	32,793,330 kWh	Sappi Fine Paper retrofitted its Skowhegan facility with variable-frequency drives on ten major process equipment systems. In the past, flow was controlled by valves paired with single-speed motors sized for full flow. This energy intensive method has been upgraded to a system that controls flow with variable pump speed. The pumps are able to read production needs and ramp up or ramp down to match demand. The upgrade reduced Sappi's electric consumption by 4,099,167 kWh a year, which is roughly equivalent to the annual energy consumed by 500 homes annually.
State of Maine	Augusta	$750,000	$3,345,000	PC Construction Company, Portland, ME Turbosteam LLC, Turners Falls, MA	18,620,000 kWh	The Bureau of General Services paired its new wood fired biomass boiler system with a cogeneration turbine serving the East Campus state office facility. This campus houses 16 different state departments and agencies. The biomass central plant provides steam heat to the campus's buildings and the turbine offsets the annual purchase of approximately 931,000 kWh.
Sugarloaf	Carrabassett Valley	$301,149	$702,681	Jordan Lumber , Kingsfield, ME Snow Economics, Natick, MA Crestwood Tubulars, St. Louis, MO	24,639,520 kWh	Snow making ensures consistent snow cover at Sugarloaf, but it's an energy- and cost-intensive process. The ski resort has replaced 300 of its snow guns with high-efficiency HKD Impulse snowmaking units. The new units produce more snow per hour of operation, while consuming significantly less compressed air. The upgrade to high- efficiency snow making will reduce electric energy consumption by 1,231,976 kWh per year or 4.09

Business	Town	Incentive	Private Match	Contractor/ Vendor	Lifetime Energy Savings kWh	Project Description
						kWh per grant dollar requested.
Sunday River	Newry	$312,900	$730,100	Snow Economics, Natick, MA Atlas Copco Constructions Mining Technique USA LLC, Philadelphia, PA Crestwood Tubulars, St. Louis, MO	21,919,000 kWh	Last year Sunday River Ski Resort made a $1 million investment to make snow- making more efficient, allowing the resort to make more snow on more trails using less energy. The HKD Impulse snow guns are the most energy-efficient on the market and use up to 90% less compressed air than conventional snow guns. The projected annual energy savings from the project is 1,095,950 kWh per year and 21,919,000 kWh over the life of the project.
Twin Rivers Paper Company	Madawaska	$198,240	$102,124	Horizon Solutions, Portland, ME	29,750,400 kWh	Twin Rivers Paper Company identified a number of electrical energy-consuming applications for efficiency improvements that were submitted in two rounds of funding. These projects included a number of pumps that could be converted from constant speed to variable speed to better track production levels. These pumps move materials and pulp between different internal process stations, as well as river water into the facility.
Twin Rivers Paper Company	Madawaska	$301,960	$301,960	Horizon Solutions, Portland, ME	30,651,260 kWh	In addition to retrofitting constant speed pumps to variable speed applications, Twin Rivers also modified a number of existing drives for greater efficiency. Combined, these projects have reduced the facility's annual electrical consumption by 3,065,126 kWh and demand on the grid.

Business	Town	Incentive	Private Match	Contractor/ Vendor	Lifetime Energy Savings kWh	Project Description
University of Maine	Orono	$300,000	$1,113,085	Wright Ryan Construction, Inc., Portland, ME Emerald Environmental Technologies, Wentworth, NH	14,793,980 kWh	UMaine Orono's Alfond Arena underwent significant renovations to reduce the facility's energy consumption including the ice rink refrigeration system and the heating, ventilation, and air conditioning (HVAC) system. The new high-efficiency ice rink refrigeration system includes variable frequency drive pumps to modulate flow, reducing power consumption during lighter occupancy and lower refrigeration loads. The existing HVAC system was replaced with a new dehumidification HVAC system which provides critical dehumidification and climate control to the facility. The new systems result in higher quality ice and greater comfort for fans.
University of Southern Maine	Portland	$135,000	$200,000	Leading Edge Design Group, Enfield, NH	7,271,433 kWh	The University of Southern Maine is installing a large lighting efficiency project on its Gorham Campus, including retrofits at the Field House, the Hill Gym, and the Ice Arena. Existing metal halide fixtures were replaced with T5 and T8 fluorescent high bay fixtures with individual wireless controls. The campus also replaced metal halide and high pressure sodium exterior site lighting with high-efficiency LED lamps. These lighting upgrades are projected to save the campus approximately $61,527 a year.
Verso Paper-Jay	Jay	$460,000	$460,000	GL&V USA Inc., Nashua, NH Advanced Fiber Technologies, Sherbrooke, Canada	62,556,860 kWh	Verso Paper undertook a number of energy efficiency upgrades to its pulping air doctoring and screening systems, as well as improved the operating efficiency of its hydroelectric generation. Verso replaced compressed air being used in the pulping process with high-pressure blowers. Older, energy intensive screens were also replaced with energy-efficient screens. In addition, the facility rebuilt its flashboard system to increase the operating efficiency of its hydroelectric dam. The projects reduced the amount of electricity Verso needs to purchase from the grid, as well as increased electricity generation on site.

Electricity Sector
Wholesale Power, Transmission, and Distribution

Key Conclusions from 2009 Plan

1) Maine's electric transmission infrastructure is aging, and in need of major upgrades and expansion, for reliability purposes, to incorporate new wind development and other renewable energy projects, and to incorporate low carbon emission electricity (hydropower) from Canada;
2) Use of natural gas for residences, business, and electrical generation continues to grow, which will place increased pressure to upgrade/expand the Maritimes Northeast Pipeline serving Maine;
3) Major policy and regulatory differences exist between Maine and the regional grid operator, ISO-NE; these unresolved differences may impact the state's continued participation in the regional grid.

Primary Electric Sector Objectives of 2009 Plan

- Evaluate Maine's continued participation in the regional electric grid administrator, ISO-NE;
- Support development of electrical transmission projects in Maine for increased economic security, system reliability, lower electricity costs, and to accommodate economically and environmentally sustainable renewable energy from Northern Maine and Canada, including offshore wind;
- Support expansion of natural gas infrastructure to serve all sectors in Maine, including the state's natural gas generators;
- Reduce peak load in all sectors.

Maine Action Since Release of the 2009 Energy Plan

- ***The Maine Public Utilities Commission (MPUC) evaluated Maine's continued participation in ISO-NE.*** At the time of the 2009 Energy Plan, there was dissatisfaction with Maine's financial obligations to continue participating in the regional grid (ISO-NE is the New England grid administrator and planning agency), and a concern that the current structure was inhibiting renewable power development. The Maine PUC was charged with evaluating the state's options regarding continued participation in ISO-NE (123rd Maine Legislature, Resolve, Chapter 193), and performed an analysis in 2008 (*PUC docket #2008-156).* In 2009, the PUC recommended that Maine's transmission and distribution utilities remain in ISO-NE for another two years, while they renegotiated the terms of Maine's financial support. The Commission stated that leaving ISO-NE at that time would: 1) not provide tangible economic benefits to ratepayers; 2) it would represent a step backward in the development of energy markets;

and 3) it would introduce significant transactional risks to implement. Leaving ISO-NE to become part of the Maine Independent System Administrator (MISA), would leave the state without access to the significant technical resources at ISO-NE, and would result in a significant loss of control over energy issues to New Brunswick, Canada.

- ***Upgrades in the state's bulk power transmission system (CMP service area) are underway; the Maine Power Reliability Project (MPRP) is almost complete.*** In 2010, Central Maine Power initiated a $1.4 billion upgrade to the utility's bulk transmission system, called the Maine Power Reliability Project (MPRP). The project is an update of the utility's 40 year old transmission system, in order to maintain grid reliability and accommodate increases in load anticipated before the 2008-09 recession. Upgrades will be completed in 2015.

- ***Interagency Review Panel (IRP) established to evaluate proposed transmission or pipelines in interstate highway corridors.*** In 2010, LD 1786 "An Act Regarding Energy Infrastructure Development" (PL 655; sponsor Rep. Hinck), established a process by which companies/developers can apply to the state to build pipelines, transmission lines or other energy infrastructure along Interstate 95 corridor, as well as two other transportation corridors owned by the state. In return, the State would receive payment(s) for reinvestment in energy efficiency and renewable energy in the transportation sector. Any benefit the state would receive would be to increase Maine's development, supply and transport of reliable, clean and secure energy; create new economic development opportunities; and attract investment. As of December 2014, the IRP has: 1) developed rules and procedures by which the Panel would evaluate energy infrastructure proposals; 2) approved a letter of intent (LOI) for a developer interested in using the corridor; and 3) hired a consultant to develop an estimated range of values for use of the corridor for energy infrastructure. The applicant is Emera Maine/National Grid; the project is the Northeast Energy Link, an underground DC transmission line from Canada to Massachusetts; and the proposed route utilizes the I-95/Turnpike/I-295 transportation corridor.

- ***Energy efficiency programs have reduced the state's peak electric load.*** Through FY 2014, Efficiency Maine (EMT) delivered 171 MW of peak demand savings to ISO-NE's forward capacity market (FCM). The forward capacity market is a process by which the regional grid operator, ISO-NE, assures that there is sufficient generating capacity available from year to year. Efficiency programs can receive payments for documented energy savings that reduce demand. EMT was able to decrease 171 MW of peak (summer) demand through their efficiency programs.

Continuing Challenges

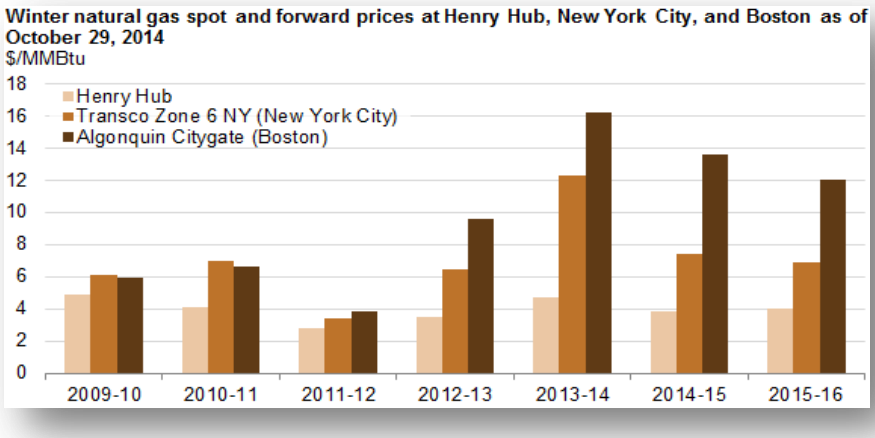
Massive natural gas infrastructure constraints are causing unprecedented increases in electric rates for both businesses and residents. Left unaddressed, these costs are, at a minimum, a significant drain to Maine's economy and place the state's businesses and industry at a significant

competitive disadvantage. The current constraints are so severe that the long term viability of the entire state's economy is threatened.

Transformation of natural gas markets across the country, with the exception of New England. In the few years since release of the 2009 plan, the markets for natural gas, oil, and other fossil fuels in the U.S. have been transformed. Adoption of new horizontal drilling techniques has resulted in domestic production of natural gas, oil, and other distillates at levels not seen in over three decades. As a result, most of the U.S. has experienced the lowest natural gas prices in years. New England has been an exception. The region's electricity market has been in a state of rapid transformation as well; in 2000, 15% of the region's electricity was produced using natural gas; by 2013, it had climbed to 46%. In addition, proposals for new generation are also primarily natural gas-fired plants. However, pipeline capacity to transport more gas to New England has not kept pace. As a result, existing pipelines are severely constrained (especially in cold weather, when heating demand is its highest), and fuel prices spike. Extremely high natural gas prices means that gas-fired electric generators do not operate, and, to maintain grid reliability, the region has relied on old and inefficient coal and oil plants to make up this deficiency.

"The strategy was expensive and dirty, but it was probably the only reason New England avoided rolling blackouts this winter." *– Forbes on ISO-NE's 2013/2014 Winter Program*

The graph below illustrates these steep natural gas costs. The 'Henry Hub' price is the benchmark price for natural gas before it is transported through constrained pipelines to New England; the 'Algonquin Citygate' price shows how much prices increase when there isn't adequate infrastructure to transport the fuel to our region. Without additional pipeline capacity, natural gas generators will face spot fuel prices three to four times higher than generators in other parts of the country.

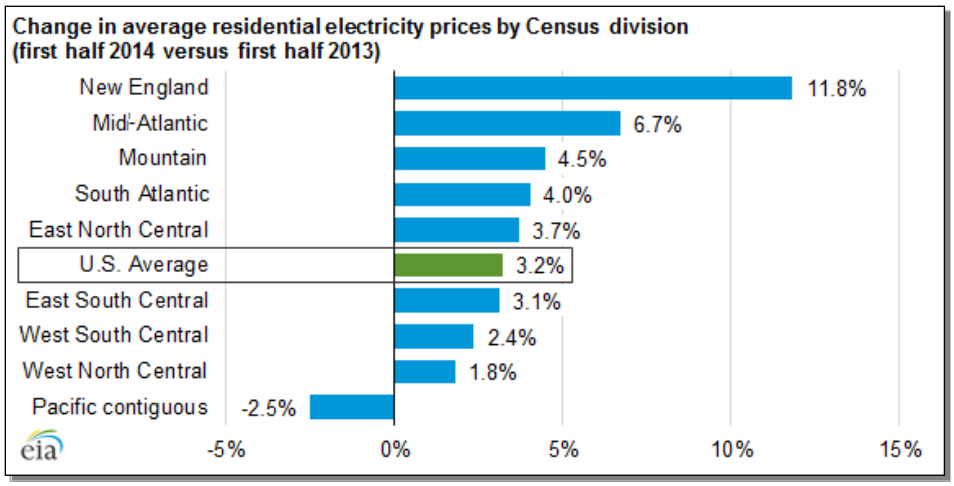


Source: U.S. Energy Information Administration, based on Bloomberg

Note: November through March are considered winter months. Forward prices for 2014-15 and 2015-16 are as of 10/29/2014.

And, although Maine has significant generation from renewable resources, the state (and region) remains susceptible to wholesale electric market pricing that is correlated to natural gas prices. For the three month period December 2013-February 2014, the wholesale cost of power for New England was $5 billion, due to high natural gas costs. Compare that to previous years; during the same time period in 2012-2013, the wholesale cost of power was $2.9 billion, and in 2011-2012, it was $1.2 billion (ISO-NE newswire, Nov. 2014).

Steep wholesale market price increases are have been and will be reflected in retail rates that consumers and businesses pay. The graph below illustrates how much more retail electricity rates have increased in New England than other regions of the country.



Source: U.S. EIA, August 2014 Electric Power Monthly.

Note: Average U.S. retail electricity price for first half of 2014 was 12.3 cents/kwh (preliminary data)

The increases illustrated above also do not include the additional price increases the region began experiencing this fall. Below is a table of recent rate increases (for energy portion of bills only) for three New England states, as well as Maine's very recent standard offer rate.

2014-15 Retail Rate Increases, Energy Only*

Residential Rates	Energy Rate (c/kWh)		% Change	Upcoming Period
	Current Rate	Upcoming Rate		
Connecticut				
CL&P	10.0	12.5	25%	Jan '15 - Jun '15
United Illuminating	8.7	13.3	53%	Jan '15 - Jun '15
Massachusetts				
NSTAR	9.4	15.0	60%	Jan '15 - Jun '15
WMECO	8.8	14.0	58%	Jan '15 - Jun '15
National Grid	8.3	16.2	96%	Nov '14 - Apr '15
Fitchburg	8.5	14.1	66%	Dec '15 - May '15
New Hampshire				
PSNH	9.9	*9.6**	*(3%)*	Jan '15 - Dec '15
Unitil	8.4	15.5	85%	Dec '14 - May '15
Liberty	7.7	15.5	100%	Nov '14 - Apr '15
NH Elec Coop	9.0	11.6	29%	Oct '14 - Apr '15
Maine				
standard offer	7.6	6.5	*(14%)*	Mar '15 - Dec '15

**Per Northeast Utilities November 21, 2014 presentation, Restructuring Roundtable, updated with Maine standard offer*

Just recently, Maine ratepayers were the recipients of 'fortuitous circumstances', due to the timing of the MPUC's solicitation of standard offer proposals. The very recent steep declines in oil prices, combined with closer-to-average winter temperatures, have resulted in Maine obtaining a much *lower* supply cost than our neighboring states. However, lower oil prices are masking the seriousness of natural gas pipeline constraints, so this decline is not expected to be sustained. Until new capacity is constructed, this situation will worsen in the next several years, as a substantial amount of the region's non-natural gas fired generation is taken out of service. In 2014 alone, almost 1,850MW of [non-gas fired] generation was retired (ISO-NE E2Tech conference, March 2014).

At Risk Generator Retirements Have Begun

Major Retirements 2014	
Salem Harbor	749 MW (coal & oil)
Norwalk Harbor	342 MW (oil)
Mount Tom	146 MW (coal)
Vermont Yankee	604 MW (nuclear)

Total MW Retiring in New England (through 2018)	
Connecticut	528 MW
Maine	159 MW
Massachusetts	2,682 MW
New Hampshire	56 MW
Rhode Island	64 MW
Vermont	666 MW

"The challenges to grid reliability are not a question of if they will arise, but when - and when is now."
Gordon van Welie, CEO, ISO-NE, 2014 Regional Electricity Outlook

Northern Maine (Aroostook and Washington counties) suffers from a lack of diversity in power generation sources, and an inability of renewable resource generators to deliver power to load areas in southern New England. This adversely affects reliability of the northern Maine grid, and requires an increasing reliance on Canadian generated power sources. Wind power development in these counties could also be curtailed due to an inability to transmit power to load centers south of Maine.

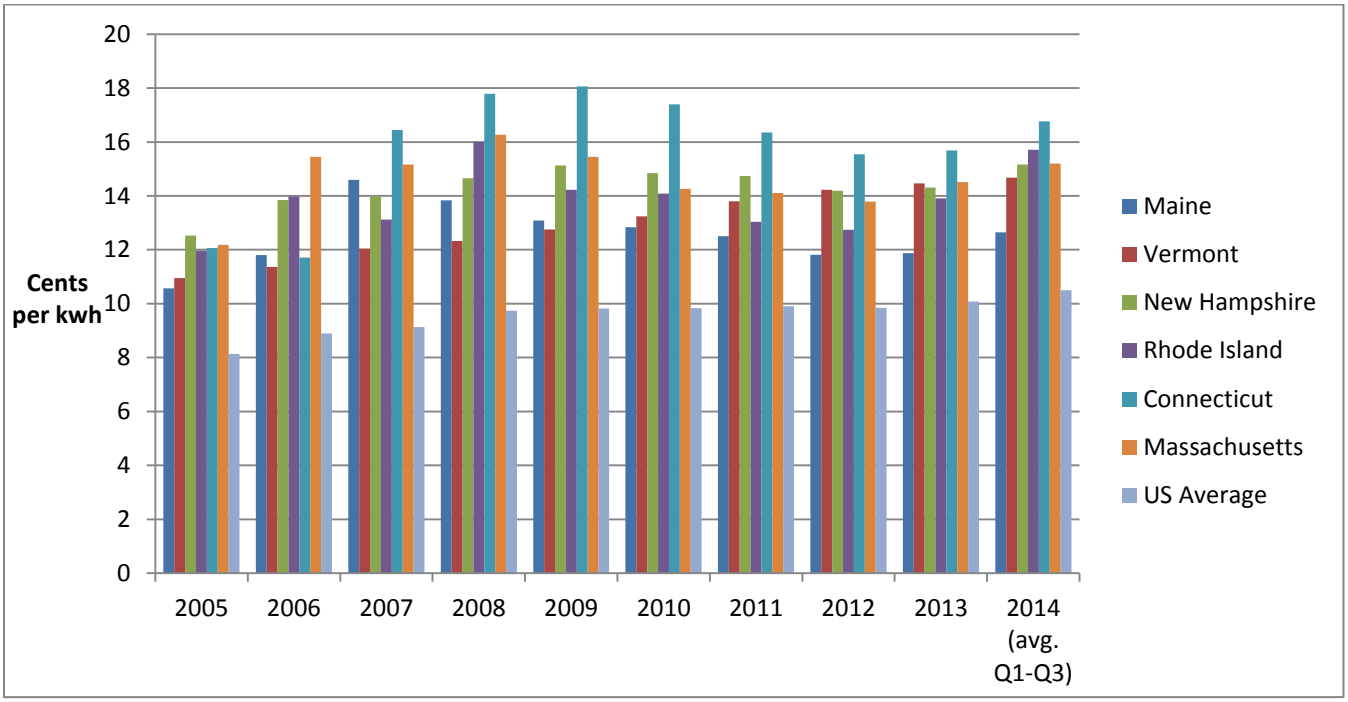
Northern Maine is connected to Canada, not New England. The northern part of Maine is unlike any other area in the lower 48 states, in that their electric grid is not directly connected to one of the three major power grids in the U.S. Instead, northern Maine is linked to New England indirectly through connections with New Brunswick, Canada, and is served by the Northern Maine Independent System Administrator (NMISA). Historically, northern Maine had sufficient local generation to serve its small population. In recent years, lower regional natural gas prices have forced the closure of some local, higher priced generation. The Maine PUC is presently evaluating generation and transmission options for this area, including providing northern Maine with a direct link to the rest of New England, and its electricity markets *http://www.eia.gov/todayinenergy/detail.cfm?id=19671;* (PUC docket #2014-00048).

2015 Maine Energy Goal for Electricity Sector

Continue to work regionally, and as an individual state, to successfully expand natural gas infrastructure into New England, to restore reliability to the regional grid, and with the longer term goal of reducing the state's electricity costs to the national average.

As the graph below illustrates, electricity in all of New England costs significantly more than the national average. Maine's rates, while lower than the other New England states, are still much more expensive than most states in the U.S.

New England and U.S. Average Electricity Prices, 2005-2014*



**Energy Information Administration*

Policy Recommendations

- ***Continue the regional process (NESCOE) to achieve a unified regional agreement to expand natural gas pipeline capacity into the region.*** In 2014, The New England States Committee on Electricity (NESCOE) made significant progress toward reaching an agreement to bring additional natural gas pipeline capacity, as well as additional electric transmission from Canada and northern Maine, into the region. The six state coalition's work was suspended in late summer, when Massachusetts withdrew from the process. Newly elected state leaders bring an opportunity to restart

this process, and Maine should take a leadership role toward finalizing an agreement for additional infrastructure.

"The lack of pipeline infrastructure has raised fuel adequacy for natural gas generators to the top of the list of pressing concerns for New England's power system. ISO New England has made changes to the wholesale power markets and to operating procedures to help address this concern, but to keep the region's power grid reliable and flexible, a commitment to investing in fuel adequacy is needed from all New England stakeholders." Gordon van Welie, ISO New England president and CEO, press release 11/6/2014.

- ***Improve transparency for consumers and business seeking to contract with competitive electricity providers (CEPs).*** Maine's deregulated electricity market has brought increased competition in the energy supply arena. Both residential and small business customers now have more companies from which they can choose to purchase their electricity (delivery of that electricity supply is still regulated by the Maine PUC). A wider array of choices, however, brings with it some problems. Because CEPs for households and small businesses are an emerging market, some business practices of these CEPs have resulted in adverse consequences to consumers. These consequences primarily stem from a lack of disclosure and/or transparency regarding the details of these retail contracts. The Office of the Public Advocate has made attempts to inform consumers, but electricity supply and delivery is a complicated topic for most consumers. Increasing disclosure requirements for CEPs would improve information dissemination to consumers on this complicated issue.

- ***Develop process by which non-transmission alternatives can be evaluated and developed.*** The 2013 Energy Omnibus bill included a provision requiring the evaluation of non-transmission alternatives (NTAs) for all proposed new transmission lines less than 69 kilovolts, and with costs over $20 million; these alternatives can include energy efficiency, load management, demand response and/or distributed generation. The statute provides criteria by which the Maine PUC must evaluate alternatives to new transmission, but does not include a clear process for the advancement of these measures. For example, what role can t&d utilities play in this process? Will they be permitted to participate in the management (smart grid coordinator) and/or deployment (provider) of approved NTAs? The Maine PUC has an inquiry open regarding this issue (docket #2013-00519). This investigation may result in a transparent and competitive process by which transmission alternatives can be deployed.

Renewable Energy Sector

Key Conclusions from 2009 Plan

1) Maine is highly dependent on expensive and unreliable foreign fossil fuels for heating our homes, powering our businesses, and fueling our vehicles, trains, and boats, which makes our citizens more and more vulnerable to rapid price escalations, fuel curtailments, and infrastructure disruptions;
2) Maine has taken a leadership role in the development of innovative energy programs and policies, including the first energy efficiency program and the first state to pass legislation addressing global warming.
3) The state should support the development of indigenous, renewable energy sources, to reduce our dependence on foreign petroleum;
4) The state needs to transition from a fossil fuel culture to a clean renewable, sustainable energy culture.

Primary Renewable Energy Objectives of 2009 Plan

- Support development of electrical transmission projects in Maine for increased reliability, and to accommodate economically and environmentally sustainable renewable energy from Northern Maine and Canada;
- Increase the generation of renewable power into the State of Maine's electricity portfolio;
- Seek to develop on-site renewable energy projects at state facilities;
- Work with public and private schools to facilitate alternative energy demonstration projects;
- Encourage Maine's businesses and residents to invest in distributed renewable energy;
- Support research at UMaine to create cellulosic ethanol, and increase the use of bio-fuels in state buildings and schools;
- Foster renewable energy (biomass, biofuels, wind, solar, tidal, geothermal, co-generation);
- Identify, assess, and remove technical, regulatory, and economic barriers to the use of co-generation.

Maine Action Since Release of the 2009 Energy Plan

- ***Maine has continued to increase electricity generation from renewable sources through compliance with the region's renewable portfolio standard.*** In 2012, Maine generated 54% of its electricity from renewable sources, already far surpassing the 30% existing plus the 10% new renewable statutory requirement. The Renewable Portfolio Standard (RPS) is a ratepayer-funded incentive

mechanism to encourage the development of legislatively designated types of electric generation; in Maine, this includes generators of less than 100MW that use fuel cells, tidal, solar, geothermal, hydroelectric, and biomass, including landfill gas; in addition, wind generators of all sizes are eligible. The vast majority of facilities satisfying the RPS in Maine are biomass projects. Projects that are able to qualify as Class I in another New England state often do so, as the REC value is higher in other states. According to the most recent (2012) Maine Public Utilities Commission report on the RPS, there is more than sufficient planned renewable generation in the ISO-NE interconnection queue to satisfy the state's RPS through 2017, when total "new" renewable generation required will reach 10%.

- ***The state legislature passed the Ocean Energy Act to encourage development of offshore wind and tidal energy; above market contracts authorized for electricity generated from tidal energy and offshore wind.*** During its 2010 session, the Maine Legislature enacted 'An Act to Implement the Recommendations of the Governor's Ocean Energy Task Force' (PL 615, Sponsor – Sen. Hobbins). Section A-6 directed the Maine Public Utilities Commission (MPUC), to conduct a competitive solicitation for proposals for long-term contracts to supply installed capacity, associated renewable energy and renewable energy credits (RECs) from one or more deep-water offshore wind energy pilot projects or tidal energy demonstration projects. Of the 30MW total authorized in the Act, 5MW was authorized for tidal energy demonstration projects, and the remaining 25MW was authorized for offshore wind energy. In 2012, the MPUC authorized a contract for tidal energy to the Ocean Renewable Power Company (ORPC); in 2013 & 2014, the Commission approved long term contracts for offshore wind projects proposed by the Norwegian energy company Statoil, and for the Maine Aqua Ventus project proposed by a University of Maine consortium. The tidal project has intermittently produced power, but is currently not in production. In October 2013 Statoil removed their proposal from consideration from the PUC. At this time, the University of Maine continues to have a term sheet in place and is positioning them for further consideration of federal funding to make the project financially viable.

- ***Residential solar and wind rebate pilot program was established using federal ARRA funds.*** For several years, the state administered a rebate program for residential and small commercial solar and wind installations. From 2010 through 2013, Efficiency Maine used a combination of funds (federal recovery act; renewable resource, and residual solar/wind rebate program SBC revenues) to continue a rebate program beyond the statutorily authorized time frame. Efficiency Maine provided 1,150 alternative energy rebates (primarily solar installations). In FY14, the final months of the program, Efficiency Maine issued rebates for 178 renewable energy systems (see table below). As you can see from the results, using a total resource cost test, the benefit-to-cost ratio was 0.57, below the minimum 1:1 ratio. This means that the total costs of the rebate program significantly exceeded the lifetime benefits.

Solar/Wind Rebate Program, FY 2014 (MMBtu Results)

Total Participants	Total Rebates	Annual MMBtu Savings	Lifetime MMBtu Savings	Efficiency Maine Costs	Participant Costs	Lifetime Energy Benefit	Benefit to Cost Ratio
178	178	4,356	87,113	$428,947	$3,024,981	$1,985,355	0.57

- ***Authorization of pilot program for community based renewable energy*.** The Community Renewable Energy Pilot program was established in 2009 (PL 329, 35-A MRSA c. 36) to provide ratepayer funded incentives, for up to 50 MW of small, community-based, renewable electricity generators. The incentive could be a long term contract (20 years) for above market rates, or a renewable energy credit (REC) multiplier. At present, this program is fully subscribed. Projects certified by the MPUC are listed below.

Community-Based Renewable Energy Pilot Program

Project	Type	Size	Price
Exeter Agri-Energy (Exeter)	anaerobic digestion	3MW	$.09/kwh
Clinton Agri-Energy (Clinton)	anaerobic digestion	5.86MW	$0.10/kwh
Jonesport Wind (Jonesport)	wind	9.6MW	$.085/kwh
Pisgah Mtn. (Clifton)	wind	9MW	$0.93/kwh
Shamrock Wind (Fort Fairfield)	wind	10MW (4MW under contract)	$0.099/kwh
Goose River Hydro (Belfast)	hydropower	0.375MW	$0.10/kwh
Maine Wood Pellets (Athens)	biomass	7.1MW	$0.099/kwh
Fox Islands Wind (Vinalhaven)	wind	4.5MW	REC multiplier
Good Will Hinckley School (Hinckley)	solar	0.026MW	REC multiplier
Revision Energy (Unity College)	solar	0.037MW	REC multiplier
Revision Energy-Riding to the Top	solar	0.034MW	REC multiplier
Lewiston-Auburn Water Authority	anaerobic digestion	0.460MW	REC multiplier

- ***Net energy billing program for distributed generation.*** The Maine Public Utilities Commission has permitted some form of net energy billing (NEB) since the 1980s. In 2011, the Legislature passed "An Act to Expand Net Energy Billing" (PL 262; sponsor Sen. Whittemore), requiring specific parameters for this program. It requires transmission and distribution utilities (t&ds) to credit small, grid-connected distributed generation (DG) installations for electricity they generate, so they only pay for electricity over what is generated by the installation (over the course of a year). Net energy billing customers are credited for the full retail cost of the electricity (energy, transmission & distribution, and stranded costs). This means that NEB customers do not pay for access to the grid; these costs are instead borne by the general body of ratepayers.
  Most NEB customers in Maine are small solar and wind installations (statutory limit is 660kw, and there is a cap on the number of NEB customers in a utility service territory). As the table below illustrates, the number of NEB customers has increased significantly in a short time period.

NEB customers	2012	2013
Central Maine Power	1007	1302
Emera – BHE	196	274
Emera – MPS	67	72

- ***The state has updated its inventory of existing and potential hydropower resources, statewide.*** The last assessment of the state's hydropower resources was conducted in in the early 1990s, and was based on the traditional hydropower model of constructing large, new dams. The regulatory environment has evolved, and new technologies have emerged since 1990. The new inventory is based on the current regulatory environment, and assesses development potential using newer technologies at both existing and currently undeveloped sites. The report and its recommendations can be accessed here.

- ***Value of solar study being conducted by the Public Utilities Commission.*** The Legislature passed legislation requiring the PUC to conduct an analysis of the "value of solar." The associated Docket No., 2014-00171, may provide context for public policy surrounding distributed generation and solar. The report is due to the Legislature in early 2015.

Continuing Challenges

Maine does not have an integrated, inclusive, renewable energy policy.

Myriad of renewable subsidy programs. Maine has the following renewable energy programs: long term contracting; ocean energy, including offshore wind & tidal (purchased power agreements, or PPAs); community renewable energy program (feed-in

tariff); net energy billing; renewable portfolio standard Class I and II; and, the Regional Greenhouse Gas Initiative. The cumulative impact of these programs is that Maine ratepayers are paying millions annually in above market costs, and these costs increase each time a new program is adopted or expanded. Below is a table that illustrates the costs (to the state's ratepayers) of these renewable energy subsidies.

State Subsidy Program for Renewable Energy	Total Annual Cost to Ratepayers*
Renewable Portfolio Standard (RPS) Class I	(2012 data) $18,431,375
Renewable Portfolio Standard (RPS) Class II	(2012 data) $533,247
Long Term Contracts - tidal	$1.875 million (for 20 years); $93,750 annual avg.
Long Term Contracts – offshore wind**	$9.9 million (for 20 years); $495,000 annual avg.
Community Renewable Energy Pilot Program	$4.2 million (for 20 years); $210,000 annual avg.
Net Energy Billing	(2012 data) $960,600 in lost revenue
Regional Greenhouse Gas Initiative (RGGI)	(2013 data) $14.1 million
Total (nominal annual costs)	$34.8 million ($34.3 net of offshore wind subsidy)

*source: MPUC
**offshore wind subsidy delayed as project did not receive federal support for construction

Costs are easily identified, but are benefits are often subjective. Maine generates more electricity than it uses, and over half of this electricity comes from renewable sources (the U.S. average was 12 percent). Maine produces more electricity from hydropower than any state east of the Mississippi, and we have the highest biomass fueled generation in the country. In addition, Maine's greenhouse gas emissions are the 44th lowest in the country (Maine energy profile).

Financial incentives for renewable generation can be regressive.
Costs for these programs have been allocated on a per kwh basis. This is a surcharge on a basic life necessity; the increased cost does not correlate to income; and ratepayers have limited ability to reduce their usage. And, although any one renewable program raises the average electric bill by less than $1.00, cumulatively, these add-on fees, when coupled with other assessments (such as Efficiency Maine Trust, low income, MPUC & OPA assessments, stranded cost charges, low income programs), means that in 2013, the average Emera-MPS customer of 550 kwh per month, was paying $8.58 in fees on a monthly bill of $75.68, or 11.3% (Emera-BHE paid $10.23 on a $81.95 bill, 12.5%); CMP paid $4.23 on a 65.56 bill, 6.45%).
http://www.maine.gov/mpuc/electricity/CMPElectricityRateTransparencyTable.htm
http://www.maine.gov/mpuc/electricity/BHEElectricityRatesandAssessments.htm
http://www.maine.gov/mpuc/electricity/MPSElectricityRatesandAssessments.htm

In 2013, Maine's residential electric rates were the 12th highest in the country; as of October, Maine's 2014 residential rates were the 11th highest *(EIA)*. Each new or expanded renewable energy program results in incremental cost increases.

Maine's net energy billing program subsidizes renewable generation at the full retail cost of the power (including transmission and delivery), rather than the wholesale cost of the energy. Is this the appropriate level of subsidy? Under Maine's net energy billing program, utilities are required to credit a distributed generation (DG) customer's excess power at full retail price which includes transmission, distribution, and the supply costs of electricity. This policy is not unique to Maine. Throughout the country there are fundamental questions regarding equity between demographic groups as well as whether the compensation for solar generation is appropriate. The state must continue to assess whether this is the appropriate DG policy and work to ensure that low-income populations as well as all ratepayers are benefiting from these policies.

New England's Definition of Renewable Energy is inconsistent from state to state.

Six New England states, more than six different renewable portfolio standards. Presently, of the six New England states, there are five different sets of renewable portfolio standards, and one set of renewable energy goals (Vermont). Below is a table that summarizes the many differences between standards.

New England Renewable Portfolio Standard Requirements 2015

RPS Attributes	CT	ME	MA	NH	RI	VT
Number of Classes	Class I and II	Class I and II	Class I, II, and APS	Class I, II, III, and IV	Class I	No distinct classes; voluntary
Class I eligible date	7/1/2003	9/1/2005	1/1/1998	1/1/2006	1/1/1998	1/1/2005 (for 20% new)
2015 RPS and total RPS requirements	**2015** – 19.5%, of which 3% is Class II & 4% Class III **2020** – 27%, increases to Class I only	**2015** – 38%, 8% of which is Class I **2017** – 40%; Class I increases to 10%	**2015** – 20.85%; 10% Class I, 7.1% a combo of Class II resources, and 3.75% APS **Future years** – Class I to increase 1%, and APS by 0.25% annually; no cap	**2015** – 15.8%, mostly Class I and III **2025** – 24.8%; increases Class I only	**2015** – 8.5%, most from new sources **2019** – 16%, all but 2% from new sources	**2017** – 20% of sales; if not met, utilities would have to meet RPS **2032** – 75% of sales to be met with renewables
Biomass included in Class I	limited	yes	Eligible only under very complex conditions; reporting requirements make	yes	yes	n/a

			qualification impractical			
Types of Resources in Class I	Fuel cells; tidal, wave & ocean thermal; solar; wind; geothermal; landfill methane; biogas; thermal from Class I; 'low emission advanced renewable energy conversion; run-of-river hydro <30MW w/addt'l fish passage requirements; some biomass (low NOx and sustainable fuel or <500kw); no double counting (generation cannot be claimed in another state's RPS)	Fuel cells; tidal; solar; wind; geothermal; new hydro with fish passage; biomass; landfill gas – all <100MW, except wind	Fuel cells; tidal, wave, current & ocean thermal; other HK; solar; wind; geothermal; hydro <30MW, no pumped storage, meeting environ. criteria; landfill methane (under certain conditions); anaerobic digestion; biomass only under very narrow conditions	Tidal, wave & current; ocean thermal; wind; geothermal; biomass; hydrogen from biomass or methane; landfill gas; methane gas; refurbished hydro and biomass; new production by III and IV resources; elect. displacement by solar hw	Fuel cells; tidal, wave, current, and ocean thermal; solar; wind; geothermal; landfill gas; anaerobic digestion; biomass, hydro <30MW+	Fuel cells; solar; wind; geothermal; landfill gas; anaerobic digestion; biomass; hydro; CHP (65% efficient)
Other Classes besides I	Class II – existing trash-to-energy with NOx cap; existing run-of-river hydro < 5MW Class III – CHP>50% efficient after 1-1-2006; DSM	Class II – existing renewable or 'efficient' (CHP)	Class II – operating before 1-1-98; waste-to-energy APS – CHP, flywheel storage; coal gasification; efficient steam if reduces fossil fuel use	Class II – new solar Class III – existing biomass & methane gas <25MW Class IV - <5MW hydro with fish passage		n/a
Solar or thermal carve out/separate class	No – solar & thermal part of Class I	No – solar part of Class I	Yes – Class I carve out	Yes – solar separate classII (0.3%) Thermal – class I carve out (2% of 15% total in 2025)		n/a
Notes			Class I generation not required to be grid connected			

Because both Massachusetts and Connecticut essentially prohibit biomass generators from qualifying for the RPS in those states, most biomass generators seek qualification in Maine, which drives down the price of Renewable Energy Credits[3] (RECs). If standards

[3] A REC (pronounced: rĕk) represents the property rights to the environmental, social, and other nonpower qualities of renewable electricity generation. A REC, and its associated attributes and benefits, can be sold separately from the underlying physical electricity associated with a renewable-based generation source. In those states with a RPS system, renewable energy has two components for sale – the physical energy, and the REC (environmental attributes - one REC is earned for every 1000 kilowatt-hours (or 1 megawatt-hour) of electricity placed on the grid). For more on RECs, please see: EPA http://www.epa.gov/greenpower/gpmarket/rec.htm

were more aligned regionally, the REC prices would be more consistent from state to state, which would benefit all renewable generators seeking RPS qualification in the state.

2015 Maine Energy Goal for Renewable Energy

Re-evaluate all Maine's renewable energy programs, and develop a simplified, integrated, inclusive, renewable energy policy which is aligned toward the state's greatest challenges – reducing electricity costs for Maine businesses, and lowering total energy costs for Maine households.

Policy Recommendations

- ***Establish clear goals and simplify the policies.*** Maine's renewable energy programs have been based on a particular technology or energy source, rather than an overall policy or objective. Maine supports renewable energy in our policies, programs, and goals. Rather than establishing specific technology goals there should be a uniform mission. Policies should be flexible to incorporate changing technology and be reviewed on a consistent basis.

- ***Align Maine's renewable energy policies toward the state's challenges.*** The state faces two major energy challenges: 1) The Price of Electricity to Attract Business Investment; 2) Inefficient and Expensive Thermal Energy. The state generates much more electricity than it uses, and over half of this already comes from renewable sources. At the same time, Maine businesses pay the 8th highest electricity costs in the country, and Maine residents pay the 11th highest. Policies should be designed to use Maine's renewable energy resource to address our challenges.

- ***Work with all New England states to align the various renewable portfolio standards/renewable energy credit (REC) markets where possible***. As outlined above, presently there are six different renewable portfolio standards in the six New England states. This creates inequitable REC markets, and can reduce their effectiveness. For example, some states do not recognize biomass in their RPS, so biomass producers are forced to sell their RECs in the limited Maine market, and this drives down the Maine REC price. If the region's RPS policies were aligned, there would be a uniform, regional REC price, and all renewable generators would operate on a 'level playing field'.

- ***Focus renewable energy development on all cost-effective renewable resources.*** In the 1980s decisions were made to approve long term, above market contracts for renewable generation, as energy prices were forecasted to increase. Energy prices instead declined, and Maine ratepayers were burdened with unnecessarily high electricity prices for years as a result. Oil prices shot up to historic highs in 2007-2008, so any other energy source (e.g., offshore wind) seemed a more viable long-term solution than oil. Since the release of the 2009 energy plan, new extraction technologies have resulted in

abundant and inexpensive domestic natural gas, oil, and distillates such as propane – unconceivable just six years ago. This increase in domestic energy production has turned global oil markets upside-down in just the last six months. In 2012, regional electricity prices were at their lowest price in a decade, yet changing electricity markets and lack of infrastructure improvements caused last winter's prices to spike to unprecedented levels. The history of energy markets clearly indicates that choosing one energy source over another is a risky, and often costly, decision. The State should recognize that the competition for electrical generation has increased and the cost-competitive level for resources is challenging.

- ***Provide price stability for distributed generation.*** Under current market and regulatory conditions, it is challenging for distributed generation to access renewable energy markets. Price stability (that reflects the value of DG) for these clean energy resources should be established. Maine should work to develop a long-term policy to provide price certainty for distributed generation resources.

- ***Encourage hydropower.*** Maine's hydropower provides clean, baseload generation. The state should pursue policies to prioritize redevelopment and investment in existing hydro dams. Currently, Maine's greenhouse gas emissions from the electrical sector are one of the lowest in the country, but if the state were to lose these generators, they would likely be replaced by additional natural gas, oil, or other resources from outside the state.

Greenhouse Gas Emissions

The 2009 Comprehensive Energy Plan discussed greenhouse gas (GHG) emissions primarily in a broad (global) context. Few conclusions were reached about GHG emissions in Maine, and recommendations for action were limited to promoting combined heat and power (CHP) installations and promoting 'smart' development, a significant challenge in such a rural state.

In 2013, the Legislature enacted LD 927, "An Act to Further Energy Independence for the State" (PL 415 – sponsor Rep. McGowan), which requires that, beginning in 2015, the biennial updates to the comprehensive state energy plan must address the association between energy planning and meeting the greenhouse gas (GHG) reduction goals in the state climate action plan pursuant to Title 38, section 577. According to the Department of Environmental Protection's *5th Biennial Report on Progress Toward GHG Reduction Goals*, 86% of GHG emissions in Maine are the result of energy consumption, largely produced by combustion of petroleum products. The significant relationship between energy use and GHG emissions makes a discussion of GHG reduction efforts an appropriate inclusion in the Comprehensive Energy Plan update.

Key Conclusions from 2009 Plan

1) Maine has already made progress in reducing its greenhouse gas emissions;
2) Maine's transportation sector is responsible for more than one-third of the state's greenhouse gas emissions;
3) The residential sector, while not a major source of greenhouse gas emissions, still relies heavily on petroleum based fuels, and most of the state's residents do not have access to lower carbon emitting fuel sources (e.g., natural gas).

Primary Greenhouse Gas Objectives of 2009 Plan

- Encourage 'smart growth' as a way to reduce vehicle miles traveled in the transportation sector, thereby reducing GHG emissions;
- Encourage adoption of co-generation and district heating clusters as a way to reduce emissions (more efficient use of power generation);
- Pursue a low carbon fuel standard on a regional basis to further reduce GHG emissions, and lower the carbon intensity of the transportation sector.

Maine/Regional/Federal Action Since Release of the 2009 Energy Plan

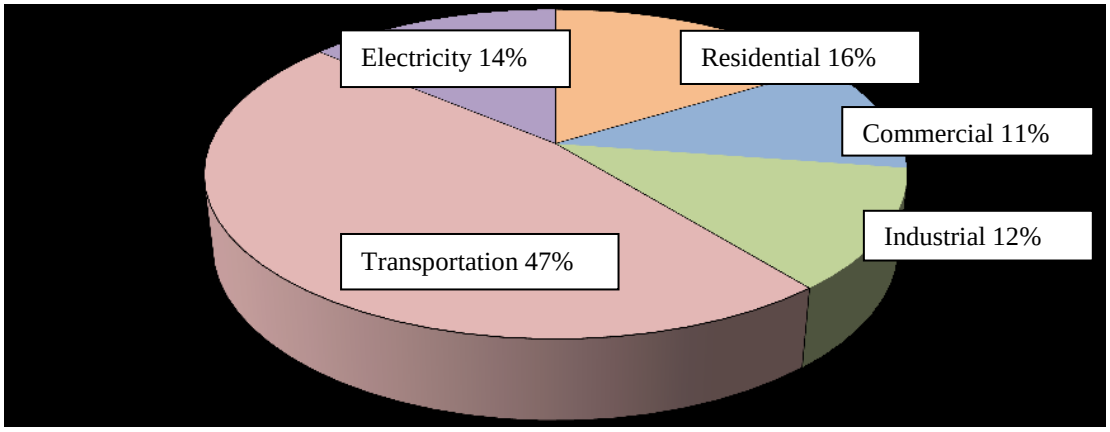
- ***Maine joined the Regional Greenhouse Gas Initiative, the first regional carbon dioxide cap-and-trade program in the United States.*** Maine, in

conjunction with other New England and some mid-Atlantic states, formed the Regional Greenhouse Gas Initiative (RGGI), a market based regulatory program that places a cap on carbon dioxide (CO_2) emissions from the power sector. The cap is reduced over time, encouraging participating states to generate more of their electricity using low-or zero-carbon sources. Participation in this program has resulted in significant reductions of GHG from the power sector, and has provided funding for residential and industrial energy efficiency programs. These efficiency programs have since yielded even further GHG emission reductions.

- ***Maine's GHG emissions have decreased steadily since 2003.*** In 2012, the Department of Environmental Protection (DEP) confirmed the state met the first goal outlined in the State Climate Action Plan, i.e., reducing GHG emissions to 1990 levels. The DEP's analysis of energy consumption, industrial processes, agriculture, and waste management for calendar years 2010 and 2011 *(5th Biennial Report on Progress Toward GHG Reduction Goals)* found that Maine is continuing to trend downward in GHG emissions. This downward trajectory aligns with meeting the medium-term goal outlined in the 2003 legislation *"Maine's Act to Provide Leadership in Addressing the Threat of Climate Change"* (PL 237; sponsor Rep. Koffman), i.e., reducing GHG emissions to 10% less than 1990 levels by 2020. Gross statewide GHG emissions increased from 1990 to a peak in 2003, and have since steadily declined. This decrease is especially notable considering that, a 900 megawatt nuclear powered electrical generation station ceased operations in 1996. GHG emissions in the state have declined 6% just since 2010.

- ***By 2011, carbon dioxide (CO_2) emissions from petroleum combustion had dropped significantly below 1990 levels.*** Emissions from the industrial sector declined 61%, and emissions from the power sector declined by 93%. Due to high oil prices, many industrial operations switched to less expensive energy sources, such as natural gas and biomass, which has reduced emissions. Oil, coal, and nuclear generation have primarily been replaced by natural gas, biomass, and waste sources. As a result, per capita emissions in 2011 were similar to levels measured in 1980.

2011 Maine CO_2 Emissions from Combustion Sources, by Sector



Source: Maine DEP 5th Report on Progress Toward GHG Reduction Goals, January 2014

- ***U.S. EPA releases the Clean Power Plan.*** In June of 2014, the federal Environmental Protection Agency published its draft 'Clean Power Plan', a 130-page proposed rule for reducing CO2 emissions nationwide, by setting emission limits on fossil fueled-fired electric generators, and by encouraging further development of low- and no-carbon generation. The rule is expected to be finalized this year, and will likely require further emission reductions from the power sector.

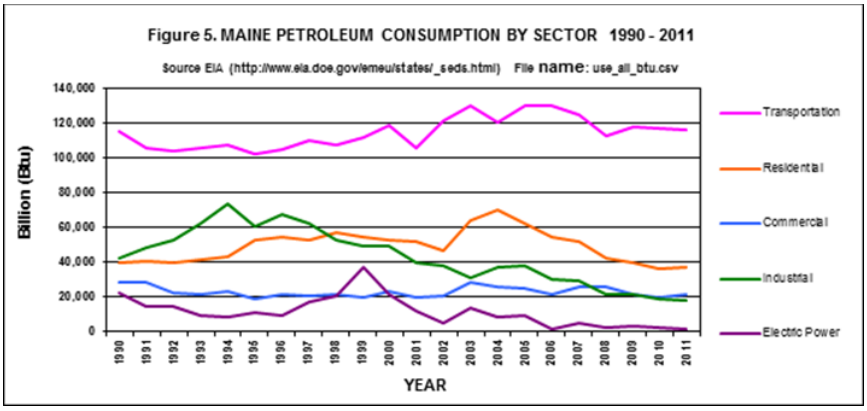
- ***The state continues to work to increase the availability of natural gas for residential, business, and electricity sectors.*** The Governor, the Energy Office, and the Maine Public Utilities Commission continue regional efforts to increase natural gas transmission capacity, and to access lower carbon-emitting energy sources from Northern Maine and Canada *(see electricity sector)*. Maine relies on several Natural Gas Combined Cycle (NGCC) generation facilities for a significant portion of the state's electric supply. NGCC facilities are among the cleanest fossil fuel-fired electricity generating units available, and these plants are a critical part of Maine's efforts to maintain a diversified network of power sources for the state's electricity needs. Increasing natural gas capacity, and enhanced transmission capacity for low-or no-carbon energy sources, will assist the state to continue reducing its GHG emissions.

Continuing Challenges

Achieving significant additional reductions in GHG emissions will be challenging in Maine.

Maine's ongoing successful efforts in GHG reductions. The state has already made significant progress in GHG emission reductions; our CO2 emissions are the 44th lowest of the 50 states (Maine Energy Profile). Maine has demonstrated leadership on this issue by its participation in the Regional Greenhouse Gas Initiative; by increasing access to natural gas; and by the state's energy efficiency efforts. We have, essentially, already harvested the 'low hanging fruit'.

Maine's rural population makes significant GHG emission reductions in the transportation sector challenging. In 2011, the DEP estimated that over 45% of remaining GHG emissions in Maine originated from the transportation sector.



Due to more stringent federal fuel efficiency standards, emissions from transportation sources have declined in recent years. However, over half of Maine's population resides in rural areas, the greatest proportion of any state in the country (Maine Energy Profile). This presents challenges for reducing vehicle miles traveled, as public transportation investments are significant relative to the benefits accrued.

2015 Maine Energy Goal for Greenhouse Gas Emissions

Continue the progress the state has made in reducing GHG emissions in the state.

Policy Recommendations

- ***Continue the state's current efforts to increase energy efficiency, and replace higher emitting energy sources with renewable energy sources and low carbon emitting natural gas.*** The state has recently devoted resources to accelerate progress towards low-carbon heating sources. In addition, additional funding has been made available for energy efficiency programs. Assisting Mainers to reduce their energy costs will also have the environmental benefit of reduced greenhouse gas emissions. In addition, the federal government has made fuel efficiency standards more stringent; has required the use of ethanol blended gasoline to reduce emissions; and has developed a plan for further reductions in GHG emissions from the state's power sector. Given time, all the efforts and initiatives already in place will result in additional reductions in GHG emissions.

Renewable Energy, Continued
Wind Energy Development

The 2009 Comprehensive State Energy Plan did not discuss wind energy in isolation from other renewable energy sources. Substantive legislation on wind energy, including the expedited permitting process, and development of the state's wind energy goals (Title 35-A, §3404 (2)), occurred in 2008 and 2010 - 'An Act to Implement Recommendations of the Governor's Task Force on Wind Power Development' (PL 661, 123rd Maine Legislature; sponsor Sen. Bartlett), and 'An Act to Implement the Recommendations of the Governor's Ocean Energy Task Force' (PL 615, 124th Maine Legislature; sponsor Sen. Hobbins). In 2013, the 126th Legislature passed 'An Act to Further Energy Independence for the State' (PL 415; sponsor Rep. McGowan), which required the state's comprehensive energy plan to include a separate section on wind energy development (2 M.R.S.A §9(3)(C)(1)(c)). This section of the plan is to include the following:

1) The State's progress toward meeting the wind energy development goals established in Title 35-A, §3404 (2), including an assessment of the likelihood of achieving the goals and any recommended changes to the goals;
2) Examination of the permitting process and any recommended changes to the permitting process;
3) Identified successes in implementing the recommendations contained in the February 2008 final report of the Governor's Task Force on Wind Power Development created by executive order issued May 8, 2007;
4) A summary of tangible benefits provided by expedited wind energy developments, including, but not limited to, documentation of community benefits packages and community benefit agreement payments provided;
5) A review of the community benefits package requirement under Title 35-A, section 3454, subsection 2, the actual amount of negotiated community benefits packages relative to the statutorily required minimum amount and any recommended changes to community benefits package policies;
6) Projections of wind energy developers' plans, as well as technology trends and their state policy implications; and
7) Recommendations, including, but not limited to, identification of places within the State's unorganized and de-organized areas for inclusion in the expedited permitting area established pursuant to Title 35-A, chapter 34-A and the creation of an independent siting authority to consider wind energy development applications.

These specific requirements are incorporated in the 'Maine Action Since the 2009 Plan'; 'Continuing Challenges', and 'Policy Recommendations' sections below.

Key Conclusions from 2009 Plan *(specific to wind energy)*

The plan concluded that:

1) Maine was poised to develop 2,000MW of land-based wind by 2015, and nearly 3,000MW of offshore and land-based wind by 2020;
2) Maine has significant offshore wind energy potential that could be developed over the next several decades. Since the state's capacity needs are only 2,000 to 3,000MW, offshore wind-generated electricity could become one of Maine's most economically productive exports to other states and regions;
3) The Governor's Wind Energy Task Force and Ocean Energy Task Force have resulted in a more streamlined wind power application process; increased interdepartmental communication and collaboration on wind farm applications; and increased efforts to balance environmental considerations with economic development.

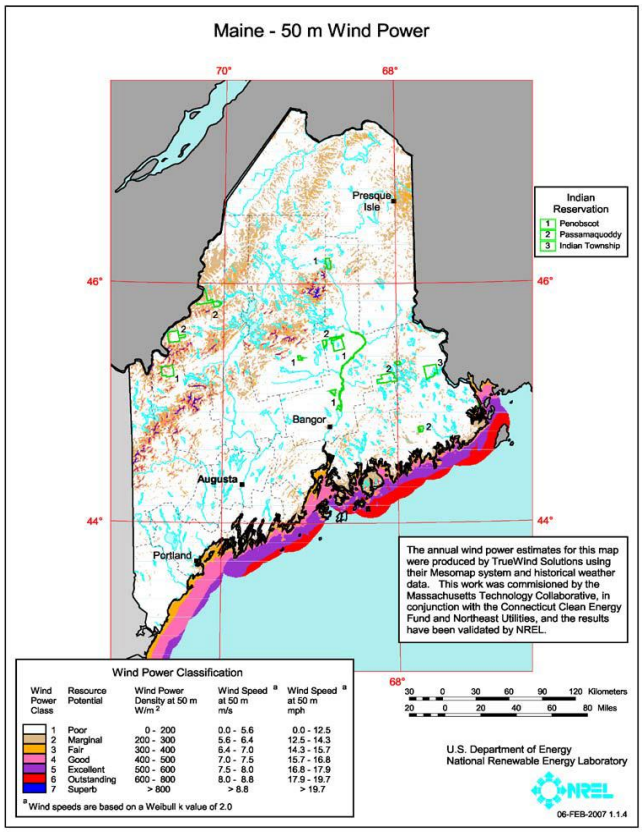
Primary Wind Energy Development Objectives of 2009 Plan

- Continue to advance Maine's position as a leader in responsible wind power development and maximize the tangible benefits that Maine people receive;
- Although not specifically part of the 2009 plan, the Legislature's passage of the Wind Energy Act (PL 661, 123rd Maine Legislature) established several wind energy goals for the state, including: 2,000MW installed capacity by 2015; 3,000MW installed capacity by 2020, including 300MW from offshore wind; and 8,000MW of installed capacity by 2030, of which 5,000MW is from offshore wind;
- Work with state agencies, the Governor's Ocean Energy Task Force, Maine Maritime Academy, and private developers to promote tidal power in Maine.

Maine Action Since Release of the 2009 Energy Plan *(specific to wind energy)*

- ***The state has implemented the recommendations of the 2008 Governor's Task Force on Wind Energy Development.*** The Task Force, in its final report, made 38 recommendations which, if implemented, would encourage investment in wind energy development in Maine. The Task Force believed these actions would not create an unreasonable regulatory burden; would enable the state to become a leader in wind power development; and would protect Maine's 'quality of place' and natural resources.

Maine Wind Resource Map (from the Governor's Task Force Report)



Source: U.S. Department of Energy, National Renewable Energy Laboratory (2007)

All 38 recommendations have been achieved through legislation, rulemaking, or other actions by state, federal or private organizations (See Wind Energy Appendix 1, located at the end of this section). Goals for and benefits of wind energy development have been formally established; permitting for wind energy projects has been streamlined, consolidated and standardized; efforts have been initiated to enhance the ability of Maine-based industry to participate in the wind power sector both through manufacturing of components and through servicing of equipment; benefits have been assured to host communities and to residents of the state; and efforts to encourage the development of Maine's offshore wind energy potential are ongoing. Over the past few years, implementation of these recommendations has helped Maine become the leader in installed wind energy generation capacity per capita in the Northeast. Some of the specific actions taken are described in the bulleted list below.

- ***The Maine Legislature enacted legislation to encourage development of both land-based and offshore wind.*** In 2008 and 2010, the Legislature passed two major initiatives to encourage both on and offshore wind development - 'An Act to Implement Recommendations of the Governor's Task Force on Wind Power

Development' (PL 661, 123rd Maine Legislature; sponsor Sen. Bartlett), and 'An Act to Implement the Recommendations of the Governor's Ocean Energy Task Force' (PL 615, 124th Maine Legislature; sponsor Sen. Hobbins). These two bills established state goals for both land-based and offshore wind energy; established an expedited permitting process for land-based, grid-scale wind development; and, authorized the use of long term contracting by the Maine PUC to subsidize offshore wind energy and tidal energy pilot projects.

- ***Maine has significantly increased the number of operating wind energy developments in the state.*** As of December 2014, Maine has eleven land-based projects in operation, with a total (nameplate) generating capacity of 443.5 MW (See Wind Energy Appendix 2, located at the end of this section).

- ***Additional grid-scale wind energy projects are under construction, permitted, under review, or proposed to the Department.*** Three additional projects are under construction (217.65MW); five projects have been approved, but are either under appeal or subject to appeal (140MW); one project is under review (54MW) and pre-application meetings have been held for four other projects (approximately 550 MW). See Wind Energy Appendix 2.

- ***Maine successfully approved installation of the first grid-connected tidal energy project in the country.*** This project, developed by the Ocean Renewable Power Company, deployed the first successful grid connected tidal power project in Coobscook Bay in 2012. The project was made possible in part by a long term, above market contract approved by the Public Utilities Commission pursuant to PL 615, 124th Maine Legislature, passed in 2010.

- ***Small community scale wind projects have been proposed, and accepted into the Community Renewable Energy Pilot Program*** *(PL 329, 124th Legislature; sponsor Rep. W. MacDonald).* The Maine Public Utilities Commission (MPUC) has certified Jonesport Wind (9.6MW); Fox Island Wind on Vinalhaven Island (4.5MW); Shamrock Wind in Fort Fairfield (10MW, 4 approved for the program); and Pigsah Wind in Clifton (9MW). To date, Fox Island Wind is the only project operating.

- ***Wind developers are now required to compensate host and/or affected communities to grid scale projects by providing a community benefits package***. In 2010, the Legislature modified the Wind Energy Act (WEA) to require developers to include a Community Benefits Package (CBP), which would provide tangible benefits to host communities and affected neighboring communities ('An Act to Provide Predictable Benefits to Maine Communities that Host Wind Energy Developments), (PL 642, 124th Legislature; sponsor Sen. Mills). The CBP must have a total value of at least $4,000 per turbine per year, averaged over 20 years. The CBP requirement is a permit condition for five projects which are either in construction or under appeal. No operational projects have, thus far, been required to meet this standard. A benefit package may include different categories of tangible benefits, such

as direct monetary payments to municipalities under Community Benefit Agreements; direct monetary payments to utility customers to reduce energy costs; and donations for land or natural resource conservation. A CBP may not include property tax payments. Current statute allows a developer some flexibility in designing a CBP. The minimum total value of the CBP is established by statute, but there is no language specifying how benefits are to be distributed. In addition, the total value may legally be reduced in certain circumstances. Non-profit developments and projects smaller than 20MW are exempt from the CBP requirement (35-A M.R.S.A. §3454(3)).

- ***Data on tangible benefits to host communities, and affected neighboring communities, is now being collected by the Department of Environmental Protection.*** Wind energy developers are required to provide tangible benefits to the host community or communities, and affected neighboring communities; however, reporting these benefit packages has not been a requirement of the permitting process until recently. Prior to the new licensing requirement, the DEP had some success in assimilating the value of tangible benefits from existing projects, but the data collected cannot be considered complete. Despite this limitation, the DEP can provide these minimum benefit figures:

    - *$539 million of in-state construction expenditures for projects developed by First Wind;*
    - *Over $19 million paid to municipalities and counties in the form of real estate property taxes;*
    - *Approximately $1,138,000 per year in payments to host communities and affected neighboring communities under Community Benefit Agreements;*
    - *$36,500 per year in college scholarships for students from host communities;*
    - *Projects approved but not yet constructed have the potential to add over $2M per year in tangible benefits, not including direct tangible benefits in the form of construction jobs and in-state construction spending.*

  The DEP will continue to pursue additional data for future reports from these first permitted projects through a voluntary annual reporting mechanism.

- ***Projections of wind energy developers' plans and technology trends appear significant in terms of future wind energy development.*** Based on information from various sources, ranging from pre-application meetings to news reports, there are between four and nine grid-scale wind energy developments in Maine which have not yet been formally proposed. These projects potentially represent over 1000 MW of new generating capacity. There are also between three and seven small-scale wind energy developments that have not been formally proposed, potentially representing as much as 90 MW of additional new generation capacity. It is expected that the rate at which new developments are proposed will ultimately depend on the federal government's action regarding the federal Production Tax Credit, which provides a generous financial incentive to developers of wind energy projects.

Industry and other factors that may influence the rate of development and that may require regulatory changes as they are proposed to be included in future projects include:

- *Taller towers*
- *On-site fabrication of some tower components*
- *More powerful turbines, with longer blades*
- *Longer expected lifespan for turbines*
- *Radar activated lighting*
- *Offshore turbines*
- *Greater emphasis on development of renewable energy due to federal regulatory changes*
- *Climate-related changes in species migration patterns and abundance*

These factors are discussed in detail in Wind Energy Appendix 3, located at the end of this section.

Continuing Challenges

Given where the state is in terms of operating, permitted, and proposed wind projects, it is highly unlikely that the state will meet the statutory goal of 2,000 MW of installed capacity by 2015.

Status of current wind development projects. The total generating capacity for all existing, permitted, proposed, and pending projects is 1403.8 megawatts. In light of this fact, it is unrealistic to expect that the 2015 goal of at least 2,000 megawatts of installed wind energy capacity will be met. Nevertheless, given the industry trend towards higher capacity turbines and larger projects, and given the rapid advances in offshore wind technology, the 2020 goal of 3,000 megawatts with 300 megawatts of offshore capacity, and the 2030 goal of 8,000 megawatts with 5,000 megawatts of offshore capacity, remain technologically feasible. Development standards and application submission requirements for offshore wind energy projects are less stringent than for land-based developments, so it is possible that, if offshore projects are proposed, they would progress more quickly from planning through review and construction than comparable land-based development.

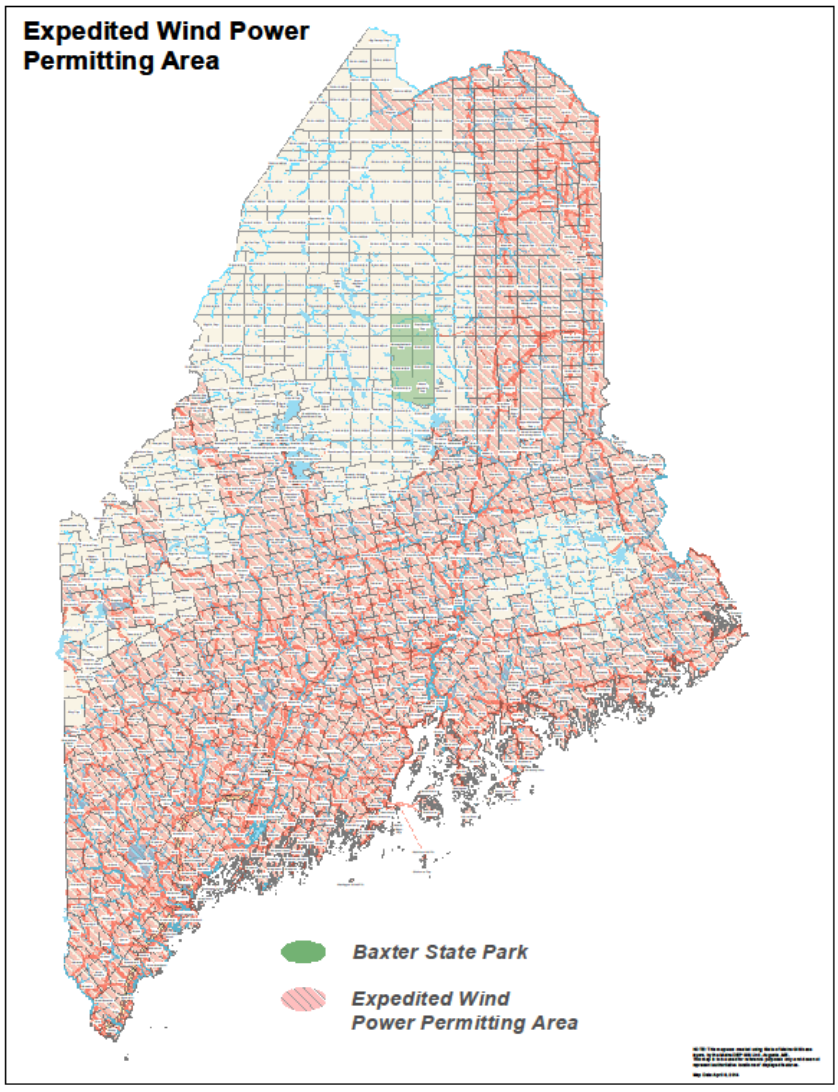
Every operating and permitted grid scale wind project has been the subject of appeals and/or lawsuits. Clarification of statutory language in the original wind energy act would benefit developers and regulators alike, and may reduce time and resources spent on appeals and other legal challenges.

Department of Environmental Protection review of the current permitting process. The DEP has reviewed the permitting process for expedited wind energy

developments, and has several recommendations to make the permitting process more consistent and less burdensome, both for applicants and for the Department. The Department's recommendations for these areas of consideration are listed in the policy recommendations section, and are discussed in more detail in Wind Energy Appendix 2.

The possibility of future expansion of the state's designated expedited permitting areas. Below is an illustration showing the expedited permitting areas of the state.

Map of Expedited Permitting Areas for Wind Energy Development



The portion of the expedited permitting area located in the unorganized and de-organized parts of the state (the UT) includes "[p]ortions of the unorganized territories that are generally on the fringe of the [LUPC] jurisdiction where unorganized townships are intermingled with plantations and organized towns, but excluding 1) broad areas that encompass concentrations of ecological, recreational and/or scenic values that are

among the most significant in the jurisdiction; and 2) smaller areas (primarily, but not necessarily limited to, P-MA zones) that possess ecological, recreational and scenic values of particular significance" (Report of the Governor's Task Force on Wind Power Development, Feb. 2008, page 18, footnote 2). Despite these constraints, which would seem to limit the expedited area in the UT to the least sensitive portions thereof, and despite the further constraints imposed by the results of scenic impact analyses and other resource impact analyses during the site investigation and application review processes, every permit approval of a wind energy development has been appealed by individuals who feel that even in these areas of less significant resource value, the impact of a wind energy development is unduly adverse. Therefore, the Department believes any attempt to expand the expedited permitting area would be met with very strong resistance at the local level, and possibly at the state Legislature. Given the current level of development, it seems that there is ample opportunity for new development in the existing expedited area sufficient to reach the 2020 and 2030 statutory goals for wind energy development, especially considering the greater generating capacity of modern turbines.

Consideration of an independent siting authority to review wind energy development applications. The DEP has considered the advisability and desirability of an independent siting authority to consider wind energy development applications. While such an authority would provide welcome relief for staff currently involved in the review of proposed wind energy developments, there is insufficient development pressure to justify the increase in resources (i.e., staffing) that would be required for such a new organization. With uncertainty surrounding the future of the Production Tax Credit (PTC), and given the dependence of many wind energy developers on PTC-induced reductions in operating costs as a financial incentive to pursue a project, there is no way to predict the workload relating to these permits going forward. Finally, establishing a new organization to review permits would in no way assure that the number of legal challenges would diminish.

Wind energy should be part of an overall mix of cost effective renewable energy generation, rather than the prioritized source of renewable energy for the state.

Holistic Renewables Policy. With the passage of the Wind Energy Act in 2008 (PL 661, 123rd Maine Legislature; sponsor Sen. Bartlett), the Maine Legislature made a decision to prioritize development of wind energy. Energy market developments since release of the 2009 Energy Plan (i.e., the shale oil and gas revolution in the U.S., which has made low cost natural gas available, and contributed to the recent decline in global oil prices) have demonstrated that prioritizing any one energy source creates cost exposure. A more inclusive, integrated renewable energy policy that encourages the most cost-effective options would diversify the state's energy base, encourage renewable energy development, and accomplish this at a lower cost to all Maine ratepayers.

2015 Maine Goal for Wind Energy Development

Clarify the statutory language regarding expedited permitting to assist both applicants and state regulators, and to minimize the number of projects that undergo appeals and other legal challenges; revisit state's wind energy development goals with the goal of developing a more inclusive and integrated renewable energy policy.

Policy Recommendations

- ***Explore and/or adopt changes to the permitting requirements for both grid-scale and smaller wind power development projects.*** The recommendations listed below would provide more certainty to both applicants and regulators (the DEP), and would perhaps reduce the number of appeals and lawsuits associated wind energy developments. Further discussion of these recommendations can be found in Wind Energy Appendix 4, located at the end of this section.

    - *More time is needed for the Department to adequately and thoroughly review applications for wind energy developments.*
    - *Current law does not provide for adequate review of small scale wind energy developments. (less than 3 acres).*
    - *The studies on which the Department relies to identify the significance of Great Ponds as scenic resources for project impact review are outdated.*
    - *The Department should consider adding standards for scenic impacts to locally significant scenic resources.*
    - *The Department should consider adding standards for evaluation of potential impacts to culturally significant sites and activities.*
    - *The Department should formalize standards for shadow flicker impacts.*
    - *The Department should investigate the appropriateness of developing standards for impacts from low frequency sound generated by wind energy developments.*
    - *The Department should develop a list of pre-qualified contractors that have expertise in financial documentation to provide analysis of financial capacity demonstrations and financial guarantees relating to decommissioning costs.*
    - *The Department should require applicants to consider the potential effects of climate change on a project over its designed operational lifetime.*

- *The Department should conduct rulemaking to formalize the requirements regarding a decommissioning plan for a proposed wind energy development.*

- ***The process by which Maine host communities and affected neighboring communities receive the required community benefit packages could be improved to maximize allocation of benefits to those most affected.*** As stated above, current statute requires developers to provide a minimum package, but the benefits are: 1) not for the length of the project, and 2) benefits don't always accrue to all affected communities. The DEP has identified several opportunities to improve these benefits packages and their distribution:

  - *The minimum per-turbine value of a CBP is fixed in statute. This value should be allowed to grow over the life of a project, either with inflation or in some way tied to the value or physical size or generation capacity of the turbines proposed for a project.*

  - *Payments to host communities and affected neighboring communities under a CBP should endure for the life of the project, instead of sunsetting after 20 years. The annual payments should be required to at least meet the statutory minimum value, rather than allowing averaging over some longer period.*

  - *There should be a requirement that some minimum portion of a CBP be actually distributed to or invested in each individual host community and affected neighboring communities for a project, rather than allowing the developer to potentially choose to ignore one or more host communities for a project in favor of others.*

  - *There is no definition for an affected neighboring community in statute or rule. The Department should establish a definition to eliminate confusion during project design and review.*

- ***Revisit wind goals with the intent of establishing an inclusive, integrated renewable energy policy in the state.*** The concept of a comprehensive, integrated renewable energy policy for Maine, which is aligned toward the state's greatest challenges – reducing electricity costs for Maine businesses and households - has been discussed in the renewable energy section. The statutory goals for wind energy should be modified to align with such an inclusive, integrated policy.

Wind Energy Appendix 1 - Implemented Recommendations of the Task Force on Wind Power Development

Below are the 38 specific recommendations listed in the Report of the Governor's Task Force on Wind Power Development, issued in February 2008.

- ✓ Track progress toward achievement of state wind energy goals (state energy plan update)
- ✓ Clarify the benefits of wind power projects (Wind Energy Act)
- ✓ Identify areas where permitting for wind power development will be streamlined (expedited area - Wind Energy Act)
- ✓ Streamline permitting (Wind Energy Act)
- ✓ Within the area where permitting will be expedited in the unorganized territories, eliminate LURC's rezoning process with respect to grid-scale wind power project applications (expedited area-Wind Energy Act)
- ✓ Expedite permit processing at DEP (Wind Energy Act)
- ✓ Add energy expertise to DEP and LURC by adding the chair of the PUC or his or her designee as a non-voting member of BEP and LURC (Wind Energy Act)
- ✓ Supplement staff resources and expertise available for permit processing (consultants)
- ✓ Adopt and adhere to timelines for permit review in LURC territory (DEP now reviews all applications)
- ✓ Harmonize the regulatory processes used by DEP and LURC (DEP now reviews all applications)
- ✓ Refine LURC's approach and standards for the review of certain issues (authority transferred to DEP)
- ✓ Clarify state approach to noise and shadow flicker issues (administrative rules, Ch. 375(10)(noise); shadow flicker in permit submission requirements but further clarification recommended)
- ✓ Refine LURC's Comprehensive Land Use Plan (DEP now reviews all applications)
- ✓ Ensure tangible benefits for Maine people (statute for expedited)
- ✓ Ensure that all commercial wind power projects meet state rules regarding noise and setback (statute)
- ✓ Develop a model municipal wind power ordinance (available at DEP web page)
- ✓ Remove obstacles at the pre-construction stage (PUC administrative rules Ch. 313 and 324)
- ✓ Provide a data clearinghouse (in process at regional level – (Northeast Wind Resource Center)
- ✓ Provide financial incentives/economic assistance (Federal Production Tax Credit [PTC]; tax increment financing [TIF])

- ✓ Designate a facilitator within DOE/PUC to engage Maine schools in the Wind for Schools Program (GEO sponsored energy education program)
- ✓ Enhance the involvement of Maine's education system (UMaine Renewable Energy minors, wind turbine blade testing facility at UMaine)
- ✓ Continue current state energy policy-related efforts to ensure that diversification of the state's energy mix and development of transmission infrastructure benefit Maine (GEO, ongoing)
- ✓ Encourage developers' efforts to provide direct economic benefits to communities that host grid-scale wind power projects through preferential access to or favorable rates for power generated by the project (Spruce Mountain Wind)
- ✓ Actively explore opportunities to site and support the growth of wind energy-related businesses in Maine (Maine Ocean & Wind Industry Initiative)
- ✓ Encourage public-private partnerships to develop workforce capacity in Maine to support the wind energy industry (Maine Ocean & Wind Industry Initiative)
- ✓ Explore provision of incentives to communities that host grid-scale wind power projects through PUC's Efficiency Maine Program and the Carbon Savings Trust Fund (fund replaced with RGGI trust fund)
- ✓ To the extent Maine tribes wish to do so, explore potential state roles, if any, in addressing financing-related barriers unique to Maine tribes interested in development of commercial wind power facilities (DECD)
- ✓ Retain current state tax incentives for wind energy development (35-A MRSA §10112 REPEALED)
- ✓ Work with Maine's Congressional delegation to secure extension of the federal Production Tax Credit (PTC extended thru 2014)
- ✓ Aggressively pursue development of Maine's offshore wind potential (minimal restrictions on development)
- ✓ Streamline Maine's environmental laws as applied to offshore wind energy projects (statute provides for minimal reviews)
- ✓ Complete development of rules regarding leasing for large-scale projects and evaluate the potential for other wind power-related improvements to the state's submerged lands leasing program (12 MRSA §1862(13)(B)(6))
- ✓ Promote dialogue with coastal stakeholders about near shore and offshore wind power siting (Wind Energy Conference 2011)
- ✓ Develop guidance regarding siting of wind power development on state-owned submerged lands (NRPA)
- ✓ Monitor and continue involvement in federal regulatory program development regarding offshore wind energy development (finalized 2009, 2011, 2013)
- ✓ Help position Maine's universities and colleges, and private engineering and construction firms to become leaders in offshore wind power (DeepCWind Consortium)

- ✓ Increase understanding of Maine's coastal wind resource (DMR, MGS ongoing)
- ✓ Track technical advances in the wind energy industry with an eye toward potential regulatory and/or policy implications (GEO, ongoing)

Wind Energy Appendix 2 - Progress toward Meeting Wind Energy Development Goals

Operating Wind Energy Developments as of December, 2014

Project Name	Developer	Town	Towers	Capacity	Start Date
Mars Hill Wind	First Wind	Mars Hill	28	42MW	Mar 2007
Beaver Ridge Wind	Patriot Renewables	Freedom	3	4.5MW	Nov 2008
Stetson Wind I	First Wind	T8R3 NBPP	38	57MW	Jan 2009
Fox Islands Wind	Fox Islands Wind LLC	Vinalhaven	3	4.5MW	Dec 2009
Stetson Wind II	First Wind	T8R4 NBPP	17	25.5MW	Mar 2010
Kibby Mountain Wind	TransCanada Maine LLC	Kibby and Skinner Twps.	44	132MW	Nov 2010
Rollins Mountain Wind	First Wind	Lincoln	40	60MW	July 2011
Record Hill Wind	Independence Wind	Roxbury	22	55MW	Dec 2011
Spruce Mountain Wind	Patriot Renewables	Woodstock	10	20MW	Dec 2011
Bull Hill Wind	First Wind	T16 MD BPP	19	34.2MW	Oct 2012
Saddleback Ridge Wind*	Patriot Renewables	Carthage	3	8.55MW	Dec 2014

*Saddleback Ridge Wind partially completed, with 3 of 12 proposed turbines operating.

Wind Energy Developments Under Construction as of December 2014

Project Name	Developer	Town	Towers	Capacity	Start Date
Oakfield Wind	First Wind	Oakfield	50	150MW	2015
Passadumkeag Wind	Quantum Utility Generation	Carthage	14	42MW	2016
Saddleback Ridge Wind*	Patriot Renewables	Carthage	9	25.65MW	2015

*Saddleback Ridge Wind partially completed, with 3 of 12 proposed turbines operating.

Wind Energy Developments Under Appeal or Open to Appeal as of December 2014

Project Name	Developer	Town	Towers	Capacity	Start Date
Bingham Wind*	First Wind	Bingham	28	42MW	2016
Canton Mountain Wind*	Patriot Renewables	Canton	3	4.5MW	2016
Bowers Mountain Wind	First Wind	Carroll Plt., Kossuth Twp.	16	48MW	2016
Pisgah Mountain Wind	Pisgah Mountain LLC	Clifton	5	12.5MW	2016
Kibby Mountain Wind II	TransCanada Maine LLC	Kibby and Skinner Twps.	11	33MW	2016

*Bingham Wind and Canton Mountain Wind are awaiting expiration of the appeal window.

Wind Energy Developments Under Department Review

Project Name	Developer	Town	Towers	Capacity	Start Date
Hancock Wind	First Wind	Aurora	18	54MW	2017

Wind Energy Developments Not Yet Submitted for Review

Project Name	Developer	Town	Towers	Capacity	Start Date
Weaver Wind	First Wind	Eastbrook	33	99MW	2018
Fletcher Mountain Wind	Iberdrola Renewables	Concord Twp.	30	99.9MW	2018
Moscow Wind	Patriot Renewables	Moscow	25	75MW	2018
Number Nine Wind	Iberdrola Renewables	T3 R8	100	275MW	2018

Wind Energy Appendix 3 - Projections of Wind Energy Developers' Plans; Technology Trends, and Their State Policy Implications

- **Taller towers**
  Advances in materials, engineering and technology will allow project designers to achieve greater overall performance and higher capacity factors at wind power projects by allowing access to more reliable and stronger winds available at greater distances from the ground surface. Higher towers may be visible at greater distances, and may warrant changes to some criteria for impacts to scenic resources. Higher towers may also result in greater intrusion of rotors into travel corridors for migrating birds and bats, and may therefore present a greater risk to wildlife.

- **On-site fabrication of some tower components**
  Tower height is limited by the strength of the tower sections. Taller towers are heavier, and the lower sections must be strong enough to support the upper sections and the nacelle, while enduring lateral stresses from the wind at the project site. The strength of the sections is related to their diameter, and the maximum size available has been limited to the maximum size that can be transported on trucks from the manufacturer to the project site. New technology enables tower sections to be fabricated on site from sheet stock, in a temporary manufacturing facility. It is possible that such temporary facilities will have impacts not foreseen for traditional wind energy developments. Rulemaking or legislative action may be warranted to ensure that no undue impacts result from a project that utilizes this technology.

- **More powerful turbines, with longer blades**
  Existing wind power facilities in Maine utilize turbines rated typically from 1.5 to 2.85 megawatts. Projects currently approved but not yet constructed will utilize turbines rated at 3.0 to 3.3 megawatts. Manufacturers are delivering turbines rated at 6.0 megawatts for offshore installations, and there is no reason to presume that the trend towards larger and more powerful equipment will not continue. More powerful turbines require longer blades for operation, but they spin at slower speeds. This may reduce a project's potential impacts on birds and bats, and may increase project visibility from scenic resources, even if there is not a corresponding increase in tower height. This potential for increased scenic impact should be addressed by rule.

- **Longer expected lifespan for turbines**
  Improvements in turbine component design and materials are increasing manufacturers' estimates of the lifespan of units in the field. Some older projects with older technology have experienced decays in power output that have affected the economic viability of the projects, shortening their operating lifespan. Typically projects have been projected to operate for at least 20 years, but in some instances power production decreased sufficiently by year 15 to render the project unprofitable. Recent research in the United Kingdom indicates that the turbines

that comprise their current fleet of wind generators are expected to last 25 years or more, while maintaining a high power output. There is no reason not to expect that further advances will continue to extend the lifespan of new generations of turbines beyond that of the currently available models. The Community Benefit requirements for wind energy projects should be amended to reflect this potential for project lifespans greater than the 20 years currently mandated in statute.

- **Radar activated lighting**
  The Federal Aviation Administration (FAA) requires avoidance lighting for all tower structures above a certain height. Lights must flash at prescribed intervals to assure structure visibility to approaching aircraft. The FAA has been working on standards for radar-activated lighting, which would sense the presence of aircraft in the vicinity of a project, and activate the lights only for the period that the aircraft was within a certain distance of the project, thus reducing project visibility and scenic impact at night. Applicants for new grid-scale wind energy projects are required to employ the "best practical mitigation" to all project impacts, and this would likely include radar-activated lighting for these newer projects. It may be appropriate to retroactively require existing projects to upgrade their FAA-required avoidance lighting to a radar-activated system to mitigate existing nighttime visual impacts.

- **Offshore turbines**
  Offshore wind energy projects are being developed in great number around the world, and there is increasing pressure for expanded development of this resource. Maine's wind energy goals include development of at least 300 megawatts of offshore generation capacity by 2020, and at least 5,000 megawatts of offshore generation capacity by 2030. If development of offshore wind energy projects proceeds at a pace sufficient to meet the state goals, there will be a corresponding need to develop sufficient transmission infrastructure to accept and integrate the new power into the regional electricity distribution grid.

- **Greater emphasis on development of renewable energy due to federal regulatory changes**
  Federal policy on greenhouse gas emissions and climate change, and related rulemaking by the Environmental Protection Agency and other federal regulatory agencies, is leading the energy production sector away from its traditional reliance on fossil fuels for generation, and making renewable energy, such as wind power, more attractive. If this trend continues there will be increasing pressure on Maine to continue to expand the amount of wind energy production in the state, along with the associated infrastructure necessary to bring the electricity generated to market. If demand for new development becomes strong enough, it may be necessary to augment Department staff to accommodate the increased workload.

- **Climate-related changes in species migration patterns and abundance**
  It is not possible to predict with any certainty the specific effects that a changing climate may have on the local environment around a wind power project, or whether any such effects may significantly influence or be influenced by the construction and operation of the project. It is appropriate therefore, for project design to take into account the possible effects of a changing climate, including any potential changes in local species abundance and habits, as well as the possibility that new species may migrate to the area in response to pressures elsewhere. In some instances, a protected species not documented during environmental analyses conducted in the pre-development site evaluation phases of a project might colonize or otherwise utilize the project area after licensing. It is appropriate that in such an instance the Department should have a mechanism available to adequately address any potential adverse impacts to the species in question.

Wind Energy Appendix 4 – Recommended Changes to the Permitting Process for Wind Energy Developments

- ***More time is needed for the Department to adequately and thoroughly review applications for wind energy developments.*** The statutory time limit for processing an application for a Grid-Scale Wind Energy Development is 180 days, with an option to extend that period by placing a project "on hold", upon mutual agreement of the applicant and the DEP. The average time the needed to process these applications is 314 days, with some projects taking much longer. Extending the statutory deadline would give developers more realistic expectations when submitting applications, and allow regulators the necessary time to conduct public hearings and properly evaluate review comments and other information collected during the review process. It would also provide greater opportunity for public comment and participation during the review process. The DEP recommends the deadline be extended from 185 days to 365 days.

- ***Current law does not provide for adequate review of small scale wind energy developments.*** A small-scale wind energy development is only small in the sense that it does not alter enough land area to qualify as a grid-scale wind energy development. The towers, turbines and transmission lines used are generally the same size as grid-scale developments, but fewer in number. Nevertheless, the level of review is significantly reduced for small-scale projects, and statutory requirements regarding project operation are considerably less stringent. Small scale wind projects are not required to have a decommissioning plan in place, nor are they required to provide financial assurance for decommissioning. There is no review of the site's geology; no requirement for a Spill Prevention, Containment and Countermeasure plan; and no requirement for a fire protection plan. Scenic impacts from small scale wind energy developments are not subject to review. Because a small-scale project is not reviewed under Site Law, it is not required to meet the No Adverse Effects rule (CMR 06-096 Chapter 375), which would require review of potential impacts to birds and bats and other wildlife. There is also no requirement for a Community Benefits Package to provide tangible benefits to host communities and affected neighboring communities. The Wind Energy Act should be amended to require more stringent standards for small-scale wind energy developments.

- ***The studies on which the state relies to identify the significance of Great Ponds as scenic resources for project impact review are outdated.*** The Wind Energy Act identifies a great pond as a scenic resource of state or national significance based on its rating on one of two studies: Maine's Finest Lakes, published in October of 1989; and the Maine Wildlands Lakes Assessment, published in June of 1987. Neither of these studies was exhaustive, and in the more than 25 years since they were published, considerable development has taken place on some of the lakes in the studies. It is not unreasonable to expect that a lake that was remote and undeveloped in 1987 may in the interim have been developed with one or more lakeside subdivisions, and that this change may affect its status as a scenic resource under the criteria used in

the original study. The Wind Energy Act should be amended to require an applicant for a wind energy development to fund scenic resource evaluation studies of all great ponds within an 8 mile radius of the proposed development, using the same standards that were used in the original 1987 and 1989 studies. The studies should be carried out by independent evaluators under contract to the state, who can demonstrate that they have no conflict of interest with the developer.

- ***The state should consider adding standards for scenic impacts to locally significant scenic resources.*** Some communities have designated local scenic resources, which may be significant to the local economy or which may be historically significant or otherwise significant at the local level. This type of resource is not protected under the Wind Energy Act, and is therefore not addressed by DEP's review of potential scenic impacts from a proposed wind energy project. The state should consider whether it is appropriate to protect such scenic resources from unduly adverse scenic impacts.

- ***The state should consider adding standards for evaluation of a project's potential impacts to culturally significant sites and activities.*** The DEP has received comments from citizens concerned about the potential for development and operation of a wind energy project to interfere with traditional Native American religious ceremonies, or culturally significant sites with historical significance potentially dating back thousands of years. The Wind Energy Act does not provide for consideration of potential impacts to such cultural resources during the application review process. The state should consider the appropriateness of regulating project impacts to culturally significant sites and activities, and if appropriate, propose legislation or rulemaking to address the issue.

- ***The DEP should formalize standards for shadow flicker impacts.*** There is no quantifiable statutory or regulatory standard for impacts from shadow flicker. Department policy has been to use the industry standard of no more than 30 hours per year of shadow flicker at an affected protected location as a limit. DEP policy has also been to allow developers to use easements to demonstrate that a project has been designed and sited to avoid undue adverse shadow flicker effects as required by the Wind Energy Act. However, while Chapter 375 does provide for the use of easements in demonstrating compliance with sound limits, there is no provision for the use of easements in avoiding and minimizing shadow flicker impacts. The DEP should formalize the annual limit for shadow flicker impacts in rule, and should conduct rulemaking to either specifically allow or specifically disallow the use of easements to address shadow flicker impacts.

- ***The DEP should investigate the appropriateness of developing standards for impacts from low frequency sound generated by wind energy developments.*** Currently, DEP's authority to regulate noise from a project extends only to audible sounds generated by the project in question. During the application review period, citizens have raised concerns regarding impacts on human health from sonic vibrations at lower frequencies than the human ear can discern (infrasound),

which may be generated by wind energy developments. Published studies regarding the effects of infrasound from wind energy projects have found contradictory results, and the subject is very controversial in public discussions about wind energy. The DEP should review the published literature and independently determine the appropriateness of establishing a standard for allowable impacts from infrasound or other low-frequency sonic vibrations.

- ***The state should develop a list of pre-qualified contractors that have expertise in financial documentation to provide analysis of financial capacity demonstrations and financial guarantees relating to decommissioning costs.*** An applicant for a permit for a grid-scale energy development is required to show assurance that it has sufficient funds to develop the project as proposed, and to provide financial assurance for decommissioning costs (regardless of the point in time when decommissioning takes place). In order to ensure the accuracy and sufficiency of these assurances, the DEP should establish a list of pre-qualified contractors with expertise in the area of financial records and financial assurance. During project review, a pre-qualified independent contractor with no conflict of interest should review the financial submissions to determine their accuracy and sufficiency, in order to protect the interests of the state over the lifetime of these projects. The cost of the review should be borne by the developer.

- ***The state should require applicants to consider the potential effects of climate change on a project over its designed operational lifetime.*** To maintain consistency with ongoing statewide efforts to mitigate and adapt to the effects of a changing climate, developers of wind energy projects should be required to consider the potential effects of climate change on their proposed project design. The potential for such effects as increased frequency and intensity of storm events and consequent changes to runoff volumes; changes to migration habits for affected species of birds, bats and other wildlife; and changes in the wind resource itself should all be considered as reasonable possibilities during project design and review. This change should be accomplished through a modification of the application submission requirements.

- ***The DEP should conduct rulemaking to formalize decommissioning plan requirements for a proposed wind energy development.*** To allay public fears of "rusting hulks" on Maine's mountaintops, to protect project sites and their vicinity from degradation due to leakage of lubricants, hydraulic fluids and other hazardous materials that might be present, and to protect the state against any potential financial liability with respect to an abandoned project, it is essential that a proposal for a wind energy development should include provisions for eventual decommissioning of the project and restoration of the site. Currently, an applicant for a grid scale wind energy development permit is required to submit a decommissioning plan as part of the application package, but there are no standards defining what constitutes an appropriate and sufficient plan. The DEP should conduct rulemaking to create formal standards for decommissioning plans for wind energy developments.

Transportation Sector

Key Conclusions from 2009 Plan

1) In 2007, Maine was effectively 100% dependent on petroleum to fuel rail, truck, bus, marine, and automobile transportation fleets;
2) Unprecedented increases in the price of gasoline and diesel fuel in 2008 were taxing the budgets of Maine residents, and adversely affecting the viability of Maine businesses and industry;
3) Maine's economy had quickly become vulnerable to volatile energy costs over which the state had no control, resulting in the export of billions of dollars from the state just to pay for foreign oil.

Primary Transportation Sector Objectives of 2009 Plan

- Support and enhance state and private sector efforts for education and awareness of alternative transportation options and promotion of a low carbon fuel standard and fuel efficient vehicles;
- Support state transportation investments and encourage private investment for enhanced passenger and freight transportation;
- Encourage greater coordination of land use and transportation policy to reduce vehicle miles traveled and decrease greenhouse gas emissions;
- Encourage the development of ethanol-blend fueling stations.

Maine Action Since Release of the 2009 Energy Plan

- ***The use of ethanol has increased in Maine's transportation sector.*** Since the 2009 Energy Plan, the U.S. government has maintained requirements for the renewable fuel standard. This blending, coupled with increased fuel efficiency standards, has resulted in decreased transportation-related GHG emissions.

- ***Maine has reintroduced interstate passenger rail service, by establishing the Downeaster service from Portland to Boston.*** The rail service has recently been expanded, and now travels to Freeport and Brunswick as well as Portland.

- ***The state has assessed petroleum use in the transportation sector, including the greenhouse gas emissions produced.*** According to the Maine DEP, greenhouse gas emissions have declined well below 1990 levels. However, of the emissions remaining, the DEP estimates that over 45% originate from the transportation sector.

- ***The state has operated alternatively fueled transportation pilot projects in several locations around the state***. The state has operated a successful propane-fueled transit fleet (the Island Explorer) in the Bar Harbor/Acadia area since 1998. In 2006, the Portland METRO added compressed natural gas (CNG) busses, as well as a CNG fueling station; in 2011, the METRO added several clean diesel busses using Recovery Act and MDOT funds. In 2014, the Casco Bay Ferry Line began using a 20% biodiesel blend (from vegetable oil), which has fewer emissions, is slightly less expensive than regular diesel, and enhances engine performance & extends engine life.

- ***The state is expanding bus service to the Lewiston/Auburn area***. In 2015, MaineDOT will construct the Downtown Auburn Transportation Center that will serve the Lewiston-Auburn fixed route bus service, Citylink. The bus station will also provide a connection for passenger transfers to intercity transit. The station will be 1500 square feet with room for a warm seating area, two public restrooms and a break area for drivers. In 2016, MaineDOT also will construct an intercity bus terminal at Exit 75 in Auburn. The station will be serviced by Concord Coach Lines and offer on-site parking and bus connections to Portland/Boston.

Continuing Challenges

While the transportation sector comprises a significant portion of the state's petroleum consumption, most transportation infrastructure investments, from increasing public transportation, to greater use of electric vehicles, have significant capital and operating costs, and Maine does not currently have the population density to support many of these investments.

Maine's highly rural population. Maine has the distinction of having the greatest proportion of its residents residing in rural areas *of any state* in the country (Maine Energy Profile). Other states may have very large rural spaces, but most of the population does not reside in these areas. Approximately 800,000 of Maine's 1.3 million residents live outside the more densely populated areas. This creates significant challenges regarding capital investment decisions for public transit or for alternative vehicle infrastructure.

In addition to a highly rural population, Maine also has the oldest population, and it is aging faster than any other state. By 2030, it is expected that one out of every four Mainers will be over 65. In 2010, 28% of the state's over-65 population resided in a community served by fixed route public transportation, or a larger flex-route transit system. That means that almost three quarters of the state's seniors live in communities not served by public transit (Maine Statewide Strategic Transit Plan 2025). A passenger survey conducted for the transit plan revealed that seniors would use public transit, if it were available to them.

Technology for alternatively fueled vehicles has not progressed sufficiently for widespread adoption in the state. Electric vehicle technology has not developed enough to be practical for most Mainers. Battery life in colder climates, limited travel range on a single charge, and higher up-front costs currently make this transportation choice not a viable option for many Maine households. Likewise, the additional upfront costs of alternatively fueled vehicles for commercial fleets and long haul trucking, along with a lack of refueling infrastructure, have prevented more widespread adoption of alternatives to diesel.

In an effort to pilot new technology, MaineDOT purchased six hybrid gas/electric vehicles in 2010 for public transit agencies in the mid-coast and southern Maine region. The price of each vehicle was more than $50,000 over the price of a conventionally fueled 16 passenger bus. The hybrid/electric technology has also proven to be very problematic. Hybrid vehicle repairs are costly and require transit providers to travel to another state for repairs. Until hybrid technology for buses improves, MaineDOT does not anticipate purchasing additional vehicles.

Rail upgrades and new investments for both freight and passengers are costly, but have potential for growth in targeted areas. MaineDOT, in conjunction with the Northern New England Passenger Rail Authority, is currently proposing additional upgrades to the existing rail system to improve service, including the Brunswick layover facility, a siding at Royal Jct., construction of a wye track in Portland, and connections to the Thompson's Point Development Project. Due to the complexity in establishing new passenger rail service in Maine, MaineDOT convened a Passenger Rail Advisory Council in 2014. The Council's charter is to advise the State; develop criteria for evaluating rail projects; and, to prioritize current and future investments in passenger rail service as appropriate between the major economic and population centers of this State.

2015 Maine Energy Goal for the Transportation Sector

Make strategic investments in transportation infrastructure that the state's population density and economy will support. Cost-effective investments can reduce the sector's energy use, and provide alternatives to petroleum for targeted applications.

Policy Recommendations

- ***Follow the Department of Transportation's plan to make targeted rail investments to increase access for shipping freight by rail, and to augment the Downeaster passenger rail service.*** MaineDOTs three year work plan has numerous investments in rail service planned for both freight and passengers. Freight rail investments are ranked by economic and efficiency criteria, with input from local stakeholders, railroad operators and the public. Passenger rail investments are prioritized by MaineDOT and the Northern New England Passenger Rail Authority (NNEPRA). The DOT is also developing a long term state rail plan to determine what

investments are most promising from cost, safety, reliability, ridership, and economic development perspectives.

- ***Pursue public-private partnerships to increase inter-city bus service, and intermodal transportation in targeted locations and expand alternative transportation.*** MaineDOT has conducted a feasibility study to evaluate the options for expanding bus and rail service in selected locations, such as Lewiston to Portland and beyond. While most of these options have significant capital and operating costs, there may be opportunities to explore public-private partnerships for establishing a commuter or feeder service in selected locations. This infrastructure can be targeted to improve access to pedestrian, bike, and alternative transportation networks.

- ***Explore opportunities for public-private partnerships with large fleet owners to transition to alternative fuels, including natural gas, propane, and electricity.*** Fleet vehicles provide the state's best opportunity for adoption of alternatively fueled vehicles, as the cost of centrally located refueling infrastructure is lower. However, the cost of converting or purchasing these more expensive vehicles poses the greatest challenge to increased use. Public-private partnerships should be explored to increase visibility of these alternatives.

- ***Explore the opportunities to convert the state's ferry system to alternative fuels, including LNG.*** This option has been explored by the state of Washington, including a feasibility analysis. Assessments of risk and safety have also been performed, and presently the state of Washington is seeking approval from the U.S. Coast Guard to convert their ferry system to LNG. Conversion from diesel could provide cost savings as well as environmental benefits. Maine should explore this option for the state's ferry system.

State Government *(Lead by Example)* Sector

Key Conclusions from 2009 Plan

1) The rapid increase in heating oil, gasoline and diesel prices, and their deleterious effects on the state's economy, underscored the need to plan for energy emergencies – whether the emergency was from a weather event or volatile energy market conditions;
2) The state's dependence on oil, and its vulnerability to wildly fluctuating prices determined by a global market, illustrated the need for the state to become more energy independent, and to diversify its energy base;
3) Active interagency coordination on state, regional, and federal energy policies offers many opportunities to make more economically efficient, environmentally responsible and energy secure decisions regarding the use of state energy resources.

Primary State Government Sector Objectives of 2009 Plan

- Promote increased efficiency standards for all new construction;
- Support and implement energy audits for state facilities, and adopt energy reduction goals at these facilities;
- Adopt a goal for renewable power generation at State*;*
- Continue to promote and enhance training opportunities for energy auditors and weatherization technicians;
- Assist UMaine and other colleges with the use of biomass and biofuel cogeneration systems;
- Implement progressive energy policies applicable to state and local government;
- Continue to plan for Maine's energy independence;
- Continue to plan for an energy emergency.

Maine/Market Action Since Release of the 2009 Energy Plan

- ***Lower heating expenditures in state buildings.*** The state successfully completed a conversion of the Cross Office Building Complex and is on track to convert nearly 30 buildings in the region to natural gas.

- ***Install energy efficiency measures and heating system upgrades in many state buildings.*** In the last several years, the Bureau of General Services (BGS) has performed many upgrades in state buildings for which they are responsible. Below is a table listing the energy projects that BGS has completed over the last several years.

Building/Location	Efficiency Measure	Heating/Cooling System
East Campus		*Dual-fuel biomass boiler*
All Capitol area buildings		*Dual-fuel conversion (natural gas and oil) boilers, including replacement of inefficient boilers*
Bureau of Motor Vehicles	*Demand control ventilation* *Efficient lighting/motion control sensors (several areas & exterior)*	
Dept. of Transportation	*Demand control ventilation*	
221 State Street (DHHS)	*Demand control ventilation*	*Efficient boiler installation*
Blaine House; staff house; parking garage		*Heat pump installations*
Criminal Justice Academy	*Efficient lighting/motion control sensors (several areas)*	
Cross Building	*Efficient lighting/motion control sensors*	*Installation of a free cooling system*
Cultural Building	*Efficient lighting/motion control sensors*	
Daschlager	*Efficient lighting/motion control sensors*	
Mechanical Building	*Efficient lighting/motion control sensors*	
Maine Lottery	*Efficient lighting/motion control sensors*	
McLean Building	*Efficient lighting/motion control sensors*	
State Crime Lab	*Efficient lighting/motion control sensors*	
Medical Examiners	*Efficient lighting/motion control sensors*	
Various garages – capitol complex; pre-release; CF; state police	*Efficient lighting/motion control sensors*	
Tyson Building	*Efficient lighting/motion control sensors*	
Wellness Center	*Efficient lighting/motion control sensors*	
Sewall Street	*Efficient lighting (post lights)*	

- ***Adopt energy related state building code standards.*** In 2008, the legislature enacted LD 2257, "An Act to Establish a Uniform Building and Energy Code" (PL 699), which established a statewide building standards, including minimum energy efficiency standards (called the Maine Uniform Building and Energy Code, or MUBEC). Current statute requires the state to make periodic energy related updates to these standards http://www.maine.gov/dps/bbcs/. The code applies to all municipalities with populations of 4,000 or more, which covers approximately 65% of the state's population. The code does not apply to municipalities with populations under 4,000.

- ***Develop a list of energy priorities in state buildings.*** The State Bureau of General Services (BGS) has developed and updated a list of energy priorities in some state buildings. BGS has contracted with Honeywell to compile an updated energy cost report of Augusta area state buildings. This analysis provides a baseline of the energy costs in each building, from which an efficiency upgrade priority list can be compiled.

- ***Develop state energy assurance and emergency plan.*** The state developed its first energy assurance plan in 2011, using federal recovery act funding http://maine.gov/energy/pdf/Maine_Energy_Assurance_Plan_6_1_11[1].pdf.

- ***Anticipated technological advancements and markets for cellulosic ethanol and other biofuels have not materialized.*** The U.S. shale drilling boom has resulted in abundant volumes of oil and natural gas, in fact, the most domestic production in three decades. This has driven down the price of oil and natural gas to very low levels; the country's natural gas have increased substantially, and global oil prices are down over 50% over the last six months. More stringent motor vehicle fuel efficiency standards have decreased fuel demand, and markets are saturated with ethanol produced from corn. In addition, technologies to produce ethanol from paper making and agricultural wastes on a commercial scale have not advanced as anticipated. Finally, there is considerable political debate over the costs and consequences of an E-85 ethanol-gasoline blend, and the actual climate impact of ethanol produced from residues. All these factors have limited progress on the expanded use of biofuels.

Continuing Challenges

There are significant opportunities to increase the efficiency and decrease energy expenditures in state buildings, but the state lacks the up-front capital to address these deficiencies timely and most cost-effectively.

Fuel costs for state buildings highlight opportunities exist for efficiency. Fuel expenditures alone for the 78 buildings for which the Bureau of General Services is responsible (includes the university and the prisons) is approximately $500 million per year. With expenditures of this magnitude compared to the square footage, significant opportunities exist to increase efficiencies in electrical and thermal loads. However, BGS has historically made upgrades in only a few buildings a year, as the Bureau has been limited to appropriations for these purposes in the two-year budget cycle. A comprehensive assessment of efficiency opportunities has not been performed in all buildings, and funding sufficient to aggregate projects has not been available.

The state still needs to improve energy emergency planning.

Recent energy emergencies. Just in the last year, the state experienced a region-wide short term propane supply shortage exacerbated by recent, rapid market changes, which significantly altered the means by which liquid fuels are transported into Maine; and, all of New England continues to grapple with natural gas infrastructure constraints more severe than experts predicted. More focus is needed on planning for such contingencies.

Formalizing interagency participation and cooperation across all energy programs, policies and initiatives would improve the use of existing resources toward meeting the state's most pressing energy challenges.

Lead by Example by maximizing information dissemination throughout state government. The state has taken some efforts to increase information dissemination and increase interagency cooperation on energy challenges. The GEO has established excellent working relationships with Efficiency Maine Trust, the Public Utilities Commission, the Maine State Housing Authority, and the Department of Environmental Protection. Efficiency Maine Trust has worked with the Maine State Housing Authority to reduce program overlap and identify synergistic opportunities in use of energy resources. However, in our development of this plan update, the GEO observed areas where more formalized interaction could be of benefit in deploying limited state resources in the most efficient manner.

2015 Maine Energy Goal for State Government

Develop and implement a plan for installing widespread energy efficiency upgrades in state and local government buildings, and improve the planning process for energy emergencies.

Policy Recommendations

- ***Develop comprehensive assessment of potential energy improvements in all state buildings, and develop a list of energy priorities.*** The Bureau of General Services has assessed the energy use in state buildings in the Augusta area, but has not had an opportunity to assess the universe of cost-effective efficiency opportunities in each building. This assessment would allow the state to competitively bid aggregated projects to accomplish upgrades in the most cost efficient manner as possible. A similar process should be followed for state buildings outside of the Capitol area.

- ***Develop and implement financing method to fund aggregated energy efficiency projects in all state buildings.*** The current two year budgeting process is not aligned with a more efficient and timely method of installing energy efficiency upgrades in state buildings. The state should explore options for leveraging a state appropriation to access greater amounts of capital, so that larger and/or aggregated projects can be financed and installed more timely. The program would be developed so that energy savings would pay for the improvements over time. Once a financing model is established, the model could be duplicated for local government building improvements.

- ***Provide the state the ability to collect information about all winter fuel deliveries into the state, in order to anticipate and prevent supply disruptions.*** The state currently has limited ability to track fuel deliveries into the

state, particularly by rail. This makes it challenging for the state to act proactively when deliveries are delayed or when supplies are tight. Routine data collection on fuel deliveries would enhance the state's ability to address infrastructure and delivery problems before it becomes an emergency situation.

- ***Formalize working relationships between state agencies on energy challenges.*** Interagency coordination and information dissemination could be enhanced in several areas. Participation by the Public Utilities Commission on the Efficiency Maine Board of Directors could provide an additional perspective on energy challenges; formalizing interaction between all agencies involved in the deployment of Regional Greenhouse Gas Initiative (RGGI) funds may result in more transparency in the use of these funds; establishing periodic review and discussion of energy programs by multiple state government agencies may result in more opportunities for synergy among programs, use of funds, and agency objectives.

Public Comment

The Governor's Energy Office solicited comments from the public during the development of this update. Below are the comments the Office received. Some have been edited for spelling and grammar.

- **Antonio Blasi** - Bring as much hydro power (on and off shore) into the mix as practical. Invest in state-of-the art fish ladders to accommodate the existing industry. Invest in solar and more hydro. Repeal the Expedited Wind Energy Act. Give county commissioners veto power over new methods of site location of development permits.

- **Ken Porter, Bowdoinham** - Please consider a natural gas expansion plan, where the consumers pay toward the running of the gas lines. I live about three miles from the lines. I am not rich. But I would have no objections to paying $10, 000 toward getting the lines extended to my house. I have neighbors that I am sure would sign onto a plan where consumers pay extra to have the natural gas run to their homes. Years ago, CMP had a plan where new customers requiring new poles down the public road, paid extra each month till the poles were paid for!

- **Gina Hamilton, New Maine Times, Bath** - There is one issue I'd like to see addressed. Maine is a state of mostly independent homeowners who need little more than a little financial assistance to do what needs to be done and a little bit of information. In part to stimulate the building trades industry, there was an effort back in 2008 to get everyone "audited". Energy audits are useful things, and may be a good starting place for people who have no idea how their house really works. But most homes don't need an audit; they simply need to have a few low-hanging fruit issues addressed. In short, the goal to winterization or weatherization is to plug up gaps that open the home to the elements, and most of us have more gaps than we'd care to think about. Anywhere that opens to the outdoors is a gap, so making sure there are no gaps around windows and doors, no leaks around unused chimneys, putting in gaskets around switch plates and outlets, sealing up places where pipes go through walls, making dead air space between thin windows and your rooms by covering windows with plastic or reusable indoor or outdoor storm windows is the first step for anyone, energy audit or not. The next step is to determine the amount of insulation in roofs, basements, and walls that are necessary to keep the home comfortable. Insulating a cold basement's ceiling — the floor of the living space — by a plastic vapor barrier on the warm side and rolled fiberglass insulation on the cold side or rigid foam insulation on the cold side is a relatively cheap fix. Blown-in cellulose insulation into walls and roofs can increase the R-value — the amount of thermal resistance the home has. An R-value of 1 means there is very little resistance to heat flow. In Maine, roofs should have an R-value of 49 or more. Fortunately, this is neither difficult nor expensive to achieve with blown-in cellulose insulation, but if the household is paying a professional to tell them that instead of paying to get it done, the energy audit is little more than a curiosity. While audits are still an important part of a large-scale renovation project, for basic weatherization projects, they're mostly unnecessary, as people are learning more about the way energy flows through their homes. A short 20 minute talk online, or a free pamphlet could address the issues for most do-it-yourselfers. Requiring a professional for most of the work simply causes a larger expenditure than is necessary. Putting together a program for people who are adept at doing this basic work — either a system where people can pick up materials to do the work and borrow equipment to do it, or a system that pays for purchases to do the work, would be very cost effective, encourage neighbors to work together to fix their issues, and solve most of the basic weatherization issues

that Maine homes face. What we'd like to see is a separate program for people who can solve most of their own energy issues, independent of professionals, to keep costs as low as possible. Perhaps an auditor can come and meet with the household, hear their plan, approve the expenditure, and return in several months' time to be sure that the work had been completed. Save the full audit for when a house is being built or being fully renovated.

- **Karla Hunter, Bucksport** - When we first moved to Maine, our home consumed 5 tanks of oil per year, 3 of those during the months of November through February. We filled in all the gaps that we could find with expanding foam. We sealed cracks and crevices with caulking. We reduced the use of fuel oil down to 3 tanks of oil (at 275 gallons per tank). We replaced an inefficient basement window and continued to seal what leaks we could find. We managed, on our third year here, to reduce our oil consumption to 2.5 tanks per year. Then we added a wood pellet stove a few years ago. During last year's extremely long and cold winter, we used just one tank of oil. We spent $1000 on oil and $1250 on wood pellets. This means we have saved $0.00 over the years, and in fact are spending more on heating costs than ever because of price increases over that time. We are just barely able to afford this so we are quite concerned that alternatives should be found. Our home should be weatherized, but the cost is prohibitive. We believe that the focus of decreased use of foreign oil should not be on finding alternative fuels alone, but on being more efficient in the fuel usage, whatever its source. To that end we support weatherization efforts for existing buildings and incentives to greater efficiency in any new structures. We do see the need for alternative fuels as fossil fuels are by their nature, finite (including natural gas, propane, and coal--whose extraction methods are less than ideal). We would like to see more focus on solar and wind power generation.

  After reading the extensive report on energy use and reduction plans we are aware that the major contributor to oil consumption is transportation. Though we are unaware of the infrastructure that currently exists and what would be needed to bring it into usable condition, the rails would seem to be a more efficient (?cost effective) method of moving freight throughout the state than trucks, although trucks that were more efficient in themselves would go a long way to helping. From observations I see lots of trucks that still sit idling during their down time, a great waste of fuel. Also the railroad engines that sit down at the paper plant run idle all day and night. Surely there must be a better use of fuel. There must be a way to restart these engines if they were to shut down during their wait for cargo. The pollution emitting from these idling engines is not good either.

  There were a couple comments throughout the report of adding a surcharge to oil to pay for weatherization efforts. This is taxing the people who are already hard hit to pay for the oil they currently use and may result in someone going without heat or choosing paying their oil bill to stay warm over such other necessities as food or medicine (as we have had to do more than once). This would be unbearable.

- **Don Tibbetts, Norway** - I believe Maine should be looking at its rivers to maximize electricity from those sources, developing a natural gas delivery system that can, over time, be expanded to serve most, if not all, citizens of our state and be looking at development possibilities to utilize ocean currents, such as the bay of Fundy or the gulf stream. I also believe the law should be changed requiring a high percentage of our power be produced by renewable sources such as wind and solar, which are clearly not developed to the necessary efficiency capablities to be cost effective. Hydropower technology already exists, as does natural gas delivery technology and the cost would be borne by private industry, not the taxpayers of Maine. Not requiring a high percentage of renewable energy would also allow us to obtain the cheapest power rather than

the most expensive. I also believe Maine should investigate the feasibility of oil delivery pipelines. If properly done, they would be non-invasive and environmentally safe. Anyone who thinks it is safer to ship crude petroleum by rail or truck need only look at Lac Megantic and the numerous truck accident spills that occur. I would contend that pipelines are a better, safer choice that shipping by ocean carrier, as there have been serious repercussions there as well. We need to use a common-sense approach to energy rather than a "what makes you feel good" approach.

- **Karen Brown Mohr, Portland** - I have been following your press: Energy Office Seeks Proposals to Assess Maine's Unrealized Hydropower Potential with New Technology. I have attached something that was in the Post that may be of interest to you. Dave Emery, David Clough, Floyd Rutherford and I did an inventory of all rivers in the US a few years ago. Our research showed tremendous opportunity to generate additional power in Maine. I am pleased that the state is looking at this important issue. This data is just the first step to develop a strategy that is needed in the US. At some point I hope to be in the state and perhaps I could discuss this study with your office. http://www.washingtonpost.com/blogs/capital-weather-gang/wp/2014/07/23/how-a-solar-storm-nearly-destroyed-life-as-we-know-it-two-years-ago/

- **Paul Sheridan, Northport** - I understand that the Governor's Energy Office is updating Maine's Comprehensive Energy Plan and is seeking comments from the public on how the state should plan for the next decade. I further read that the office is still undecided about whether to hold a public hearing. I am writing to suggest to the GEO that there are many things to be learned from many of Maine's citizens: its carpenters, designer, contractors, architects, and engineers. In reviewing the 2008 Comprehensive Energy Plan as well as the 2013 oil reduction assessment report, I see very little emphasis put upon the two largest (and quickest payback) methodologies for a sensible, sustainable energy plan: increasing conservation and maximization of insulation. With all due respect, members of your office needs to get out of the State House's stuffiness, and into the fresh air of town halls. You need to schedule a series of public hearings, in all regions of the state to make the best use of the collective knowledge of Mainers.

- **Brad Sherwood, Professional Home Projects, Maine Employee Ownership Network** - I recommend having public hearings on a revised energy plan for the principles of transparency and government representing the wishes of the people, to which it belongs. Here are three comments I have concerning Maine energy policy. 1. Maine should protect itself from the potential long term shutdown caused by a major solar flare. We are fortunate to have been missed by solar flares for the past 120 years but cannot rely upon the hope it will never happen again. If we install surge protectors at our major substations we can avoid this. One of our legislators has researched this thoroughly already. I don't remember her name. 2. Energy efficiency. This has been very helpful to our energy security and needs continued emphasis. Japan has a law that requires every device using electricity to be more efficient than previous models. 3. Subsidies should be considered as a public investment and lessons can be learned from the subsidies that were invested into the oil industry in the early 1900's. First, they helped the industry to achieve the critical mass to become self-sustaining and improve the technology. The same dynamic is being repeated by the renewable industry. Second, that 100 years later the oil industry bullies Congress into continuing them. We should end the subsidies for the oil industry and establish a 20 year plan for ending renewable subsidies by stages.

- **Richard Paradis, Farmingdale** - Minimize solar and wind energy except for very limited research. Maximize nuclear and natural gas. Move from an utopian world to reality for economic expansion to provide jobs for the young folks we spend so much to educate. To spend yourself broke to achieve a unrealistic energy free future is plain stupid. And, thank God Governor LePage ran for Governor and was elected. I hope he is reelected by an even greater margin this time. He has my vote.

- **Janet Williams, Searsport** – When considering an updated energy plan, I urge you to push for increased support for renewable energy sources – solar, wind, and waves. There is so much potential to produce cheaper electricity and boost the Maine economy by selling electricity to other states. The oil industry has received subsidies for years, and continues to receive subsidies even though it is swimming in profits. Renewable energy deserves the same help. Also, please support all efforts to winterize and make energy efficient the thousands of old homes in Maine, which saves money and cuts down on energy use. Fossil fuels must be phased out and all subsidies to those industries must be stopped. It is vital that Maine refuses to cooperate with Stephen Harper's government in its efforts to export Canadian tar sands oil. For the sake of the environment and climate change, that oil must stay in the ground.

- **Sandi Hennequin, New England Power Generators Association, Boston** – comments available via hyperlink

- **Steve Leahy, Northeast Gas Association, Needham MA** – comments available via hyperlink

- **Andrea Chartier, Belfast** - I understand the Governor's Energy Office (GEO) is updating Maine's Comprehensive Energy Plan and is seeking comments from the public. Here are my comments. I would like to see incorporated into the new plan the following 4 items: 1) The greatly reduced use of fossil fuels for energy and heating and the greatly increased use of renewable energy such as solar, wind, and geothermal; 2) A great increase in research for better energy storage (to compensate for times when solar and wind energy are not immediately able to meet energy needs); 3) A great increase in research for a better windmill (one that doesn't kill birds, isn't noisy, and can make use of very low wind speeds as well as withstand higher wind speeds, such as the cylinder-style windmill); 4) A great increase in the use of direct solar heating of homes, businesses, and water used for washing or heating (as opposed to the less efficient use of electricity converted from solar or wind power to heat buildings and water).

- **Carrie Annand, Biomass Power Association, Portland** – comments available via hyperlink

- **Jeff Marks, E2Tech, Portland** - On behalf of the Environmental and Energy Technology Council of Maine (E2Tech), thank you for the opportunity to provide public comments regarding updates to the Maine Comprehensive Energy Plan. E2Tech and its partners have performed extensive analyses on the environmental, energy and clean technology sectors in Maine. We evaluated the sectors' economic impact, discussed the trajectory of the cleantech sector, and developed a strategic plan for E2Tech to improve and tailor its activities to serve its members, provide value, and help expand the clean technology sector in Maine. We believe these materials will be useful to you as you revise the 2008 Energy Plan and prepare recommendations to reduce energy costs, expand cost-effective and clean energy to power and heat our homes and businesses, and invest in companies that will promote economic

development and jobs in the State. Our comments and materials are focused almost exclusively on economic and business development scenarios, issues and outlook.

Attached to these comments are the following documents for your review:

- Cover Letter with comments and references to supporting materials
- *Business Climate for Maine's Clean Technology Sector 2013*
- *The Clean Technology Sector in Maine 2013*
- *The Trajectory of Clean Technology in Maine and Beyond*
- *Maine Clean Technology Business & Economic Development: Strategic Plan 2014*

The above documents are accessible via hyperlink.

- **Glen Marquis, Ocean Renewable Power Company, Portland** – comments available via hyperlink

- **Jeremy Payne, Maine Renewable Energy Association, Augusta** – comments available via hyperlink